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Multiple Perspectives on Effective Learning Environments

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ABSTRACTS

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This book provides the abstracts for papers, symposia, panel discussions, interactive poster presentations, CIT sessions and thematic poster presentations of the EARLI 2005 Conference.

Abstracts are in chronological order by slot number of dates.

A list of participants' e-mail adresses is included at the end.

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Junior Researchers of EARLI (JURE) Pre-conference

Workshop 1
Conversation Analysis
Alan Zemel,
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Conversation analysis studies the order/organization/orderliness of social action, particularly those social actions that are located in everyday interaction, in discursive practices, in the sayings/tellings/doings of members of society (Psathas, 1995, p. 2).
- As analysts, we concern ourselves with the local relevance of actions to the participants themselves.
- Why?
- Because we do not possess a privileged view of social action.
- What is the basis for this claim?
- Because we use the same tools, methods and procedures for doing sense making work that are used by the interactants whose actions we observe. CA is an analytical methodology that attempts to describe the actions of participants in terms of the relevances demonstrated by participants in and as their interaction (Ten Have 1999, Psathas 1995, Pomerantz and Fehr 1997). This methodology privileges the perspective of the participants over the analyst's perspective (Pomerantz and Fehr 1997). Actions are seen as situated within a stream of ongoing action and are sequentially organized. Furthermore, conversation analysts presume that actors design and 'customize' their action for the particular circumstances in which they are accomplished. In this workshop, we will discuss some of the basic principles of conversation analysis and ethnomethodology and engage with each other and data in a data session. Through this work, we will consider how to analyse different kinds of interactional data (video, audio, chat logs, etc.), and try to identify specific mechanisms by which participants do sense-making together.

Workshop 2

Cognitive Measurements to Design Effective Learning Environments

Fred Paas[1] and Slava Kalyuga[2]
[1]Open University of The Netherlands,
[2]University of New South Wales, Australia

The aim of researchers in the field of Cognitive Load Theory (CLT) has been to engineer the instructional control of cognitive load to provide the means to optimise cognitive load in learning arrangements. In this workshop, the current state of cognitive load measurement in the CLT context is presented. Specifically, the different measurement techniques are described with respect to their contribution to the theory. First, the construct 'cognitive load' and related concepts are defined. Then, the instrumentation for the measurement of cognitive load is explained and an overview is presented of the different measurement techniques that have been used in cognitive load research. Special attention is given to computational approaches for visualizing the relative mental efficiency and involvement of instructional conditions based on mental effort and performance measures. Finally, the role of cognitive load measurement in the advancement of the theory is discussed.

Another point of focus in this workshop is the possibility to use cognitive load based measurements to design learning arrangements that manage and present complex instructional information in flexible, accessible, and learner-individualized formats. Cognitive load experienced by learners depends significantly on their prior knowledge and experience. Therefore, instructional methods need to change dynamically with alterations in expertise to reduce extraneous and increase germane cognitive load during instruction. To optimise cognitive load in adaptive learning environments, it is necessary to have a simple, rapid measure of learners' knowledge suitable for real-time assessment of expertise. The workshop will present some preliminary results of developing and applying a schema-based rapid method of evaluating learners' knowledge structures in several task domains (algebra, arithmetic word problems, kinematics, reading skills) based on cognitive load theory. This diagnostic technique is based on evaluating an immediate content of memory as learners approach a task or solve a problem.The workshop will also discuss the suitability of several methods of combining rapid measures of learners' performance with measures of cognitive load into integrated indicators of instructional efficiency for optimising adaptive e-learning environments.

Workshop 3

Analysis of Hierarchical Data
Johannes Hartig, German Institute for International Educational Research,
Germany

Hierarchical data structures are a common phenomenon in educational research. For example, a population of interest may consist of schools, classrooms, and students within classes. For empirical research questions, schools may be sampled from the population and students may be sampled within the schools. In such samples, the data of individuals within the same schools are not independent. Standard statistical analysis techniques like linear regression or analysis of variance do not take into account these dependencies, and results obtained by these methods are biased. Furthermore, data can be collected on all levels of the hierarchy: Variables describing students can be assessed on individual level, and additionally information characterising schools or classrooms may be obtained by teacher questionnaires or classroom observations. Statistical analysis procedures are needed that can take dependencies of data within groups into account and that allow to simultaneously handle measurements made at different levels of the hierarchy. The workshop will give an introduction into the nature and handling of hierarchical data structures. Specifically, the basic ideas of hierarchical linear regression and multilevel structural equation modelling will be outlined and illustrated. Additionally, an overview of statistical software available to conduct analyses with hierarchical data will be given. The workshop is open to all participants who are interested in the topic, though it might be helpful to have some knowledge of qua ntitative analysis techniques.

Workshop 4

Item-Response Theory and Standard-Based Assessment
Nina Jude,
German Institute for International Educational Research, Germany

At present, a trend towards standard-based educational reforms and corresponding assessment approaches can be observed throughout Europe. By setting standards and monitoring students' levels of competence
using standard-based assessment, policy makers hope to identify strengths and weaknesses of the educational system, to increase the overall outcome level and to reduce inequalities. For these evaluations, tests and questionnaires are developed, presupposing that one can more or less directly infer a person's position on a

competence scale from his/hers responses to the tests. In contrast to traditional testing approaches, latest educational assessments use measurement models basedon Item-Response-Theory. This allows for a linkage between the specific skills being assessed and the actual competence shown by the test-takers, as those models assume a probabilistic interrelation between answers on test-items and the underlying latent competence. In IRT-based tests, test taker abilities and item difficulties are estimated on the same scale, thus making it possible to describe students' competencies directly using item demands. Good examples are the tests used in PISA 2000 and 2003 with their linkage of specific items to sections on the competence scales. This enables sophisticated statements about levels of competencies Ð the standards - achieved by the students and also about still-to-reach steps in the learning process. Furthermore, standard-based models of competence that imply theoretical assumptions about item difficulties due to their cognitive demand or their reference to the curriculum can be tested empirically using IRT-modelling.

The workshop will provide an overview over the basic principles of Item-Response-Theory in contrast to Classical Test Theory. Practical examples for standard-based interpretation of competence scores will be given using samples from the PISA studies. The workshop is open to all participants who are interested in the topic, though it might be helpful to have some knowledge of psychometric statistics.

Workshop 5
Qualitative Research Interviewing: Free Attitude Techniques
Gert van der Westhuizen, University of Johannesburg, South Africa

The focus of this workshop is on the concepts and processes of Free Attitude interviewing. The purpose is to familiarise participants with this approach as a form of non-directive depth interviewing. Emphasis is placed on specific techniques of probing and reflecting of information. The workshop is offered to a group limited in number. It is experiential, and some sense-making activities are included. Apart from the questioning techniques, specific interviewer qualities such as open-mindedness, respect, and listening are emphasised.

Workshop 6
Quality Control in Qualitative Research: Audit for Determining the Trustworthiness of Educational Research
Wilfried Admiraal and Sanne Akkerman,
University of Utrecht, The Netherlands

Qualitative research mostly is characterized by complex studies in which standardized procedures and rules for the collection and analyses of data cannot be used to solve the research problem. Research methodologies in this kind of research often trigger much interpretation of the researcher, collecting real-life data from different sources and analysing this data iteratively. Criteria of transparency (are research decisions made explicit), confirmability (are research decisions justified and grounded) and dependability (are these decisions acceptable according to rules and standards in the particular domain) are more difficult to reach. Up until now, there is not much literature on how to control the quality of this kind of qualitative research. We suggest an audit procedure described as a procedure in which the scientific quality of the study and the research process is verified by an assessor on the basis of a priori guidelines.In this workshop, the participants will set up an audit trail for their own research project. This means that they have to decide what quality criteria they will use for their research project, which documents they will put in the audit trail, who the auditor will be, what tasks and roles the auditee and auditor will have, how the auditor will perform the audit, and how they proceed with the audit procedure and the results of it. Participants will work in small groups of 3 or 4 on their audit. Participants are asked to prepare for this workshop by reading a paper on the audit procedure and describing their research project in about 250 words.

Workshop 7
The Process of Writing Scientific Articles
Kirsti Lonka, Karolinska Institutet, Sweden / University of Helsinki, Finland

The problem with teaching academic writing is that important tacit knowledge, silent and procedural in nature, is generally left untaught. According to Boice (1993), part of the problem is that university professors prefer demonstrations of brilliance rather than the acquisition of it, and this preference denies many students the chance to become successful writers. One reason for this is that tacit knowledge is, by definition, hard to teach and difficult to find in written and substantive form. This workshop is very practical. The aim is to describe typical thoughts about scientific writing that may hinder success. The second step is trying to eliminate and modify

these thoughts in a way that promotes productivity and creativity in a research team. In academic writing, the sociocultural view (Dysthe, 2003) emphasizes that knowledge and understanding are constructed in social interaction. Second, language is the key cultural tool, which mediates learning. Third, learning takes place in 'a community of practice' that also includes well functioning group processes. Fourth, because knowledge is always situated, motivation to learn is largely dependent on the learning culture. Every research group creates its own specific learning culture. I claim that in many cases, the culture does not support the process of writing in the context of educational psychology and education. One problem is that the idea of a research group may appear strange and researchers do not develop social practices that would support publishing in international refereed journals. In this workshop the idea of process-writing is applied in the setting of writing scientific articles. My approach is a combination of courses in cognitive strategies with generative writing and shared revision, whereas practical advice on stylistic rules and grammar are not emphasised. The aim of the intervention is to reveal and then revise practices and ideas of writing that usually remain tacit. The theories and methods are applied by Bereiter and Scardamalia (1987), Olson (1994), Bjørk & Røisønen (1996), Boice (1993); Tynjøl?, Mason, & Lonka (2001), and Lonka & Ahola (1995). The idea is to put these theories in action in a very demanding real- life situation. The methods are focused free-writing exercises, using multiple drafts, training peer-feedback strategies, revealing the myths and revising mental models of writing (for instance, by sharing research evidence on writing making tacit knowledge overt to discussion, and reflecting on the participants' own writing practices and cultures).

Paper session 1: Interaction Patterns and Classroom Practices
Chair/Discussant: Senem Sanal-Erginel, Middle East Technical University, Turkey

Variation Theory as a Tool for Planning and Analysis of Literacy Lessons in Swedish Education
Laila Gustavsson, Kristianstad College University, Sweden

In this paper results from a praxis-oriented research project, which aims to focus on teachers' development during an in service training, is presented. The raised question is if and how teachers' in service training affects pupils' learning. By the introduce of a theory about learning, the variation theory, the teachers gradually develop a more powerful understanding about the connections between what they do in the classroom and what pupils actually have possibilities to learn. The more

developed understanding is shown by the way the teachers discuss instruction and pupils' learning in a theoretical way, together with the outcome of results shown by the pupils when they take tests about the learning object. The used method is learning study. In this paper results from the first and third learning study cycles (2x3 lessons) in Swedish as a first language will be presented, to show how the theoretical insights about learning have changed and developed. Secondly the results of the pupils' learning outcome are presented to give a picture of if and in what way the teachers' development is connected to the learning outcome shown by the pupils.

A Methodology for Analysing the Relations between Interaction Patterns and Modes of Talk in the Classroom
Hayuta Yinon, Haifa University, Israel

As part of a study, that investigated relations between interaction patterns and modes of talk in frontal language lessons in one seven grade classroom in northern Israel, a unique method of analysis was developed, which allowed for examining modes of talk in relation to interaction patterns in the classroom. The data comprised of interviews with language teachers and pupils, observations of lessons, and collection of school documents. This qualitative study adopted a classroom discourse analysis approach, and followed grounded theory procedures. As a result, the new method of analysis was developed. The method includes several stages. The main stage is based on identifying 'interaction cycles' in the observations, a new construct that emerged from the study, and which defined the completion of an entire cycle of the IRE/F sequence. The uniqueness of the analytical tool can be attributed to three factors. First, it is pioneer in that it allows for analysing classroom discourse in relation to interaction patterns and modes of talk. Second, the method allows for tracking of the inner dynamics of classroom interaction, which is usually only recognized by its actual participants. Third, the method allows for interpreting any kind of event in the classroom.

Innovating Mother-Tongue Education in Pre-Vocational Education: Fostering a Community of Learners
Anne Toorenaar and Gert Rijlaarsdam, University of Amsterdam, The Netherlands

In Dutch pre-vocational education teachers of mother-tongue education (L1) are focussed to innovate their educational practice. They deal with students with motivational problems and a poor level of communicative competences. To improve this, L1-teachers look for a meaningful and rich context Ð linked up with the vocational

program - in which students cooperatively acquire and reflect on their communicative competences in realistic whole language tasks. By doing so, students should be able to connect the different practices Ð L1 ?vocational program ?internship Ð in which they participate as language learners and users. This innovation links up with the concepts of 'community of learners' and 'community of practice'. In the next two years, researchers and teacher will furtherance the L1-innovation and elaborate a conceptual framework based upon the two concepts of 'community of learners' and 'community of practice'. This paper shows the results of the first case study. In two schools (4 teachers, 4 classes 9th grade) data has been gathered by observations and stimulated recall interviews. Results shows in what way and to what extent learning activities of students and instructional behaviours of teachers Ð needed to transform the classroom into a community of learners - have already taken shape.

Paper session 2: Competency Assessment
Chair/Discussant: Judith Gulikers, Open University of the Netherlands

Students' Self-Assessment on Their Competencies in Mathematics - Development of the Questionnaire COMA
Holger Gaertner, Free University Berlin, Germany

The goal of this study is to construct a reliable and valid questionnaire that provides teachers with information about several mathematics-specific competencies of their students. These competence domains (subject, methodical, personal and social) correspond to recent German curricula for teaching mathematics. The four competencies were operationalized as follows: The methodical competence comprises work-organization and self-assessment ability. The social competence includes co-operation, communication as well as the ability to handle criticism. The personal competence includes mathematics-specific interest, self-concept and self-efficacy. The subject-specific competences were measured with items according to the educational standards of the curriculum. 24 classes (grade 5-8) participated in this study (N=499). The reliabilities for the different scales were between .63 and .87. The confirmatory factor analysis (CFA) supported the assumption that the questionnaire measures the four domains of competence (RMSEA=.08; CFI=.96). In addition, the CFA revealed high inter-correlations between the four domains of competence, which were particularly high for elementary school students. In comparison, Secondary school students judged their subject competence as more independent from the other competencies. As expected, the class means differed by grade, especially on the subject competence. Teachers participating in the study confirmed that all

relevant aspects of the new curriculum were covered.

Output Orientated Course Evaluation: Berlin Instrument for Evaluation of Students' Competencies
Edith Braun, Free University Berlin, Germany

Because of the lack of output orientated questionnaires for higher educational courses a new evaluation instrument has been developed. This instrument, so called Berliner Evaluation Instrument of Students? Competencies, measures the subjective gain of competencies in four areas. The areas of competencies are following: knowledge, methodology, social skills (meaning communication and cooperation skills), and personal proficiency. In winter 2004/05 this instrument was used in 396 courses at six universities in Germany. 1901 student responded which is a total of 3413 completed questionnaires because students visited several courses and filled it out more often. The classical test criteria are fine; especially the confirmatorical factoring verified the theoretical areas of competence. Furthermore the internal consistencies of the scales are good.

The Wheel of Competency Assessment: Presenting Quality Criteria for Competency Assessment Programmes
Liesbeth K. J. Baartman, Theo J. Bastiaens, and Paul A. Kirschner,
Open University of The Netherlands

Instruction and learning are increasingly based on competencies, increasing the call for assessment methods to adequately determine competency acquisition. One single assessment method appears not to be sufficient, necessitating a Competency Assessment Programme (CAP) that combines different methods, from classical methods to recently developed alternatives. A problem is that many quality criteria for classical methods cannot be applied to CAPs, which use a combination of different methods. This article presents a model of ten quality criteria for CAPs: authenticity, cognitive complexity, meaningfulness, transparency, fairness, transparency, directness, educational consequences, costs & efficiency, reproducibility of decisions and comparability. An expert meeting where participants entered quality criteria into a Group Support System was used to test this model. The results confirm the framework (9 out of 10 criteria) and expand it with three additional criteria: fitness for purpose, acceptability, and fitness for self-assessment. Based on the results, and adapted and layered framework is presented.

Paper session 3: Teacher-Classroom Interaction
Chair/Discussant: Stavroula Philippou, Primary School Teacher/Educational
                     Researcher, Cyprus

*Learning from Ones Practise: Teacher's Growth during In-Service Training in the
Classroom*
Anna Wernberg, Kristianstad College University, Sweden

In service training is in many ways important for teachers' development in their
profession. In many cases one or two teachers are sent to a continuation course and
at the best they return with some idea of how to improve the practise. The problems
then occur of how to implement these new ideas to the other teachers who did not
attend the course, and also the problem of putting the learned theories into practise.
In this paper I will show how a teacher develops through in service training in the
classroom. The teacher participated in a research project, The pedagogy of learning,
where one aim is to develop teachers' learning. The method used in this project is
Learning Study. Learning Study is an iterative process where teachers in collabora-
tion with a researcher plan and conduct three research lessons, with an intention to
improve educational settings by revision based upon the analyses of the data (video
recording from the research lesson and post-test) which indicates the students' de-
velopment.

*The Same Teacher, the Same Intended Curriculum, but Different Classrooms: Is It
the Same Implemented Curriculum?*
Tammy Eisenmann and Ruhama Even, Weizmann Institute of Science, Israel

The focus of this study is the implemented curriculum and the role played by the
classroom in determining the implemented curriculum. We examine a case study
of one teacher who teaches the same intended mathematics curriculum in two 7th
grade classrooms, each in a school with different socio-cultural background. Main
data sources include observations of the teaching of the beginning of the topic of
equivalent algebraic expressions (about 20 lessons in each class). The data are ana-
lyzed both qualitatively and quantitatively. The paper presents an analysis of two el-
ements of the implemented curriculum: (1) Instructional materials, (2) Instructional
organizations. The main findings show there were similarities and differences in the
way the mathematics materials were used in the two classes and in the main activi-
ties that took place during the lessons. We propose some explanations to the differ-
ences we found that connect between the implemented space (schools, students and

teacher) and the implemented curriculum.

Changing a Primary Teacher's Interaction Strategies with Second Language Learners of Mathematics
Gerda-Eva Swank, Utrecht University of Professional Education, The Netherlands

Active participation in classroom interaction is considered to be crucial for children's language development, both in specific language teaching as in content lessons delivered through the medium of the second language. A growing number of studies, however, report on teachers discouraging student participation, tending to a teacher fronted approach. A case study explored how two primary teachers changed their interaction patterns through inventions. This paper reports on findings with the changing of the interaction strategies of a math teacher in a primary school with second language learners.
The research questions were
1 Which strategies do teachers use to promote students' active verbal participation in classroom interaction in content teaching?
2 How do teachers' interaction patterns change during professional development activities?
3 How does their thinking change during professional development activities?
4 Which interventions could explain the changes in teacher behaviour and thinking?
Data on teachers' behaviour consisted of videotaped lessons. Data on teachers' cognitions were collected trough stimulated recall interviews and a concept map. The teacher received feedback on her work from an in-service trainer. The results show that through the weeks, the teacher succeeded in opening up more discussion and stimulating students to talk about math in Dutch. Her behaviour and cognitions are closely related and changeable.

Paper session 4: Student Attitudes and Beliefs
Chair/Discussant: Nina Jude, German Institute for International Educational Research, Germany

You Say TomAto, I say Tomato. How Different Subjects Foster Different Beliefs in the Students that Study Them
Cathal Siochru, Liverpool Hope University, UK

Recent studies on epistemology, an individual's beliefs about the way knowledge

works, suggest that one individual can have two independent sets of epistemological beliefs relative to two different knowledge domains (Hofer, 2000). This study aimed to assess the reliability of Hofer's (2000) findings and her Epistemological Belief's Questionnaire (EPQ). It looked at the epistemologies of different students studying one of five different subjects, as well as looking at the epistemology(s) of students studying two of those subjects at the same time. The results of the reliability analysis showed that only three of Hofer's four factors were reliable (Certainty : a=0.709; Source : a=0.651; Justification : a=0.538; Simplicity : a=0.197). A MANOVA confirmed that different students from different subjects had different epistemologies (Certainty : df=4, F=17.780, p< 0.001; Source : df=4, F=15.425, p< 0.001; Justification : df=4, F=3.101, p<0.05).   However the results from the Dependent T-Tests comparing responses from the same individual regarding their epistemological beliefs in Psychology and Sociology didn't show evidence of two significantly different epistemologies (Certainty : t=-1.084, df=27, p=0.288; Source : t=-0.904, df=27, p=0.374; Justification: t=-1.039, df=27, p=0.308). Results are discussed in terms of the reliability of the EPQ and the issue of homogeneity of epistemological beliefs across domains.

The Nature of Life Meanings of Pre-adolescents
Martin Ubani, University of Helsinki, Finland

The aim of this study is to examine the spirituality of the Finnish 12-13 year-old pre-adolescents (N=26). The recent studies in RE emphasise that spirituality is a universal human characteristic. In other words, people are spiritual regardless of their religious orientation. In the Nordic context spirituality is often connected to search for meaning and existential questions. In this study, spirituality is explored by examining the children's views on the meaning of life. The results echo the recent studies that show that children have a rich spiritual life. The meanings that the students gave to life included three dimensions. They are called referential, relational and revelatory life meanings. It is suggested that these dimensions are integral elements of children's spirituality. The study uses a narrative phenomenological approach.

Environmental Knowledge and Attitudes of Turkish Elementary School Students:
The Effect of Gender and Parents' Education Level
Elvan Alp, Hamide Ertepinar, Ceren Tekkaya, Middle East Technical University, Turkey and Ayhan Yilmaz, Hacettepe University, Turkey

The present study aims to (a) determine Turkish elementary school students' environmental knowledge and attitudes, (b) examine the effect of gender and parents' education level on children's environmental knowledge and attitudes, (c) explore how children's environmental friendly behavior related to environmental knowledge, environmental affects and behavioral intentions. The data was collected by the administration of Children's Environmental Attitudes and Knowledge Scale (CHEAKS) as a measuring instrument to 782 eight grade students from 18 randomly selected elementary schools. The results indicated that children had favorable attitudes toward the environment but their environmental knowledge was fragmentary and incorrect. There was a significant effect of gender on environmental attitudes of students in favor of females. However, no significant effect of gender was found on environmental knowledge. Environmental knowledge was significantly related to parents' education level. Results showed that the mean knowledge score of students with fathers having university education was significantly higher than that for students with fathers having less than university education. The same general trend was observed for the mothers' education level. No significant effect of parents' education level was found on students' attitudes toward the environment. Environmental friendly behaviors of the students were highly correlated with behavioral intentions and environmental affects but there was no statistically significant relationship between students' environmental knowledge and environmental friendly behaviors. These results indicated that behavioral intentions and environmental affects might be the determinants of environmental friendly behaviors.

Paper session 5: Evaluating the Use of ICT in Education
Chair/Discussant: Herman J. Abs, German Institute for International Educational Research, Germany

Intentions of Integrating ICT in Campus-Based University Teaching: Qualitative Results and Further Research Prospects
Claudia Hauswirth, University of Dortmund, Germany

Up to spring 2004 university teachers with different experiences in using educational media and in strategic positions in a German campus-based university were interviewed about their experience and assessments of instructional benefits of ICT. One aim of the study was to identify intentions of Integrating ICT into the teaching context of university teachers. Four dimensions of intentions could be identified: teaching strategy-oriented, learning-strategy-oriented, social-communicative and strategic. This paper summarizes the main findings of the dissertation project and

refers to further research prospects.

Influences of the Integration of Cyprus into the European Union on ICT Policy and the Construction of 'ICT in teaching and learning' in Cypriot Primary Schools
Christina Hadjithoma, University of Bristol, UK

Beyond doubt, the attempts for introducing ICT in educational systems in European countries have been increasingly taking place, and this phenomenon is rationalised through arguments that can be found in various discourses. Focusing on the way that ICT policy in Cyprus was influenced by the European Union agenda, and the implications that this had on the construction of 'ICT in Teaching and Learning' by policy-makers and educators in Cyprus, this paper claims that the study of related discourses and policies is crucial, when studying ICT and learning and instruction. The findings of the research, which employed qualitative methods of analysis, that is discourse analysis of policy-documents (EU and Cypriot official documents) and interviews with key officials who are involved in the implementation of ICT policy are discussed in this paper. The main thesis of the paper is that the way that ICT is embedded and used in teaching and learning is a result of a combination of influences, arising from national, international and global forces, and although this has implications mostly for policy-oriented research, it is also important for research into the development of future models of teaching and learning with ICT.

Evaluating Computer Technology Integration in Cyprus Elementary Schools
Nikleia Eteokleous, P.A. College, Cyprus

The study evaluated the current situation in Cyprus elementary classrooms regarding computer technology integration. It examined how Cypriot elementary teachers use computers, and the factors that influence computer integration in their classroom practices. To address the study's research questions, an evaluative case study design was applied. It employed a mixed method approach through the usage of structured questionnaires and semi- structured, open-ended interviews as the major methods of data collection. Quantitative and qualitative data gathered from a sample of Cypriot teachers in which high, moderate, and low computer use teachers were identified. The results of the quantitative analysis indicated that while Cypriot teachers use computers rather extensively for their own purposes, they use them less frequently in their classes. When they do use them in their classes, it tends to be in a rather sporadic fashion, more as extras or fancy chalkboards than as true

learning tools. Few teachers were found to use computers in any sort of constructivist or progressive way. Qualitative analysis summarizes the factors that influence teachers in applying computers in their classroom practices. At the end, the study provides a discussion of the results, implications for policymakers and educators, as well as questions for further study.

Paper session 6: The Ability to Comprehend Written and Spoken Language
Chair/Discussant: Nele McElvany, Max Planck Institute for Human
                       Development, Germany

The Influence of Learning to Read Music On the Ability to Learn how to Decode Verbal Language

Yehudit Carmon, Bar-Ilan University, Israel

Reading acquisition remains a worldwide problem, unresolved through traditional reading instruction approaches. Analyzing music and verbal reading differences, we found basic shared components: audio-visual integration; successive signs in a specific direction; the development of hearing memory to accumulate signs in the working memory until acquiring the cognitive/emotional message, and perceiving the alphabetical principle. The reading instruction methods do not pay enough attention to these elements. This fact, together with an overflowing quantity of reading components, might cause initial reading problems. With a new musical method, Toy Musical Notes (TMN,) using just a few signs, the shared skills are explicitly acquired, creating a child's first reading scheme in the brain. The verbal reading becomes a second, much easier reading. Hundred and fifty preschool children were tested in three intervention groups: the TMN method, conventional music, and non-music enrichment. Their text reading acquisition parameters were tested in first grade. The TMN group findings were significantly higher than the conventional music group, and the latter scored higher than the non-music group in all reading parameters: number of mistakes; comprehension; vocal reading time, and more. The research found the TMN method especially effective for the acquisition of reading skills.

Verbal Working Memory Skills as Predictors of Listening Comprehension of Text in the Preschool and Elementary School Years

Elissavet Chrysochoou, Aristotle University of Thessaloniki, Greece

Childrens' language comprehension abilities have been investigated in relation to various cognitive skills. Significant research has been conducted in the frame of Baddeley and Hitch s (1974) working memory (WM) model. The model s central executive (CE) is thought to be involved in syntactic and semantic processing, in storing the products and in retrieving relevant information from long-term memory. It would, therefore, be expected to significantly contribute to text comprehension. The models phonological loop (PL) is thought to limit its contribution to language comprehension in maintaining a phonological record that can be consulted during off-line processing. Currently, a Working Memory Test Battery for Children (Pickering and Gathercole, 2001) has enabled a fine-grained WM assessment from the preschool years. Its PL and CE tasks, a vocabulary task and texts with accompanying comprehension questions were translated to Greek and were adapted. Tasks were administered to 180 children, divided into three groups (C.A. 5:7, 7:7 and 9:7, respectively). Our aim was to shed further light on the processing and storage functions involved in young children s listening comprehension of text. Statistical analyses indicated the structural validity of the adapted assessment tools and their sensitivity to age-related differences. The results of stepwise and hierarchical regression analyses are discussed and implications are indicated.

The Relationship Between Rapid Automatized Naming Components and Reading Ability: A Longitudinal Study from Kindergarten Until the End of Grade 1

George K. Georgiou, University of Alberta, Canada

The present study examines (a) how RAN components Ð articulation time, pause time, and pause time consistency Ð develop from kindergarten to the end of first grade, (b) how RAN components are related to different reading measures, and (c) which RAN components differentiate poor from skilled readers. Sixty-two children were administered RAN tasks in kindergarten and at the beginning and end of grade 1. Performance on Colour and Letter Naming was recorded and analysed. Reading accuracy and reading fluency measures were used as the criterion variables. Results indicated that pause time developed significantly from kindergarten to the end of grade 1 and was highly correlated with both reading accuracy and reading fluency measures. Articulation time did not develop and was only weakly correlated with the reading measures. Pause time consistency shared most of its variance with the

pause time. Finally, only pause time differentiated between poor and skilled readers.

Paper session 7: Contextual Learning/School Management
Chair/Discussant: Debbie Bond, Syracuse University, USA

Learning in a Personal-Context: Levels of choice in a Free-Choice Learning Environment at Science and Natural History Museums
Yael Bamberger and Revital T. Tal, Technion Israel Institute of Technology

The study aims to characterize contextual learning processes during class visits to science and natural history museums. It is based on the assumption that outdoors learning is different from classroom-based learning and strongly relies on personal context. Acquiring learning skills in free choice outdoors environments such as science museums is extremely important. Therefore, the learning activities during class visits to museums are studied, focusing on levels of choice provided. The study follows up four museums of different size, location, visitor number and foci. Participants are 700 students in grades 4-8. A descriptive-interpretative approach was adopted, with data sources comprising observations, semi-constructed interviews with students and teachers, and museums' working sheets. Four levels of choice were identified within the museums' provided activities, which affect the effectiveness of learning: no choice, some choice, subject choice and free choice. The effectiveness of learning was evaluated as well by questions and answers of the students, interactions, management of group behaviour, off-task behaviour, linkage to students' prior knowledge and experience, and linkage to the school's science curriculum.

Learning a Foreign Language - a Purpose or a Means?
Tatiana Olevsky, Hebrew University of Jerusalem, Israel

Learning a foreign language in an early age is although more productive, but at the same time it sets a number of motivational problems. When formulating a purpose of studies, if we move the focus from improving language skills per se to developing child's leading activity (as defined by Leontiev) that corresponds to his/her age, we can significantly diminish the motivational problem that naturally exists in the traditional approach. The paper describes an application of the principle explained above. Simple arithmetic tasks have been used in order to teach English to a group of 5-year old Israeli kids.

EARLI 2005 Conference

A 1   23 August 2005   14:30 - 16:30   Room A008

Symposium
Collaborative learning

FACTORS OF EFFECTIVE COOPERATIVE AND COLLABORATIVE LEARNING

Chair: Anne Huber, University of Education Weingarten, Germany
Organiser: Anne Huber, University of Education Weingarten, Germany
Discussant: Jan Terwel, Vrije University Amsterdam, Netherlands
             Guenter Huber, University of Tuebingen, Germany

This symposium elaborates on factors influencing the effectivity of cooperative and collaborative learning. Cooperative and collaborative learning is organized in various learning environments, varying from primary and secondary school to college and professional training contexts (e.g. teacher training). In these contexts learning aims at knowledge building, problem solving as well as at attitude change. Three different types of factors can be distinguished: (1) characteristics of the individual learner, for example cognitive ability, previous knowledge, gender or ethnicity. (2) internal and external characteristics of the cooperative learning method, for example resource interdependence versus resource independence or different instructions on how to go about learning and (3) characteristics of the learning process, for example whether learners are involved in careful problem definition, cognitive conflicts or in social comparison processes. We hope to shed light on which developments are necessary in order to improve scientifically and educationally significant outcomes of research on cooperative and collaborative learning.

Resource interdependence and note taking as a means to improve peer learning
Celine Buchs, University of Geneva, Switzerland
Fabrizio Butera, University of Lausanne, Switzerland

Previous studies have indicated that resource interdependence (information distribution) elicits two different dynamics in regard to student interactions and learning. Working on complementary information produces more positive interactions;

however, a good quality of information transmission is needed in order to guarantee learning. Working on identical information produces confrontations of points of view as well as a focus on social comparison of competence, which is threatening for one's own competence; this threat is detrimental to learning. A pilot study underlined that the quality of information transmission was higher when students could take notes. On the other hand, not taking notes permitted to reduce both confrontations and competition reported by students working on identical information. In the present study, students worked cooperatively in dyads with the same partner during 3 sessions, either on complementary information (positive resource interdependence) or on identical information (resource independence); they were allowed vs. not allowed to take notes. Results indicated that perception of confrontations and of competence stake was greatest when students worked on identical information while taking notes; students also reported the lowest efforts in explaining information in that condition. As for individual learning, the marginal interaction between resource independence and note-taking indicated that when students worked on identical information, they performed better without taking notes, whereas when students worked on complementary information, not taking notes was not beneficial (and the listeners' learning could be disturbed when their partner could not take notes). Directions for educational settings include: a) when students work on identical information (e.g. the same pedagogical materials), not taking notes could emphasize the efforts needed and reduce the stake of competence, which in turn favours performance in that condition; b) when students work on complementary information, a good transmission of information is required, and therefore taking notes could be necessary.

The role of strategy instructions and cognitive ability for learning with the Jigsaw method
Anne Huber, University of Education Weingarten, Germany

The Jigsaw method is a cooperative learning method. In a first phase learners become experts for different parts of the learning subject. In a second phase experts teach each other their expert knowledge. In a third phase learners initiate and monitor activities for elaborating and deepening their knowledge. The paper presents a study, which tries to find out the role of learning instructions and cognitive ability within the Jigsaw method. From self-determination theory of motivation and from the cognitive-elaboration perspective of cooperative learning it can be derived, that strategy instructions are very important in order to obtain positive results in achievement, intrinsic motivation and perceived competence. Strategy instructions

help learners to learn more thoroughly and therefore have positive effects on the expected outcomes (see above). From research on cognitive ability and achievement we know that students with higher cognitive ability usually reach higher levels of achievement than students with lower cognitive ability. Cognitive ability therefore is an important factor for achievement results. In order to test these hypotheses a 2 x 2 factorial design was realised with the factor ìlearning instructions: ìJigsaw with learning instructions versus ìJigsaw without learning instructions and the factor ìcognitive ability: ìhigh cognitive ability versus ìlow cognitive ability. The Jigsaw method was used over eight weeks in four secondary school classes in order to teach biology. Results of this study confirm the expectations largely. Most of the hypotheses could be approved. Unexpected results are discussed within the framework of self-determination theory of motivation. Important advises for teachers can be derived from the study. It can be shown how to use the Jigsaw method best in order to account for interindividual differences.

The structure and dynamics of the collaborative problem solving process
Hannu Soini, University of Oulu, Finland
Katri Jaemsae, University of Oulu, Finland
Antti Rantanen, University of Oulu, Finland
Matleena Sedergren, University of Oulu, Finland

Our earlier findings have shown that peer consultation is a promising method when we try to increase higher education students problem solving skills or commitment to their studies. Peer consultation takes advantage of students mutual co-operation, dialogue and reflectivity by encouraging them to accept more responsibility for learning by their peers. We have examined the impact of peer consultation on the case problem solving process among medical students on a paediatrics course. The aim of this method is for the whole group to be able to put themselves in the position of one of the group members for a certain period of time, to listen to this group member and to really consider his/her problems. Consultative work means creative work in small groups under the guidance of a supervisor. Peer consultation helps students to learn for themselves. It is also a tool with which the students can evaluate their own learning process. The contribution of peer consultation to the problem oriented learning is to concentrate on the careful definition of the problem and to identify collaboratively the different aspects of the question. In this paper we will present our preliminary findings of the underlying structure and dynamics of the problem solving process in different learning environments.

External and internal characteristics of cooperative learning
Mary Koutselini, University of Cyprus, Cyprus

The study presents the results of an educational intervention during in-service training of secondary school teachers. The aim was to help teachers simulate cooperative learning and construct the characteristics that differentiate it from plain group work. The results of the study indicated that teachers have negative attitudes towards cooperative learning because they dont know how to ensure collaboration, coherence and interaction of the members of the group; their attitudes changed gradually during the study, and after the experience that only cooperative learning with concrete internal and external characteristics resulted to learning outcomes for ALL students.

Computer Supported Collaborative Learning: Individual differences in participation and outcomes
Fleur Prinsen, Vrije University Amsterdam, Netherlands
Monique Volman, Vrije University Amsterdam, Netherlands
Jan Terwel, Vrije University Amsterdam, Netherlands

Computer Supported Collaborative Learning is often presented as a promising innovation. But CSCL faces some well known problems together with some more specific new challenges. Some of the already mentioned problems in co-operative learning research appear in a new fashion in the context of CSCL. Apart from the question whether working with CSCL generates satisfying learning outcomes, an important question is whether all participants profit from collaboration with the computer as a communication device. Is it possible that especially high achievers profit, as is often noticed with innovative learning environments. How do low achievers participate in this environment? Do the gender differences that are found in co-operative learning research also occur in CSCL? And what is known about the relationship between social-ethnic background and participation in CSCL? Firstly, this paper will review what is known in the literature about differences in participation and learning outcomes of students differing in gender, ability, pre-knowledge and social-ethnic background when working in a CSCL environment. We argue that, if there are differences between these student categories in participation in CSCL environments, there should be more attention paid to ways of including students in the collaboration in a way that can lead to good results. This is one of the most important lessons from a long research tradition in co-operative learning. Secondly, this paper offers a description of a new, special designed program for CSCL

for 10 to 12-year - old students. The content of the program is about nutrition and health within the integrated subject matter World orientation and Science. Thirdly, this paper describes the implementation and effects of the experimental program in 5 classes with in total 120 students in primary schools. Special attention is given to the differential effects of pre-knowledge, gender and ethnicity on the participation and learning outcomes of students.

A 2　　　　　23 August 2005　　　14:30 - 16:30　　　　　　Room A009

Symposium
Teaching and Instructional Design

FACTORS INFLUENCING THE STABILITY OF THE MODALITY EFFECT

Chair:　　　　Geraldine Clarebout, K.U.Leuven, Belgium
Organiser:　　Geraldine Clarebout, K.U.Leuven, Belgium
　　　　　　　Jan Elen, K.U.Leuven, Belgium
Discussant:　 Wolgang Schnotz, University of Koblenz: Landau, Germany

This symposium aims at gaining insight in the stability of the modality effect. This effect is related to the split attention effect that occurs when learners have to attend to and integrate multiple information sources (e.g., Mayer, 2001; Sweller & Chandler, 1994). If the different information sources all require visual information processing, the visual information processing channel might get overloaded. The modality effect postulates that providing some of the information in an auditory format reduces the load of the visual information processing channel. Different studies in multimedia learning environments (e.g. Moreno, Mayer & Lester, 2000, Mousavi, Low & Sweller, 1995) provide evidence for this effect. Students get higher scores on recall and transfer tests when instructional messages are provided through narration (and visuals) rather than only visually.. However, most of these studies have been carried out in more closed environments', with little learner control and a well-defined problem. In this symposium, the different contributions address the modality effect in different contexts and/or in relation to different variables. In a first contribution by Moreno a theory of multimedia learning is proposed and the modality principle is tested for three different media. Paas et al. investigate the relation between the modality principle and pacing. Clarebout and Elen studied the modality effect in an open learning environment. The final contribution by Elen

and van Gorp researched the relation between modality and learner control.The discussant critically reflects on the different research studies and findings and tries to integrate the different results to come up with a proposal for a research agenda.

Does the modality principle hold for different media?
Roxana Moreno, University of New Mexico, United States

Does the modality principle hold for different media? The goal of this presentation is to answer this question by examining the classic distinction between the roles of media versus method in promoting learning. To this end, I first propose a cognitive theory of multimedia learning from which a set of instructional design principles are derived. Then, for three different media (i.e., multimedia explanations, animated pedagogical agents, and virtual reality), I review a set of experiments where one of such design principles was tested: the modality principle. Finally, I discuss the theoretical and practical implications of the findings.

Observational learning from cognitive models: uncovering the cognitive processes
Pieter Wouters, Educational Technology Expertise Center, Netherlands
Fred Paas, Educational Technology Expertise Center, Netherlands
Jeroen van Merrienboer, Educational Technology Expertise Center, Netherlands

Theories of multimedia learning advocate the use of dynamic visualizations in combination with explanatory verbal text. Information that has been encoded in two ways can be retrieved and used more easily. Modern educational theories also regard the application of cognitive modelling with its focus on authentic tasks as a promising instructional approach. Cognitive modelling not only shows what is happening during the performance of a task, but also why this is happening. The application of dynamic visualizations in cognitive modelling offers interesting affordances because conceptual or abstract processes can be visualised. Cognitive load theory contends that instruction should minimize the extraneous cognitive load. One of the most investigated phenomena regarding extraneous cognitive load is the split-attention effect. With respect to dynamic visualizations in cognitive modelling several split-attention effects may occur. Beside spatial split-attention, which occurs when visual material and its explaining text are separated from each other, dynamic visualizations may impose specific split-attention effects, such as the intra-representation split-attention and transient split-attention. Two design guidelines are often proposed in order to meet these split-attention effects. The modality principle, which states that explanatory text should be presented orally,

and pacing, which enables learners to adapt the presentation speed to their cognitive needs. In this study, a 2*2 factorial design was used to investigate the relation between modality and pacing. The focus, however, was not on the effect on transfer performance, but on the uncovering of cognitive processes that underlie the difference in transfer performance. Two valuable methods were used in this exploratory study, the think aloud method and the analysis of eye movements. The analysis of data will be completed in April 2005 and final results are presented at the EARLI.

Modality effect in open learning environments
Geraldine Clarebout, K.U.Leuven, Belgium
Jan Elen, K.U.Leuven, Belgium

Different studies of Moreno and Mayer (e.g., Moreno, Mayer & Lester, 2001) revealed a modality effect of pedagogical agents on learning: an agent using narration lead to deeper learning than an agent using on-screen text. The aim of the present study is to test the modality effect in open learning environments with an agent providing metacognitive support. Participants were 42 first year educational sciences and psychology students. A quasi experimental design was used. In this study no confirmation was found of the modality effect, suggesting that this effect cannot be generalised to open learning environments where the agent provides support on a metacognitive level, rather than a content specific level which is the case in the Moreno et al. studies.

The modality effect and primary school learning materials
Jan Elen, K.U.Leuven, Belgium
Els Van Gorp, K.H.Kempen, Belgium

Numerous experimental settings have illustrated the modality effect. These studies have a number of clear characteristics: respondents are mainly higher education students, information addresses procedures or processes, and there is no learner-control with respect to the pace of the presentation. In order to explore the boundaries of the modality effect in this study an experiment was carried out with primary schools children and 12 conditions: three conditions with respect to the relationship between text and pictures (text separate, text integrated, and text auditory), two image modalities (static versus dynamic) and two conditions with respect to learner-control. These twelve conditions were tested for two sets of materials (one procedural and the other purely factual), resulting in a total number of 24 conditions. Each condition had 10 participants. Learning gains (knowledge and transfer)

were calculated and total watching time as well as watching time for each screen were registered. Analyses of variance revealed no main effects of independent variables for learning gains with respect to retention or transfer.

A 3   23 August 2005   14:30 - 16:30   Room A109

Symposium
Social Interaction in Learning and Instruction

INVESTIGATING CLASSROOM INTERACTION: METHODOLOGIES IN ACTION (PART I)

Chair: Paivi Kristiina Kumpulainen, University of Oulu, Finland
Organiser: Paivi Kristiina Kumpulainen, University of Oulu, Finland
Margarida   Cesar, Universidade de Lisboa, Portugal
Discussant: Michele Grossen, University of Lausanne, Switzerland

This symposium realized in two sessions (Part I and Part II) introduces strands of research on classroom interaction whose logic of inquiry produce different approaches, analyses and interpretations of social interactions and discourses in contemporary classroom settings. The methodological approaches which are introduced and discussed in the symposium within the context of empirical investigations of classroom interactions draw on studies of language and discourse, ethnography, as well as on sociological, psychological, and domain-specific analyses. In recognizing the complexity and challenges in mapping out the complex research territory focusing on classroom interactions, the prime goal of the symposium is to build a complimentary context for discussion of the ways in which different approaches to classroom interaction are realized and how they produce different analyses because of their purpose, conceptual framework, and methodological choice. The illumination of diverse approaches to classroom interaction and discourse is believed to demonstrate the potential and challenges each strand of research is likely to bring towards understanding the psychological, social and cultural life of the classroom and how these mediate the situated practice of teaching and learning in today's schooling.

The analysis of talk as data in educational settings
Neil Mercer, Open University, UK, United Kingdom

Researchers from a range of disciplinary backgrounds - including psychologists, sociologists, anthropologists, linguists - have studied talk in educational settings, and they have used a variety of methods to do so. The methods they have used reflect their research interests and orientations to research. That is, particular methods are associated with particular research perspectives or approaches; and each approach always, even if only implicitly, embodies some assumptions about the nature of spoken language and how it can be analysed. My main aim in this paper is to provide a basic guide to ways of analysing talk which can be used in educational research. I begin with a review of approaches and methods, and then discuss some of the key issues involved in making methodological choices. Given limited space, I have not attempted to go into detail about any of the methods involved, but instead I shall highlight their key features and compared their strengths and weaknesses. My review of existing methodologies describes eight approaches which have provided analytic methods for educational research. These are (1) systematic observation, (2) ethnography, (3) sociolinguistic analysis, (4) linguistic discourse analysis, (5) sociocultural discourse analysis, (6) conversational analysis, (7) discursive psychology, and (8) computer-based text. These categorizations need to be viewed as conceptual abstractions since, in practice, approaches overlap, and researchers often (and increasingly often) use more than one method. The paper finishes by encouraging researchers interested in educational talk to consider a range of methodological options for addressing any research questions, to make explicit one's reasons for selecting or combining methods, and most of all to avoid reducing methodological problems to simplistic choices, such as that between 'quantitative' and 'qualitative' methods.

(Re)formulating opportunities for learning and academic identities: Interactional ethnography and the study of intertextuality and consequential progression
Judith Green, University of California Santa Barbara, United States
Elizabeth Yeager, University of California Santa Barbara, United States
Laura Hill-Bonnet, University of California Santa Barbara, United States
Audra Skukauskaite, University of California Santa Barbara, United States
Carol N. Dixon Dixon, University of California Santa Barbara, United States
LeAnn Putney, University of Nevada, United States
Ana Floriani, Illinois Wesleyan University, United States

This paper presents Interactional Ethnography, an approach to studying the social construction of everyday life in classrooms and ways in which classroom practices are supported and/or constrained by school, district, state and national policies (Castanheira, Crawford, Green & Dixon, 2002; Dixon, Green, Yeager, Franquiz & Baker, 2000). Our goal is two-fold: 1) to demonstrate how Interactional Ethnography's constitutes a logic of inquiry, entailing multiple layers of analyses needed to make visible knowledge and practices constructed by the collective, and the ways in which individuals-within-the-collective take up and use these opportunities to (re)formulate local knowledge and academic identities; 2) to demonstrate how changes in policies at the school, district, state and national levels support and/or constrain the opportunities teachers are able to construct with their students. To achieve these goals, we focus on the social construction of social science in a ibilingual classroom in three years (1993-1994; 1995-1996; 1996-1997) prior to a policy shift to iEnglish Only. The contrastive analyses of years pre-post a major reform (1998-1999) make visible lost opportunities for learning and academic identity when Spanish was no longer a resource for constructing public texts. Contrastive analyses show how change(s) in multiple policy contexts led to changes in the ways in which the teacher was able to formulate academic identity potentials and opportunities for student learning to be social scientists (e.g., historians and ethnographers), to provide equity of access across years and to create common knowledge for her students. Through contrastive analyses of social science in this 5th grade bilingual class across years, we illustrate the principles of practice guiding the multiple layers of analysis necessary to explore both the in-the-moment, face-to-face, discursive construction of life, and the across time construction of opportunities for learning and identity formulation made available to the group and individuals within the group.

Framing activities: exploring the demands on pupils in new classroom activities
Asa Makitalo, Gothenburg University, Sweden
A. Jakobbson, University College of Malmo and Lund University, Sweden
Roger Saljo, Gothenburg University, Sweden

The purpose of the present paper is to contribute to the understanding of the problems of framing (in the Goffmanian sense) educational discourse that students might experience. The context is a science classroom and pupils are working on the issues of climate change. In our analysis of how the participants concretised this rather abstract notion in their work, we found that the various framings that are possible in this case (a political, an historical, an economic, a scientific version etc.) were mixed in the pupils' interpretations of what the issue was all about. Thus, their analytical endeavours were characterised by a mix of voices that frame the issue of climate change in diverse social languages. Learning to see what framing that is relevant in a particular setting, and what arguments it implies and that are relevant, is an important learning task in modern pedagogy. Learning of this kind is very different from the traditional approaches of institutionalised schooling, and the skills students need to master this involve insights both into the different framings that are relevant, and they also need to understand from which position a particular argument or hypothesis is formulated.

Defending and positioning: Studying discursive practices in inquiry mathematics and science classrooms
Ellice Forman, University of Pittsburgh, United States
Ellen Ansell, University of Pittsburgh, United States

Many mathematics and science classrooms through out the industrialized world are undergoing a revolution in instructional practices. One of the most obvious results is a shift of focus from the memorization of facts, practice in algorithms, and use of routine laboratory assignments to collective inquiry activities organized around complex problems. A key component of this instructional revolution is that classrooms dominated by teacher talk and individual seatwork are now busy, noisy places. That change means that educational researchers must have tools available that enable them to assess the effectiveness of classroom talk. The aim of this chapter is to present a conceptual framework for understanding the form and function of discourse in inquiry mathematics and science classrooms and a set of methodological tools for studying these talk-rich classrooms. Our primary focus will be on the classroom as a site for the enculturation of mathematical and scientific argumenta-

tion and identity. The paper will be organized around three conceptual and methodological themes: investigating how classroom norms for scientific argumentation are co-constructed; studying how teacher and students co-create scientific arguments; and assessing the creation of mathematical and scientific identities through discourse. We will begin by providing a justification for the study of argumentation and identity in K-12 classrooms. We will also include a discussion of the differences between mathematical and scientific arguments. Next, we will present some promising methods for studying argumentation and identity formation in inquiry classrooms. Finally, we will evaluate the limitations of current theories and methods and suggest new directions for this line of research.

A 4   23 August 2005   14:30 - 16:30   Room E010

Symposium
Teacher Education

VIDEO BASED RESEARCH TO PROMOTE TEACHER EXPERTISE

Chair: Helmut Fischler, Free University of Berlin, Germany
Organiser: Helmut Fischler, Free University of Berlin, Germany
Discussant: Steeve Wheeler, University of Plymouth, United Kingdom

Teachers are one of the most influential context factors in students' learning environments. Based on this, the conference theme gives rise to several important questions concerning teachers' learning processes, one of which will be addressed in this symposium: How does the use of video enhance teacher learning and achieve that best qualified teachers work in our schools? What better way for novices or experienced teachers to improve their teaching than to analyse videotapes of themselves or colleagues in action? Brophy (2004) points at the potential video techniques have for pre-service or in-service teacher education. In various teacher training projects videos are a highly appreciated tool to give (prospective) teachers the chance to integrate vivid examples into their studies about teaching and learning. But what do we really know about the outcomes of these programs? In the symposium, a second powerful field of application is described: Videos are used in the course of research activities that observe and promote processes and results within programs aiming at enhancing teachers' expertise. Four examples of using videos as a means for controlling effects of efforts to promote teachers' expertise will be presented. These effects are observed and analysed with the help of videotaped lessons cover-

ing a longer period of time in which changes of teachers' teaching competencies are expected. The research examples presented include general aspects of teaching like adaptive teaching as well as subject specific features like activating students in science lessons.

Video test to evaluate the development of 'adaptive teaching competency'
Christian Bruehwiler, School of Teacher Education, St. Gallen, Switzerland
Matthias Baer, School of Teacher Education, St. Gallen, Switzerland
Marion Rogalla, School of Teacher Education, St. Gallen, Switzerland

In this paper findings from our research project on 'Adaptive Teacher Compentency' involving 50 teachers at primary and secondary schools are presented. Our research is aimed at capturing the interplay between teacher knowledge and teacher action in enabling understanding-centred as well as individually oriented learning of each student in a classroom. The concept of 'Adaptive Teacher Competency' is proposed to allow an understanding of the conditions of planning and acting in instruction. The project included an intervention aimed at developing teachers' adaptive competency which was evaluated in a quasi-experimental design. To measure the effects of the intervention a variety of instruments were developed employing quantitative as well as qualitative methods. However, the focus of the presentation is on the video test capturing adaptive teaching competency, since it is believed that this instrument could be crucial for measuring the effects of teacher education. The video test enables a measurement of participants adaptivity of instruction performance which is close to the teaching situation but also standardised to support comparison. In this way the video test is a new instrument to gain a better understanding of the various concepts of instruction teachers deploy and how the teachers implement these. The methodology of the video test will be discussed as well as the findings of its statistical analyses. Comparing experimental and control group within the four dimensions of Adaptive Teaching Competency (Subject Knowledge, Diagnosis of Students Learning, Methods of Instruction, and Classroom Management), significant effect size was found in the dimension of Methods of Instruction: the competency of the teachers in the experimental group increases. Conclusions on the future development of teacher education are drawn.

Preconditions for learning in a school for all: development of a video-based study group method for junior high school teachers

June Junge, University of Stavanger, Norway
Elaine Munthe, University of Stavanger, Norway

This paper addresses the pilot phase of the Preconditions for Learning in a School for All-project (2004-2005). Here, a learning method is being developed in close collaboration with a group of teachers at one junior high school. The method involves teachers and their students being video filmed in the classroom, and then analysing and discussing this video in a group of teachers who all teach the same students. An aid in these discussions is a manual developed by researchers at the University of Virginia, USA (CLASS). This manual was developed to analyze video films of classroom interaction in relation to variables that research has shown as effective in enhancing academic and social growth. Objectives of this pilot study phase is to test this manual as a learning tool in relation to video, and to develop this material further, making it relevant for Norwegian junior high schools teachers. The discussions carried out in the group are also video filmed, and are analysed and discussed by a group of researchers (including the researcher who leads the discussion in the group of teachers) at the CBR to study and further advance the communication that goes on in the group as well as to further develop the CLASS manual for junior high school teachers. Outcomes presented in this paper will focus mainly on how the use of video contributes to learning among teachers. Sources of information to discuss this will be the videotaped discussions, the teachers' own perceptions as they are expressed verbally, and analyses of classroom videos carried out throughout one school year to measure change.

Using video data in subject related pedagogical coaching processes

Helmut Fischler, Free University of Berlin, Germany

After a period of about 20 years with research on students' ideas about concepts in natural sciences (e.g. force, energy, atom) and with investigations of learning processes in science lessons it becomes more and more important to reflect on how the findings can be transferred into daily teaching processes. That means: How can teachers be helped to include principles of effective teaching derived from these findings into their scope of action? To identify the supporting and restricting factors in the processes of enhancing teachers expertise is the main goal of a project in which subject related coaching is used as a means to modify teachers' conceptions about teaching and learning as well as their acting in classrooms, in short: to foster

teachers professional development. The theoretical background is shaped by theories of cognitive and emotive therapy. These theories focus on the transformation of an individual's problem specific frame of references and of his/her corresponding behavior. Video taped teaching episodes or lessons meet different demands appearing in the coaching process:- Observing their own behavior in classroom processes and teacher-students interactions help teachers to perceive their emotive and cognitive state. In coaching processes, videotaped episodes serve as stimuli for reflections. - In coaching processes it is necessary that the coach has gained insight not only into a teacher's conceptions about teaching and learning but also into characteristics of his/her teaching behaviors. Videotaped episodes facilitate the analysis of teachers' teaching practices. - The effects of coaching processes have to be controlled on the level of teachers' conceptions as well as on the level of their decision making in classrooms. The various functions of videotaped teaching episodes in coaching processes will be described in detail.

Professional development of physics teachers and in-service teacher training: Video-based studies
Hans Fischer, University of Duisburg-Essen, Germany

During the last ten years techniques have been developed to investigate the effects of teacher further education on teachers' activities and on students' behaviour in physics classrooms. Video analysis based on theoretical models of teaching and learning physics, and several methods of investigating performance and motivation as well as controlling different variables of the teaching process have been worked out. As a result, a set of research tools came into being, which facilitates analysing and enhancing teacher training and its effects in more detail. The triangulation of the different data capture allows a sophisticated and divers interpretation of the data describing learning and teaching in the physics classroom and tracking the effects of teachers' professional development. In addition, specific category sets and basic coding of videos are used as interactive methods of teacher training, known as ìvideo feedback methodology. The framework of the project will be outlined. It is based upon an analysis of theories and models for (physics) teachers' professional development and the theory of basic models of teaching and learning by Oser, modified for physics instruction. This frame of reference is used to develop the category system of the video analysis as well as for constructing questionnaires and interviews (using the repertory grid method by Kelly). Development, use and results of a low and high inferent video analysis, as applied for the analysis of the teachers' and students' activities in the physics classroom will be explained in de-

tail. Since field tests of the different tools and the teacher training will be finished in summer 2005 we will report also about the reliability of the different tools and about structure and implementation of the teacher training seminar stressing different facets of the used video analysis.

A 5   23 August 2005   14:30 - 16:30   Room E005

Symposium
Mathematics Education

THE MATHEMATICS EDUCATION TRADITIONS OF EUROPE (METE) PROJECT: PRINCIPLES AND OUTCOMES

Chair: Paul Andrews, University of Cambridge, United Kingdom
Organiser: Paul Andrews, University of Cambridge, United Kingdom
Discussant: Peter Op 't Eynde, University of Leuven, Belgium
                Kurt Reusser, University of Zurich, Switzerland

The mathematics education traditions of Europe (METE) project is a European Union funded study of the teaching of mathematics in the age range 10-14 in Flemish Belgium, England, Finland, Hungary and Spain. The main data set has been video recordings of sequences of lessons taught on topics common to all curricula and representative of different forms of mathematical thinking.This symposium outlines the processes by which the project coding schedule was developed and, in respect of the topics covered, presents the analyses of both qualitative and quantitative data in respect of the teaching of percentages and polygons in primary classrooms and linear equations and polygons in secondary classrooms.The coding schedule, the outcomes of a grounded process, offers a unique perspective in comparative education while the topic analyses offer alternative perspectives on standard content for mathematics educators irrespective of national location.

The mathematics education traditions of europe (mete) project: methodological perspectives and instrument development
Paul Andrews, University of Cambridge, United Kingdom

This paper outlines the processes by which a multinational team of researchers developed a descriptive schedule for use with video-recordings of mathematics lessons in five European countries: Flemish Belgium, England, Finland, Hungary and

Spain. Located within a constructivist perspective on learning as the negotiation of meaning, we discuss the resolution of initial problems concerning false assumptions about shared understanding of educational terminology. We discuss, also, drawing on grounded theory, an iterative process of classroom observation and schedule development which was undertaken in all countries by teams of researchers from each country. The schedule thus developed enabled all project colleagues, irrespective of nationality, to code mathematics lessons with confidence and understanding while highlighting both similarities and differences between the lessons taught by teachers in project countries. The coding schedule comprised three sections plus a timeline. The first section, named the mathematical focus, comprised seven codes related to observable general learning objectives of mathematics. These were mathematics as conceptual, structural, derivational, procedural, efficiency, problem solving and reasoning. The second section, called the mathematical context, comprised four codes related to the conception of mathematics underpinning the tasks on which learners were invited to work. Each was related to some sense of a real world and the integrity of the data used. They were real-world genuine data, real-world fabricated data, not real-world genuine data and not real-world fabricated data. The third section, called the mathematical didactics, comprised ten categories concerned with the observable didactic strategies project teachers employed. These were activating prior knowledge, exercising prior knowledge, explaining, sharing, exploring, coaching, assessing or evaluating, motivating, questioning and differentiating. These three sets of categories, when applied to the episodes of a lesson, allowed for the diverse nature of project lessons to be exposed and critically examined. Some implications for comparative research in general are discussed.

Mathematics education traditions of europe (METE) project: A comparative study of the teaching of linear equations in five european countries
Paul Andrews, University of Cambridge, United Kingdom
Judy Sayers, University College Northampton, United Kingdom

This paper reports on one aspect of the work of the Mathematics Education Traditions of Europe (METE) project. Drawing on a socio-cultural perspective on teaching and learning and a grounded theory approach to research, the project has explored the teaching of mathematics to learners in the age range 10-14 in Flemish Belgium, England, Finland, Hungary and Spain. Its main objective was to examine the ways in which learning is structured over time by examining videotaped sequences of lessons taught on standard topics representative of all project curricula and forms of mathematical thinking. This paper reports on the teaching of linear

equations and discusses both quantitative analyses, derived from codes applied to the videotaped lessons, and qualitative analyses focused on the ways in which teachers structure the topic and the forms of activities used to develop it. The development of the coding schedule for videotaped lessons, undertaken the previous year of the project, involved a week of live observations in each project country. Each lesson was observed by at least one colleague from each participating country and subsequent negotiative processes enabled, in a grounded manner, the development of a coding schedule which all colleagues understood and were able to implement. The outcomes of the quantitative analysis indicated several significant differences, determined by nationality, in respect of the observable learning objectives, the conception of mathematics in which learners' tasks were embedded, and the didactic strategies employed. The qualitative analysis indicated, for example, the balance metaphor for equations was introduced, in varying degrees of explicitness, in four of the five countries while equations with the unknown on both sides were introduced early in three of the five countries to justify the learning of the procedures that followed. The outcomes are discussed in relation to the framework developed earlier and the implications considered.

Teaching percentages in the primary school: A five country comparative study
Fien Depaepe, University of Leuven, Belgium
Erik De Corte, University of Leuven, Belgium
Lieven Verschaffel, University of Leuven, Belgium
Peter Op 't Eynde, University of Leuven, Belgium

The paper deals with a small-scale videobased comparative study of the teaching of percentages at the primary school level in five European countries: England, Belgium-Flanders, Hungary, Spain, and Finland. In each country a sequence of four or five consecutive percentage lessons was videotaped in a fifth grade mathematics class. All lessons were analysed quantitatively and qualitatively. The quantitative analyses covered the following categories: mathematical focus (referring to the underlying objectives of teacher's actions and decision-making), mathematical context (referring to the conception of mathematics underlying the tasks posed in a lesson), didactics (referring to the didactic strategies teachers use in different contexts), and the concrete materials used by the teacher and the students to support the teaching-learning process. A more qualitative comparison of the different approaches of teaching percentages focused on the different pedagogic and social activities in which students were involved. All lessons were framed within a perspective on the teaching and learning of percentages that was based on findings from the recent

literature, and related to the objectives of percentage instruction, conceptual aspects of percentages, and some didactic tools. The aim of the study was to identify distinctive features of the percentage education traditions in the five countries. It did not aim at the evaluation and generalisation of the different educational practices, but attempted to understand some good mathematical practices within their specific educational context. The paper discusses the outcomes of those analyses. It presents the frequencies and patterns of the subcategories of the different dimensions of our analyses, and describes differences as well as similarities of the percentage lessons with regard to the perspective on teaching and learning percentages.

The mathematics education traditions of Europe (METE) project
Jose Carrillo, University of Huelva, Spain
Nuria Climent, University of Huelva, Spain

This paper reports on an analysis of sequences of lessons on polygons taught to primary-aged learners by four teachers in Flanders (Belgium), England, Hungary and Spain. Our objective, as part of the mathematics education traditions of Europe (METE) project, was to compare how these four teachers, considered to be good practitioners by their local communities, approach the teaching of the topic. To achieve this objective we adopted a double methodological perspective. Firstly, each lesson is analysed in terms of the variables defined in the theoretical/methodological paper (Andrews, 2005) and the instruments described therein. Secondly, a qualitative analysis identified teachers' underlying perspectives on the topic and the activities they used to attain them. Importantly, the two analyses described above allowed us to identify both similar and different features of these teachers' practice and, in so doing, enabled us to infer some nationally-informed characteristic features in respect of the teaching of polygons.Our work draws on a number of perspectives on the teaching and learning of polygons derived from literature, both in terms of the mathematics itself and the didactics as they impact on the topic. Our analysis acknowledges the context in which each teacher works and then presents both an individual and comparative account of the ways in which teachers in project countries manage the teaching of polygons. The implications of the analyses are discussed within the literature-based framework derived earlier.

Teaching polygons in the secondary school: a comparative study in five European countries

Eva Szeredi, Eotvos Lorand University Budapest, Hungary
Judit Torok, Eotvos Lorand University Budapest, Hungary

The paper deals in details with one aspect of the mathematics education traditions of Europe (METE) project concerning the teaching and learning polygons in grades 7 or 8. The general theoretical framework, the methodology and the design of the research are discussed in details in the introductory paper. In this particular paper we present a particular theoretical framework for the teaching of geometry in order to provide a reference for our analysis, to facilitate the interpretation of our results and the posing of new questions. We present an analysis of both qualitative and quantitative data derived from 18 lessons, in four sequences, taught on secondary polygons and videotaped in four European countries. The quantitative analysis is based on codes applied according to a schedule developed earlier in the project and described in full in the first paper of this symposium. Mean scores, calculated for each code across all lessons allowed for the development of a composite European lesson against which others can be compared. Moreover, composite lessons for each country were also constructed to facilitate comparison. Statistical analyses indicated substantial nationally-located variation while correlations identified interrelationships between variables. The qualitative analysis showed interesting variations in the ways in which teachers conceptualise and present polygons to learners. For example, some teachers emphasised classification and vocabulary while others focused attention on definitions and theorems. We relate our findings to the existing literature and, in so doing, consider the implications for the ways in which geometrical learning might be better managed according to locally defined curricular expectations.

Symposium
Peer Interaction

QUALITY AND CHARACTERISTICS OF PEER COLLABORATION

Chair: Sylvia Rojas-Drummond, National Autonomous Univerity of Mexico, Mexico
Organiser: Ed Elbers, Utrecht University, Netherlands
            Sylvia Rojas-Drummond, National Autonomous Univerity of Mexico, Mexico
Discussant: Karen Littleton, Open University, United Kingdom

The papers in this symposium share an interest not only in the quality but also in the conditions and characteristics of peer collaboration in the classroom. All papers are based on observations of collaboration of primary school children and apply in-depth analyses of verbal interaction. The studies in this symposium address two related issues:
1. The relationship between global and micro-analytic measures for the characterization of the collaboration as well as for the assessment of its quality.
2. The extent to which the quality of collaboration should be assessed in relationship to the conditions of the collaboration, such as the goal, the educational programme of which it is a part, and the nature of the task.
The papers show that global measures (such as Mercer's concept of exploratory talk) are insufficient for characterizing peer collaboration in some circumstances. The description of the quality of collaboration in terms of explicit and accountable reasoning does often not correspond with the reality of actual interactions. Students' attempts to mutually coordinate and integrate contributions go hand in hand with interruptions, overlaps and conflicts (Vass, Haan/Elbers). An increase of students' communicative acts does not always imply an improvement of exploratory talk (Fernandez). The papers share the emphasis on the conditions of peer collaboration. Three contributions (by Vass, Fernandez, and Rojas-Drummond) point to the importance of the task (creative writing compared to a logical reasoning task), whereas De Haan and Elbers draw attention to the role of language skills and the cultural norms for reasoning in a multi-ethnic classroom. Rojas-Drummond et al. argue that the creation of learning communities provides an appropriate context for Children's collaboration.

The co-construction of oral and written texts in children's collaborative learning using ICT
Sylvia Rojas-Drummond, National Autonomous Univerity of Mexico, Mexico
Daniel Albarran, National Autonomous Univerity of Mexico, Mexico
Guadalupe Vega, National Autonomous Univerity of Mexico, Mexico
Mariana Zuniga, National Autonomous Univerity of Mexico, Mexico
Maricela Velez, National Pedagogical University, Mexico

The purpose of this paper is to describe how children co-construct knowledge as they work in a project which involves discussing together to create a written text using ICT. The study is based on a sociocultural perspective. To achieve this account, the paper is divided into two parts. In a first part, we work at a micro level by analysing in detail the quality of the interaction and discourse taking place in these collaborative groups of children as they work in their project. In a second part of the paper, we move to a macro level by describing the broader context in which this collaborative groups work, which corresponds to a learning community. Concerning the first, micro level, the analysis is based on examples of dialogues produced by 4th grade children (9 to 10 years old) as they plan, share ideas, argue their points of view, negotiate, elaborate and integrate their different perspectives to create a multimedia story. With these examples we illustrate how children participate and coordinate efforts in the co-construction of knowledge. In relation to the second, macro level, we describe the broader sociocultural context in which children develop their projects. Children participate in an educational programme which has been implemented in public primary schools in Mexico called ìLearning Together. The purpose of the programme is to form learning communities with the active participation of primary students, teachers, as well as university researchers. This programme seeks to develop functional social, cognitive, psycholinguistic and technological abilities in primary students. In conclusion, in our paper we illustrate how the creation of learning communities provides appropriate contexts for Children's joining efforts in the co-construction of knowledge.

*Oracy for literacy: Exploratory talk and co-construction in chldren's collabora-
tion*
Juan Manuel Fernandez Cardenas, Comite Norte de Cooperacion con la UNESCO,
Mexico
Sylvia Rojas-Drummond, National Autonomous Univerity of Mexico, Mexico
Nancy Mazon, National Autonomous Univerity of Mexico, Mexico
Rupert Wegerif, University of Southampton, United Kingdom

The present report has two main purposes. The first is to analyse the quality of the
strategies children used for discussing in small groups to solve two tasks: a) a modi-
fied version of the Raven's Standard Test of Progressive Matrices (RSPM), and b)
a test where children discussed and wrote an integrated summary of three related
texts. The second purpose is to test two approaches to the analysis of discourse:
a) a scheme for analysing exploratory talk (ET) and b) the ethnography of com-
munication. We report two related studies with 6th grade primary school Mexican
children (11 to 12 y.o.).They solved the two tasks mentioned as pre- and post tests
before and after they were trained in the use of Exploratory Talk (ET) as well as
in strategies for producing summaries. We found that, after training, children im-
proved substantially in the use of ET to think together and argue when solving the
RSPM test but not the summary task. However, when we used the ethnography of
communication to analyse their talk for the second task, we found that the number
and quality of communicative events and acts increased importantly. Also, the qual-
ity of the summaries children produced improved significantly. In conclusion, the
overall discursive analyses carried out for both tasks revealed that, in spite of some
differences, there were also many commonalities in Children's talk. These included:
asking for and providing opinions, generating alternatives, elaborating on the in-
formation shared, coordinating efforts and seeking agreement. To account for these
similarities, we propose to adopt the concept of ìco-construction as an inclusive
term to characterise the efforts of collaboration and coordination of activities used
by the children in a variety of educational contexts.

*The discourse of collaborative creative writing. Peer collaboration as a context for
mutual inspiration*
Eva Vass, University of Southampton, United Kingdom

Drawing on socio-cultural theory, this paper focuses on Children's classroom-based
collaborative creative writing. The central aim of the reported research was to con-
tribute to our understanding of young Children's creativity, and describe ways in

which peer collaboration can resource, stimulate and enhance their creative writing activities. The study drew on longitudinal observations of ongoing classroom activities in Year 3 and Year 4 classrooms (children aged 7-9) in England. Selected pairs' collaborative creative writing activities were observed and recorded using video and audio equipment in the literacy classroom and in the ICT suite (13 pairs, about 2-4 occasions each). The research built on the contextualised, qualitative analysis of the social and cognitive processes linked to shared creative text composition via the in-depth study of verbal interaction. For the analysis a functional model was developed. By linking cognitive processes associated with writing (engagement and reflection) to observed collaborative and discursive features, the research has identified discourse patterns and collaborative strategies which facilitate sharedness and thus support joint creative writing activities. A central finding was the centrality of emotions in the observed creative writing activities. Also, the analysis revealed Children's reliance on collaborative floor (Coates, 1996) a discourse building on interruptions and overlaps, often without clear-cut turn-taking. Challenging traditional descriptions of effective collaboration, the use of collaborative floor was found to support the joint generation of creative content. By enabling the partners to mutually inspire each other, it facilitated sharedness. These findings have implications to both educational research and practice, contributing to our understanding of how peer interaction can be used to resource joint creative activities.

Transactivity in peer collaboration in a multi-ethnic primary school
Mariette De Haan, Utrecht University, Netherlands
Ed Elbers, Utrecht University, Netherlands

In this paper we present an analysis of peer collaboration in a multi-ethnic school in the Netherlands. The school encourages collaboration and students are accustomed to work in small groups of four or five students. Our observations focus on students in a 7th grade (children between 11 and 13 years of age) during mathematics lessons. We recorded the conversations between the children during the collaborative activities with audio recorders and transcribed them. The analysis was based on 20 hours of transcribed recordings. Studies of collaboration typically use one or more predefined concepts for assessing the quality of collaboration. In this study, rather than evaluating the collaborative activities with pre-defined norms, we use the analysis of the actual talk for figuring out how students structure their collaboration from moment to moment. We distinguished transactive episodes (TE's), which we define as episodes where minimally one student attempts to create a common problem solving situation that is answered by minimally one other student. For

each TE, we established which activity students were undertaking or what part of the problem solving process students were addressing. These TE's could, for instance, encompass the exchange of information about the task, the definition of the mathematical procedure, or the actual performance of a mathematical procedure. Analysing the students' conversations in this way, we could understand the contributions of students more easily as sensible forms of participation in the process of collective reasoning. In our interpretation of the students' forms of reasoning we will pay attention to how language skills, cultural norms of reasoning, and particular interpretations of the task contribute to the development of the particular forms of argumentation found in this classroom.

A 7   23 August 2005   14:30 - 16:30   Room A007

Symposium
Student Learning in Higher Education

THRESHOLD CONCEPTS AND VARIATION IN STUDENTS' UNDERSTANDING

Chair: David Galbraith, Staffordshire University, United Kingdom
Organiser: Jean Mangan, Staffordshire University, United Kingdom
                Peter Davies, Staffordshire University, United Kingdom
Discussant: Glynis   Cousin, Higher Education Academy, United Kingdom

This symposium is concerned with the development and use of two approaches, threshold concepts and learning study, that may help teachers to understand and address the difficulties that students face in learning troublesome knowledge within a discipline. These approaches share the assumptions that teaching should aim to develop students' deep, transformative, learning and that teachers must possess a rich knowledge of typical variations in students' subject understanding. Whilst the threshold concept approach focuses attention on integrating ways of thinking that subject experts take for granted, learning study focuses on the processes by which teachers can be helped to identify and respond to variation in students' understanding of particular phenomena. The first paper discusses a synthesis of how threshold concepts have been embraced across different disciplines, using a case study approach. It provides perspectives on constructively aligning courses to the experience and understanding of students, conceptualising how students approach, engage in and emerge from potentially transformative and troublesome episodes

of learning and the variation within student learning. The embedding of threshold concepts in the curriculum and assessment practice is explored. The other papers discuss new empirical work, applying the approaches within the discipline of economics. The first considers the testing of learning theory in the classroom using a control group for comparison. Substantial improvement in understanding is reported. The two other papers use the approach of threshold concepts. In the first a wide range of methods for the identification of thresholds within a discipline are discussed and the effectiveness of a number of these is assessed empirically. The second tests the hypothesis that peer group ability in one's study group may impact on the acquisition of a threshold concepts using a research design involving both the randomly-assignment and self-selection of students to study groups.

Overcoming barriers to student learning: Threshold concepts and troublesome knowledge
Jan H.F. Meyer, University of South Australia, Durham University, United Kingdom
Ray Land, Coventry University, United Kingdom

The current interest in threshold concepts' and troublesome knowledge has arisen from work undertaken within an ESRC funded research project (2000-2005) Enhancing Teaching and Learning Environments in Undergraduate Courses. Threshold Concepts' has since been recognised by the Higher Education Funding Council for England (HEFCE) as an area meriting further study in its own right, and from autumn 2004 HEFCE is funding a national FDTL 5 consortium project on Developing first year undergraduates' acquisition of threshold concepts in economics led by Professor Peter Davies at Staffordshire University. The topic of threshold concepts is arousing the interests of academics and educational researchers in a growing number of countries. The work, to our knowledge, is already being cited in Australia, Hong Kong, Sweden, Greece, South Africa and the USA. The basic idea underpinning this field of enquiry is that in certain disciplines there are conceptual gateways' or portals' that lead to previously inaccessible, and initially perhaps troublesome ways of thinking about something. A new way of understanding, interpreting, or viewing something may thus emerge ó a transformed internal view of subject matter, subject landscape, or even world view. In attempting to characterise such conceptual gateways it was suggested in the earlier work that they are transformative (occasioning a significant shift in the perception of a subject), and may also be irreversible (unlikely to be forgotten, or unlearned only through considerable effort), integrative (exposing the previously hidden interrelatedness

of something) and troublesome, for a variety of reasons. This paper draws on the research of both these major projects, as well as the work of an international range of scholars who have become interested in and contributed to this new field of enquiry. It presents a synthesis of how threshold concepts have been embraced across different disciplines.

Recognising threshold concepts: An exploration of different approaches
Peter Davies, Staffordshire University, United Kingdom
Jean Mangan, United Kingdom, United Kingdom

Meyer and Land (2003) have proposed that there exist in many disciplines threshold concepts, which can be considered akin to passing through a portal, or conceptual gateway, thus opening up a new and previously inaccessible way of thinking about something. Such concepts lead to a transformed way of understanding, or viewing something that may represent how people think in a particular discipline, or how they perceive, apprehend or experience particular phenomena within a discipline. If threshold concepts are to be embedded in the curriculum as a means of improving student understanding, the first step within any discipline is the identification of such concepts. This paper considers how such concepts can be recognised, why particular methods may be appropriate and discusses the strengths and weakness of the various approaches. The methods considered include dialogue with lecturers, analysis of students' writing and oral expression, analysis of mark schemes and comparison of the treatment of a phenomenon by members of different disciplines. The discussion may be applied to any field, but the discipline of economics is used as the example in our exposition. Data has been collected on a variety of these approaches with different groups of students (both specialist and non-specialists) and staff. The results are presented of their effectiveness in revealing threshold concepts, consistency with other approaches and ease of data collection and analysis. The paper concludes with recommendations as to the more fruitful approaches to consider in future work.

Peer effects on learning threshold concepts in economics
Martin Shanahan, University of South Australia, Australia
Jennifer Foster, University of South Australia, Australia
Jan H.F. Meyer, University of South Australia, Durham University, United Kingdom

One metaphor for the idea of the threshold concept is that it is a portal, which, when

crossed by the learner, grants access to a previously inaccessible or transformed way of thinking. Within the discipline of economics, the idea of opportunity cost has been identified as a threshold concept (Meyer and Land 2003; Shanahan and Meyer 2003). In economics, recent attention has been paid to the role of peer ability in education. These explorations have attempted to isolate the effect of average peer ability on overall achievement measures from the potentially confounding factor of self-selection into student groups. Empirical results have been mixed, reflecting in part the gap in understanding regarding the causal process by which peers affect education. One such causal process may be peer influence on the acquisition of threshold concepts. In this study, we test the hypothesis that peer group ability in one's small study group, measured by external measures of peers' educational attainment (university entrance scores and prior economics knowledge) and internal learning processes (measured by an economics-specific reflection on learning inventory), may impact on students' understanding of threshold concepts in introductory economics. We use a unique research design where some students are randomly assigned to study groups. Both randomly-assigned and self-selected students are surveyed at various points in the course to ascertain their understanding of opportunity cost. This design allows us to circumvent student selection in our estimate of the raw peer effect, and also allows us to explore whether students who are able to choose their study group acquire these key threshold concepts more completely than those who are randomly assigned. The results of the study cast new light onto the nature of peer influence in economics education, the factors that influence the acquisition of threshold concepts, and the impact of self-selection in education.

Learning theory as teaching resource: Another example of the radical enhancement of students' understanding of the economic aspects of the world around them
Ming-Fai Pang, University of Hong Kong, China, Peoples Republic of
Ference Marton, Gothenburg University, Sweden

A group of experienced secondary school teachers used a novel learning theory as a resource for planning and carrying out their teaching of a difficult economic concept. Their students' mastery of this concept after a series of three lessons was compared with the mastery of the same concept by students who were taught by another group of teachers under the same conditions except for the use of the theory. The difference in learning outcomes was extreme. Observations of what was happening in the classrooms showed subtle but decisive differences correlated with the differences in outcome. These differences were interpreted in terms of the theory used by the first group, and the results seem to give support to the theory.

Symposium
Systems in Education

MULTIPLE PERSPECTIVES ON CLASSROOMS AROUND THE WORLD: THE LEARNER'S PERSPECTIVE STUDY

Chair: David Clarke, University of Melbourne, Australia
Organiser: David Clarke, University of Melbourne, Australia
Discussant: Jeremy Kilpatrick, University of Georgia - Athens, United States

Since its inception in 1999, the Learner's Perspective Study (LPS) has documented the practices of 'well-taught' eighth-grade mathematics classrooms for sequences of ten or more consecutive lessons using a three-camera approach, supplemented by post-lesson video-stimulated interviews with teacher and students. The move to employ multi-camera and multi-audio in researching educational settings is not primarily technology-driven, but rather motivated by the recent shifts in theories of learning, from a view of learning as transfer to a view of learning as constructed in action. The LPS research community now includes 14 countries and as the body of data has grown, so has the capacity for fine-grained comparative analyses of the practices and associated learning in classrooms as geographically distant as Uppsala, Melbourne, Tel Aviv, Durban and San Diego, or as close as Hong Kong, Shanghai and Tokyo. The five presentations in this symposium offer different perspectives on classroom practice: revisiting the teacher-centred, student-centred dichotomy from the perspective of Asian classrooms; utilising complementary theoretical frames to reveal tensions between participation and content-coverage; exploiting the contrasts of international classroom practice to offer novel analyses related to time and flow; utlising particular lesson events as units for comparative analysis of classroom practices and meanings across six cultures; and juxtaposing teacher and student perceptions of those events. The result is a rich, multi-faceted portrayal of the practices of competent teachers in classrooms around the world. Taken individually, the presentations both confirm and challenge accepted wisdom in relation to valued classroom practice and in several instances problematise elements of the reform agenda being pursued in 'Western' cultures. The result should be sufficiently confronting to stimulate lively discussion.

Teacher-dominating lessons in Shanghai: A triangulation from three perspectives
Ida Ah Chee Mok, University of Hong Kong, Hong Kong

Students learning in teacher-dominating classrooms in Confucian-heritage cultures give very good performances in comparative studies such as TIMSS. These results create a myth regarding the value of the teacher-dominating lessons. In the LPS data from different countries it is not difficult to find episodes with different levels of control or intervention from the teachers. We argue here that what really matters can be perceived from three perspectives: (1) what the teacher wants his students to learn, (2) what the students capture their lessons, and (3) how the teacher's input creates a possibility of understanding the mathematics. The data in this paper come from 15 consecutive (grade 7) mathematics lessons by a teacher in Shanghai, including the teacher's and students' interviews. In this attempt to triangulate the picture of a lesson from three different angles, we see that the teacher's and the students' characteristics are essential elements contributing to the success of the lesson. It is worth noting that like his counterparts in other parts of the world the Shanghai teacher values his students' thinking and participation very much and agrees that knowledge should not be acquired by transmission. However, in the implementation the teacher shows a version of student-centredness different from that in the western world. In spite of the similarity in the belief of what a good learning environment should embrace, the image of the lesson is very much content-oriented and teacher-controlled. Referring to a detailed analysis of the content of a specific lesson via the framework of variation, it is found that the teacher is very skilful in using variation even though he may not be aware of it. The teacher demonstrates a personalized pedagogical theory which he demonstrates successfully in his own lesson.

The price of participation - how interaction affords and constrains the classroom learning of mathematics
Jonas Emanuelsson, Gothenburg University, Sweden
Fritjof Fritjof Sahlstr?m, Uppsala University, Sweden

This presentation aims to demonstrate empirically the interdependency of the content of learning and the organisation of interaction in the mathematics classroom. Drawing upon two different theoretical positions, we have analysed videotaped interaction in the naturalistic classroom. Materials analysed are collected within the Learner's Perspective Study, called LPS (Clarke, 2003) and data from several countries are compared and contrasted in the presentation. The general aim of this paper

is to further the understanding of how mathematical content is taught and learned in classrooms, using two different and complementary theoretical perspectives for the analysis. The same empirical material, consisting of whole-class teaching, and seat interaction among peers, from two different mathematics classrooms in the United States and Sweden, is analysed both within a conversation analysis framework (Sacks, Schegloff & Jefferson, 1974; Schegloff, 1996) and from the point of view of variation theory (Marton & Booth, 1997; Marton et. al., 2004). In the article, the tension between participation and mathematical content is a recurring theme. Results show that extensive possibilities for the students to participate in interaction are associated with a price. The price to be paid is the consistency in the presentation of the mathematical content and hence more limited possibilities for the students to learn mathematics. However, under certain circumstances the "content - cost" is less than under others. We describe and discuss these circumstances.

The unfolding of lessons and their pedagogical rationale as a criterion for international comparisons: The case of teaching systems of linear equations
Michael Fried, University of the Negev, Israel
Miriam Amit, University of the Negev, Israel

International studies such as the TIMSS have taught us, among other things, that international comparisons are devilishly difficult to make (e.g. Keitel & Kilpatrick, 1999). Even where curricular complexities may be put aside and a common subject agreed upon, Stigler and Hiebert (1999) and others have shown that lesson structure and presentation can vary greatly from country to country, culture to culture. The present paper adduces further evidence for this fact and underlines a crucial aspect of the presentation of mathematical subjects to be taken into account in international studies, namely, the manner in which lessons unfold in time. Aspects of time in mathematics teaching and learning have been studied by various scholars such as Chevallard (1985), Brousseau (1999) and Arzarello, Bartolini Bussi, & Robutti (2002). In this paper, we shall examine how algebra lessons on systems of linear equations flow in time and how their pedagogical rationale unfolds. The lessons, which are the focus of this paper, were observed in an eighth grade classroom in the Negev city of Beer Sheva. These are compared with lessons in Shanghai and Hong Kong on the same subject matter, as described by Mok, Leung, Lopez-Real, and Marton (Mok et al., 2002). The comparison of our findings with those of Mok, et al. showed that while there were some differences between the lessons in Hong Kong and Shanghai, those lessons were far more comparable with one another than they were with the lessons we observed in Beer Sheva. Despite the concurrence of

subject matter in all three classrooms, the way the Beer Sheva lessons flowed and developed the material differed so strikingly from either Hong Kong or Shanghai that the very possibility of comparison became no longer obvious. This finding suggests that criteria for international comparison need considerable and critical investigation.

Exploring international classroom practice through a fine-grained analysis of one lesson event in the classrooms of six cultures: Kikan-Shido
David Clarke, University of Melbourne, Australia
Catherine O'Keefe, University of Melbourne, Australia

If we approach social settings (and the situations they frame) as multiply-constructed and open to multiple construal, then the methodology employed in their study must offer a voice to the several participants in these settings. This is particularly true when our interest is the cultural-specificity of practice. In this study, we examined classroom practices in Asian classrooms (Tokyo, Hong Kong and Shanghai) and contrast these with practices in San Diego, Berlin, and Melbourne by applying a layered analytical approach the utilised the 'lesson event' as its basic unit of analysis and identified patterns of participation characteristic of the classrooms studied. Our analysis suggests that there are distinct differences in these patterns of participation even among 'Asian classrooms'. In this presentation, the lesson event 'Kikan-Shido' (Between desks instruction) is used as the unit of analysis to compare the patterns of participation operating in classrooms in Shanghai, Hong Kong, Melbourne, San Diego, Tokyo and Berlin are identified and compared. In addition, the reconstructive accounts elicited from teachers and students in those classrooms provide insight into the motivations and meanings that underlie classroom participants' collaborative structuring of these patterns of participation. In particular, differences are identified in teachers' enactment of 'Kikan-Shido' and these differences are related to specific pedagogical principles that appear to underlie the teachers' practice. The simplest example of such a difference is the distinction between 'monitoring' and 'guiding' student mathematical work during Kikan-Shido. Our analysis identifies the proportion of time spent on each of these activities as a signature characteristic of each teacher's practice. Another of these key differences relates to the distribution of responsibility for knowledge generation. Our analyses confirm the parallel work of Mok and her colleagues in demonstrating that the teacher-centred/student-centred dichotomy seriously misrepresents the subtleties of practice in both Asian and Western classrooms.

Perceptions of lesson events and associated values held by the teacher and the students
Yoshinori Shimizu, Tokyo-Gakugei University, Japan

This paper reports the analysis of post-lesson video-stimulated interviews with the teachers and students in three eighth-grade grade mathematics classrooms in Tokyo. The methodology employed in the Learner's Perspective Study offered the teachers and the students the opportunity in post-lesson video-stimulated interviews to ìparse the lesson they had just experienced. That is, to identify for the interviewer those events in the lesson that the participant felt to be significant, the teacher and the students were given control of the video replay and asked to identify and comment upon classroom events of personal importance. It is clearly possible that students identify as significant classroom events that are quite different from those intended by the teacher. By juxtaposing their perceptions of classroom events, both within one particular lesson and in the sequence of consecutive lessons, discrepancies and agreements between teacher and the students were identified. Associated values held by the teachers and the students were analyzed in relation to such lesson events as "Kikan-Shido" (instruction between desks) and "Matome" (summing up). The analysis described in this paper suggests that, while they share views on ìsignificant lesson events, they construct different meanings associated with the same event. Then, the analysis raises the question of the extent to which teacher and learner practices are in a mutually supportive relationship. The results indicate that teacher and learner practices appear to be both conflicting and mutually sustaining. The analysis also reveals the richness and potential of the collected data, as well as strength of the methodology, in the Learner's Perspective Study.

Symposium
Comprehension of Text and Graphics

LEARNING THROUGH CONSTRUCTING EXTERNAL REPRESENTATIONS

Chair: Erica de Vries, University of Grenoble II, France
                Shaaron Ainsworth, University of Nottingham, United Kingdom
Organiser: Erica de Vries, University of Grenoble II, France
                Shaaron Ainsworth, University of Nottingham, United Kingdom
Discussant: Elsbeth Stern, Max Planck Institute for Human Development,
                Germany

Many learning situations offer multiple forms of representations for learners to interpret, but there is increasing interest in asking learners to construct their own external representations. In addition to editing text, learners may construct graphs, build models, draw pictures or write equations. Despite the large amount of research on interpreting representations, much research needs to be done as to the role of construction activities in learning with computer-based representations or with more traditional paper-and-pencil representations. A number of questions should be addressed if we are to understand learning through construction. These include: What forms of representation are suggested, used and/or invented by learners? How does collaborative construction differ from that of individual construction? What roles does construction play in the processes and products in learning? When is it advantageous to construct a representation versus interpret a given representation? What support do learners need to construct representations? The papers address a wide range of learning topics which vary in the number of permissible solutions to problems (single correct versus multiple permissible answers) and tools used to support representation construction, i.e. from pen and paper to on-line discussion and simulation environments. Consequently, the main aim of the symposium is to address these questions by bringing together researchers with varied approaches to the study of learners' construction of external representations.

Co-elaborating knowledge with external representations

Marije van Amelsfoort, Utrecht University, Netherlands
Jerry Andriessen, Utrecht University, Netherlands
Gellof Kanselaar, Utrecht University, Netherlands

This study focuses on the collaborative construction of diagrams in argumentation-based learning. In collaborative argumentation-based learning (CABLE), students discuss an issue together in order to better understand it. Diagrams are said to be beneficial for CABLE for many reasons, including forcing students to make opinions and arguments explicit, or keeping focus on the discussion. We are mostly interested in diagrams as tools to structure argumentation and relate argumentative knowledge. We want to know whether the collaborative construction of a diagram supports students in relating knowledge in a space of debate, enabling a better understanding of the issue under discussion. Earlier studies found that students have difficulties in the construction and use of diagrams in CABLE. They focus on the content of the boxes, but not on the relations between the boxes, (or on the overall picture). This is perhaps not a surprising finding. Students are unused to constructing diagrams for argumentation, let alone in collaboration. The construction of an argumentative structure might be too hard for students who are used to narrative structures. There might also be differences in individual preferences for verbal or visual learning. In this study, pairs of students discuss the issue of Genetic Modification. In condition one, students construct a diagram in which focus is placed on relations by labeling them. In condition two, students construct a diagram in which focus is placed on arguments by labeling them. In the third condition, students can only use chat. We investigate the amount and nature of relations students (co-)construct. We expect understanding of the space of debate to be highest in the relation condition, and lowest in the chat-only condition. Differences in preference for verbal or visual learning will be taken into account. Results of the study will be discussed in Cyprus.

Dynamic modeling, the added value of simulating a representation

Wouter van Joolingen, University of Twente, Netherlands
Simone Lohner, University of Amsterdam, Netherlands
Elwin Savelsbergh, Utrecht University, Netherlands

The central question in this presentation is to what extent simulating the dynamic properties of dynamic models improves inquiry and understanding of the domain that is being modeled. In dynamic modeling tasks, students build a representation

of the domain using a system-dynamics representation as found in tools such as STELLA. In the study presented, 43 students created a dynamic model of the earth's greenhouse effect, one group could simulate the model constructed; a second group could not simulate the model. In pre- and post tests, learner's knowledge and reasoning was assessed with items in which learners had to expose reasoning ability by predicting the change in the model as result of a particular event, such as removing the earth's atmosphere. A coding scheme for reasoning ability with dynamic models is introduced, based on dimensions of knowledge type and knowledge subject. It is expected that students in the dynamic modeling group are better in generating graphs. With respect to the reasoning with the model, one expects students using the conceptual model to generate more elaborate verbal explanations of their thoughts, as they had the need to reason explicitly with their model. On the conference, the results of analysis, which is currently in progress, will be presented.

Learning by constructing self-explanation diagrams
Shaaron Ainsworth, University of Nottingham, United Kingdom
Ioanna Iacovides, University of Nottingham, United Kingdom

The self-explanation effect (whereby students generate explanations to themselves as they are studying) has been shown to enhance learning in many domains. Recent research has demonstrated that the way that material is presented influences the self-explanation effect. Ainsworth & Loizou (2003) presented students with information about the circulatory system in either text or diagrams and prompted them to self-explain. Diagrams students outperformed text students at post-test, generated more self-explanations and their learning was more dependent on self-explaining. The current study sought to explore if these same benefits would ensue if students constructed self-explanations in diagrammatic form. Consequently, twenty-four subjects were given information about the human circulatory system to learn. Half of them were given the information in the form of diagrams and asked to write down their self-explanations. The other half were given the information in the form of text and asked to construct their own self-explanation diagrams as they self-explained. The results showed that students in both conditions learnt and at post-test performed identically on every measure of learning. They also generated the same number and quality of explanations. The only ways these two groups differed is in the amount of information they chose to translate across representations. Text students included almost twice as much information in their pictures as diagram students in their summaries. Furthermore, the amount of information translated predicted learning outcomes whereas the number of self-explanations did not. Overall,

these results showed that by generating their own diagrammatic self-explanations while studying, students can overcome the previously reported text disadvantage. It also suggests that some of the some of the benefits of self-explanation may be due to translating information over representations of different forms.

Analysing design problem solving products as external representations
Erica de Vries, University of Grenoble II, France

This contribution examines external representations as problem solutions in design tasks for technology education. Design tasks are introduced to put students in learning situations that resemble professional situations and to make students use the physical and semiotic tools of the trade. Design tasks involve the construction of a plan of a future artefact, and one of its defining characteristics is the fact that multiple solutions exists which can be rated on their feasibility and technical quality, cf. rating technological aspects of solutions such as manufacturing, use, and maintenance of the future artefact. Design solutions are not simple drawings; they can be characterized as composite representations that incorporate geometrical and functional information using different semiotic codes. The current study investigated drawings and textual comments produced by students from different backgrounds for a student residence problem in order to give answers to questions about the strategies and representational formats used. Two groups of students participated in the study: students from a secondary school for vocational training and fourth year university students in educational science. The analysis scheme takes into account information in graphical and textual form and a number of different representational aspects. Results are presented and interpreted in terms of both affordance of the situation, cf. aspects inducing students' choice of a particular representational format, and vicariance, cf. the interchangeability of cognitive processes for determining action in a given situation.

A 10   23 August 2005   14:30 - 16:30   Room A010

Symposium
Motivational, Social and Affective Processes

EXPANDING MOTIVATION AND SELF-REGULATION IN MULTIPLE SOCIAL LEARNING AND TEACHING CONTEXTS

Chair: Hanna Jarvenoja, University of Oulu, Finland
                Sanna Jarvela, University of Oulu, Finland
                Simone Volet, Murdoch University, Australia
                Anastasia Efklides, University of Thessaloniki, Greece
                Susan Bobbitt Nolen, University of Washington, United States
                Marja Vauras, University of Turku, Finland
                Erkki Olkinuora, University of Turku, Finland
                Jarkko Makinen, University of Turku, Finland
                Pekka Salonen, University of Turku, Finland
Organiser: Marja Vauras, University of Turku, Finland
                Simone Volet, Murdoch University, Australia

The session focuses on challenges for research on motivation, emotion, and self-regulation in complex learning and teaching environments typical in today's knowledge- and competence-oriented society. Formal and in-work learning environments in all educational levels are, increasingly, greatly variable, rapidly changing, and less structured, mixed-motive situations. Productive engagement in learning activities as well as professional development has to be understood in relation to the real contexts in which it is embedded, since context is assumed to give meaning to task-oriented actions. Theoretical perspectives to teaching-learning processes taking place in various contexts, captured in terms like contextualized, socially mediated, co-regulated, have more recently extended to research on motivation, emotion and self-regulation. Researching situated motivation, emotion and regulation implies locating goals, engagement and affect in the dynamic activities of social systems. Social interaction with dynamic, relational regulation and negotiation patterns become accentuated and, thus, shift research towards multi-dimensional aspects of learning and development. However, despite some rather sophisticated attempts to describe socio-cognitive interaction dynamics, there is still lack of concepts and research on macro-level social structures (e.g., participation or relational control structures) shaping interaction processes and subsequent developmental pathways.

In five presentations, we discuss challenges for motivation, emotion and self-regulation research and ideas for a more expanded, holistic framework for the analysis of these constructs. The focus is on dynamic, developmental and situational interactions between motivation, affect, self-regulation, personal growth and learning processes. Some new concepts, better depicting the social nature of these processes, will be proposed. Empirical observations and data clarifying the arguments will be presented, although the focus is on the state-of-the-art literature or meta- analysis. Also, we draw attention to efficient methodological tools to examine and assess dynamic motivational, affective and regulatory processes, and of finding models for good practice and instructional design.

Emotional and motivation control in collaborative learning situations - how students are able to regulate emotions evoked from these challenges?
Hanna Jarvenoja, University of Oulu, Finland
Sanna Jarvela, University of Oulu, Finland

The aim of the study is to investigate the interplay of the regulation processes between an individual and a group, as well as dynamics between emotion and motivation control. The social learning situations where individuals' characteristics, goals and demands meet can arouse emotions and create motivational conflicts. For example, the idea of collaborative learning models is that the students aim for construction and attainment of a shared goal so that the responsibility of the learning process is equally shared. This requires constant negotiation, argumentation and sharing ideas among the group members and during these processes social conflicts can emerge. Socially challenging situations are critical for successful collaboration and they therefore invite the need to control both individuals' own motivation and emotions and the other group members' emotional arousal and motivation. This paper aims to specify what kind of emotional challenges social aspects of collaborative learning bring to the situation and as well as students self-, other- and shared-regulation in these situations. The data consists of educational psychology students' (n=35) self-reports collected with a specific ìdynamic questionnaire. The questionnaire is designed to reach the dynamic nature of collaborative learning. In the analysis the experienced social challenges are linked to the reported activity of the students' use of regulation strategies. Also student groups' internal dynamics are analysed by creating groups' goal and regulation activity profiles. The results indicate that certain types of social challenges are linked to more active use of regulation strategies than the others. The data of the group dynamics gave multi-faceted view on how individual students' goals and interpretations of the social challenges

are linked to the use of regulation strategies. It also showed how the students interpret the group's role for their achievement.

Self-regulation and self-in-context regulation: pathways to knowledge construction in social learning environments
Simone Volet, Murdoch University, Australia
Marja Vauras, University of Turku, Finland
Pekka Salonen, University of Turku, Finland

This paper discusses an expanded, holistic framework for the analysis of regulatory constructs (self-, other-, co- and shared-regulation). The framework aims at clarifying the diversity of regulatory models through screening the individually- and socially-oriented regulatory constructs, and relating them to the basic theoretical assumptions underlying the socio-cognitive and socio-cultural approaches. A social shared regulation space is conceptualized, where knowledge is socially constructed through participation in activities that vary in locus of regulation. A range of established and hypothetical paths link these forms of shared regulation with self-regulation. The developmental paths have a sound theoretical grounding supported by extensive empirical work, and some have also been turned into instructional paths as they have inspired the development of instructional strategies, e.g., reciprocal teaching, joint problem-solving, computer conferencing and various forms of collaborative learning. Some hypothetical paths have been added, leading to a tentative full model of regulation in learning. This model questions whether self-regulation should be considered as the single ultimate form of regulation. In light of the second wave of cognitive theory, which has emphasized the necessity to focus on the "individual-in-context", we propose a new concept, "self-in-context regulation", in order to explain regulation in social learning context. SCR integrates self-regulation and shared regulation in a single process. The concept of SCR will be used to explain how the forms of shared regulation lead to knowledge construction in real learning situations, and how it may work best as an instructional tool. Illustrations from real-life learning at micro-level will be presented.

Self- and co-regulation in instructional context: restraining and facilitative interaction patterns
Pekka Salonen, University of Turku, Finland
Anastasia Efklides, University of Thessaloniki, Greece
Marja Vauras, University of Turku, Finland

This paper attempts to link learning-related cognitive-metacognitive, motivational and affective regulatory processes to patterns of interpersonal transaction. Most models of socially guided learning presuppose a gradual progress from other- to self-regulation, often described through the scaffolding metaphor. In optimal scaffolding, the teacher, e.g., sensitively regulates task difficulty, assists the student to articulate the essential features, and contingently doses and fades help-giving. Such scaffolding acts are often discussed in a somewhat idealized manner. Based on the findings from interpersonal and relational control theories (pertaining e.g. to therapy and familial transactions), we propose that instructional interaction is governed by inter-behavioral macro-structures, such as recursive patterns of relational control and affect coordination These patterns may importantly co-determine the ways the teacher and student respond to each other, and the ways the teacher modulates the student's cognitive, metacognitive, motivational, and affective activity. For example, complementary relational patterns may be 'stabilized' and, particularly under stress, become escalatory with increased rigid domineering-submissive behaviors and negativity. Although there is some empirical evidence that recurrent interpersonal control and affective patterns contribute to instructional processes, there are no studies focusing on the interplay of interpersonal relational control, affectivity, and teacher's regulatory activity. Our pilot studies suggest that recurrent relational control and affective patterns may essentially co-determine the successfulness of teacher's cognitive, metacognitive and motivational regulatory activity during scaffolding processes. Thus, it is important to understand how interpersonal motivational, affective and relational control mechanisms and socio-cognitive processes interact and contribute to the development of a learner's regulatory processes.

When worlds collide: negotiating competing views of teaching across social contexts and the effect on student teachers' motivation to learn
Susan Bobbitt Nolen, University of Washington, United States
Ilana Seidel Horn, University of Washington, United States
Christopher J. Ward, University of Washington, United States
Reed R. Stevens, University of Washington, United States
Katherine Estacio, University of Washington, United States

Researchers have recently examined the role of multiple contexts in students' developing interest and motivation to learn. In the US and other countries, individuals who wish to be teachers learn by participating in multiple contexts: both formal education in colleges or universities and apprenticeships as student teachers or interns in school settings. Taking a socio-cultural perspective, these contexts could be studied as places of identity development rather than as contexts for learning. Holland, Lachicotte, Skinner & Cain (1998) claim that motivation and will are formed as the individual develops identities in the socially-constructed roles, meaning-systems, and symbols of the cultural contexts in which they live, so-called figured worlds'. In this perspective, motivation to learn or interest in learning particular aspects of teaching could be framed as the individual choosing tools that ìfit his or her identity as a teacher. But pre-service teachers may be faced with one set of practices endorsed by university instructors, while a conflicting set of practices may be endorsed by school staff. The same strategy may have different significance in the two worlds. The students might be motivated to learn a strategy that is most congruent with their developing ideal teacher self, but that self develops dialectically in the sometimes conflicting meaning systems of different educational contexts. Multiple contexts might give rise to multiple, competing teacher identities that students must negotiate in their development as novice teachers. This presentation will discuss the theoretical implications of framing motivation and interest in terms of their relationship to identity development. We will illustrate the framework with data from our study of pre-service teacher development. However, we will argue that an identity-development framework could also shed light more generally on the development of stable individual interests in other social contexts.

Meta-analysis of general study orientations
Erkki Olkinuora, University of Turku, Finland
Jarkko Makinen, University of Washington, Finland

In this presentation, we take a look at research focusing on students' general study orientations. General study orientations are regarded as one central viewpoint concerning the motivation and goals of degree studies. The scope of the study extends from early measurements in the late 90's to very recent and even ongoing investigations. The main goal of the presentation is to portray the most common structure of study orientations throughout different higher education institutions representing multiple study fields and various student groups. Findings based on several independent surveys (orientations measured by the Inventory of General Study Orientations, IGSO) and a comprehensive interview study shows that general study orientations typically take a seven dimensional structure. These dimensions are deep orientation, anxious surface orientation, achievement orientation, systematic orientation, work-life orientation, social orientation, and non-commitment. The meta-analysis of all quantitative data available on the issue as well as the results of the interview study confirms the seven dimensional structure of general study orientations. These orientations are then related to close concepts presented by well-known researchers (like, Entwistle, Vermunt, Marton etc.) in the area of higher education.

A 11   23 August 2005   14:30 - 16:30   Room E113

Symposium
Teacher Professional Development

PROFESSIONAL DEVELOPMENT FOR SUSTAINABLE EDUCATIONAL CHANGE: ON THE INTERRELATIONSHIP BETWEEN INSTIT

Chair: Michael Eraut, University of Sussex, United Kingdom
Organiser: Philip Adey, King's College London, United Kingdom
Discussant: Michael Eraut, University of Sussex, United Kingdom
               Sten Ludvigsen, University of Oslo, Norway

This symposium will address the issue of sustainable change in schools through teacher professional development, from a variety of perspectives. We will investigate the two-way interaction between the school as an instituition, represented by

its senior management and the departmental structure, and teachers as individuals. Imants et al. study this process over 14 years in one school as a process of bureaucratisation. Adey et al. study the relationship of coaching to sustainable change in schools.

Teachers' professional development and sustained change
Jeroen Imants, Radboud University of Nijmegen, Netherlands
J Luttenberg, Radboud University of Nijmegen, Netherlands
T Carpay, Radboud University of Nijmegen, Netherlands

In this paper we focus on the problem of sustainability of change, as it is related to teachers' professional development. To this end we analyze the developments in one secondary school over a 14 year period, both at the school level and the level of individual teachers. Most insights in educational change and teachers' professional development are based on cross-sectional research and this research has a restricted focus on early implementation. Research on educational change ignores the dynamics in the processes of sense making as well as the problems of institutionalisation and sustained change. By means of a case study of one reforming secondary school for a 14 year period we gain deeper understanding in how these individual and organizational sense making processes contribute to (the absence of) sustained change. In our conceptual framework we build on Giddens' notion of structuration and Mintzbergs' notion of bureaucracy. Six key elements for implementation of innovations in schoolsas identified by Fullan are used to describe the change process in the school. School development was analysed by means of document analysis, followed by repeated interviews with key persons. To study teacher development three teachers who worked in the school during the research period with diverging positions towards the school reform were interviewed twice. Our conclusion is that the process in the school can be regarded as a process of bureaucratisation. in which opportunities for innovative teachers' professional learning and sustained educational change in the direction of self-directed learning structurally are reduced.

The nature of ìcoaching in professional development
Philip Adey, King's College London, United Kingdom
Gwen Hewitt, freelance, United Kingdom
John Hewitt, freelance, United Kingdom

In designing a comprehensive long-term professional development programme intended to introduce radical changes in pedagogy, for the development of higher order thinking in school students, coaching played a central role. This paper will describe the various types of coaching used, including demonstrations, observation and feedback, and team teaching. It will offer some data from interviews conducted with teachers who were coached and with teacher-tutors who became coaches, in a local authority context where an attempt was being made to make professional development systemic. The main aim, however, is to relate the practice of coaching teachers to three theoretical perspectives on pedagogical change: teacher conceptualisations (with implications for necessary conceptual change), reflection on practice (with implications for the role of the tutor as expert), and teachers' intuitive knowledge which develops when new explicit techniques become internalised and automated. It will be argued that these three complementary perspectives provide theoretical justification for the practice of coaching (whose empirical worth has been well established) and also give guidance for forms of coaching which should be most effective (and cost-effective).

Implementing content-focused coaching in large urban school districts: Challenges and design strategies
Fritz Staub, University of Zurich, Switzerland
Donna DiPrima Bickel, University of Pittsburgh, United States

A pivotal question for collaborations between educational researchers and practitioners is how abstract research-based knowledge can be infused into large systems in ways that transform current practice and enhance student learning. The problem of how abstracted knowledge, such as general principles of learning, can be made useful for teachers in classrooms is at the heart what leads to the development and conceptualization of Content-Focused CoachingSM (CFC) (West & Staub, 2003). CFC is a professional development model for the advancement of student learning and teaching by having a coach and a teacher or a group of teachers jointly plan, enact and reflect on lessons. The model consists of a specific activity setting and a set of theory-based conceptual tools assisting coaches and teachers in conducting content-focused coaching conversations. This study documents and analyzes the

implementation of Content-Focused CoachingSM for the teaching of elementary literacy in three large urban US school districts, which began in the years 2000, 2001, and 2002 respectively. The case studies are based on interviews with staff developers and district personnel, as well as written formative evaluations on the implementation of CFC from coaches, principals and other district personnel. The paper will present and discusses the challenges met, the kind of design problems solved, and begin to make explicit the expertise required to bring an innovative professional development model such as CFC to large school districts.

A 12   23 August 2005   14:30 - 16:30   Room E009

Symposium
Multimedia and Hypermedia Learning

MULTIMEDIA AND PROBLEM-BASED LEARNING

Chair: Jos Beishuizen, Vrije Universiteit Amsterdam, Netherlands
Organiser: Jos Beishuizen, Vrije Universiteit Amsterdam, Netherlands
Discussant: Abbas Darabi, Florida State University, United States

Recently, the development of theories about learning from multiple media, like verbal and pictorial information, or examples and theory descriptions, has received increased attention. Multimedia enhanced learning environments enable learners to make active use of available information by a simple mouse click. In this symposium, questions related to the value of so many multimodal information sources for learning processes and learning outcomes are addressed by reporting experimental research. When both text and pictures are available, how should these modes by presented in order to help the learner to create an integrated semantic representation of both concepts and similarities? When a knowledge domain has to be explored by students preparing for a simulation experiment, do they make use of examples or do they focus on theory descriptions? To what extent are their preferences determined by their learning style? When novice and expert students are working in a problem based learning environment, do they differ in their need of information? And can they be supported to determine their information requirements by conceptual and procedural help? When advanced internet users have to carry out an information search task in a well-known domain, related to their own expertise, or in an unknown domain, do they differ in search strategies? Contributions to this symposium will be discussed in order to contribute to existing theories about multimedia

learning.

Integrating information from text and pictures: How can learners be supported?
Tobias Bartholome, University of Muenster, Germany
Rainer Bromme, University of Muenster, Germany

One of the main cognitive demands in learning from text and pictures is mapping the different representations onto each other and integrating the information from the different sources into a mental model. In this research we examine the effects of two kinds of instructional measures for supporting this conceptual integration process in a computer-based setting: support for mapping and prompts supposed to structure the integration process. Participants (n = 84) learned concepts from the domain of botany with a combination of texts and line drawings in one of four groups (mapping support [numerical labels vs. interactive highlighting of corresponding elements] x structuring prompts [given vs. not given]). Subsequently, cognitive load and confidence in learning were rated. Post-tests included different text- as well as picture-oriented measures of conceptual botanic knowledge (e.g., categorising plant exemplars or giving definitions). In addition, the impact of the learner-related factors self-efficacy, spatial abilities and working memory span on knowledge acquisition was assessed. Main results yielded an interaction between the two kinds of supportive measures as well as a main effect of mapping support. Results are discussed with regard to prominent resource-oriented models of learning with text and pictures (e.g., generative theory of multimedia learning, Mayer, 2001; cognitive load theory, Sweller, van Merrienboer, & Paas, 1998). Our results call for complementing these resource-oriented models with a conceptualisation of the cognitive and metacognitive processes involved. We propose a new notion of the integration of text and pictures as construction of hybrid knowledge structures, incorporating similarity-based and rule-based components (e.g., Keil, Smith, Simons, & Levin, 1998).

Supporting information interaction during problem solving in powerful e-learning environments
Paul Kirschner, Open University, Netherlands
Liesbeth Kester, Open University, Netherlands
Jeroen van Merrienboer, Open University, Netherlands

Modern curricula are increasingly making use of powerful electronic learning environments (pELEs) to facilitate complex cognitive skill acquisition that contain

realistic practice problems (e.g., simulations etc.), and varied information resources (e.g., texts, auditory fragments, animation). When confronted with such a realistic practice problem, all learners need certain information to help them construct their own knowledge. They need to determine and act upon their information requirements by choosing and using the right information at the right time. However, novices in a domain do not have a good impression of what there is to know about a particular problem (Ormrod, 2004) and therefore cannot determine which information might help them to solve it. The decisions made by learners on what information to use can result in misconceptions especially when dealing with more complex problems or tasks (Hannafin, Land & Oliver, 1999). In addition, research shows that properly perceiving the problem demands is often problematic for domain-novices (see Broekkamp, van Hout-Wolters, van den Bergh & Rijlaarsdam, 2004 and Broekkamp, van Hout-Wolters, Rijlaarsdam, & van den Bergh, 2002 for task demands in relation to test expectations; Luyten, Lowyck, & Tuerlinckx, 2001 for task perception; and Zumbach & Reimann, 2001 for goal orientation). This impedes novices in acting upon their information requirements.

Learning styles, experience and information seeking
Nelleke van Wouwe, Leiden University, Netherlands
Jos Beishuizen, Vrije Universiteit Amsterdam, Netherlands

Previous studies have shown that learning style and experience affect learning and information seeking on the WWW. The investigators are inconclusive though, if certain learning styles improve search performance more than others. This study tested the effect of learning styles and experience on efficiency, systematic searching and learning on the WWW. Furthermore it characterized different information seeking strategies (by the frequency of behavioural movements and search patterns) per learning style and experience. Forty-two IBM employees were assigned to the experimental conditions by their scores on the Inventory of Learning Styles (ILS; Vermunt, 1998) and experience. Each participant received two knowledge tests and search tasks. Information seeking behaviour was logged and afterwards categorized on the basis of a behavioural model. Results showed no main effects of learning style or experience on learning, efficiency and systematic searching. An interaction effect of experience and learning style on systematic searching and efficiency was observed though. The influence of experience was more prominent with the undirected learning style than with the meaning directed learning style, which was hypothesized. Unexpected was the high efficiency and systematic searching by experts with an undirected learning style which might be due to absence of nega-

tive learner characteristics in a non-educational setting. The application of the ILS on the work floor has to be further investigated. Information seeking behaviour observed in this study was comparable to the normative model used. The behaviour shown by participants with a meaning directed and an undirected learning style were respectively comparable to expert and novice strategies that resulted from research on problem solving tasks.

Theory-based or examples-based designing and conducting experiments
Herman Jonker, Vrije Universiteit Amsterdam, Netherlands
Jos Beishuizen, Vrije Universiteit Amsterdam, Netherlands

Students differ in the extent to which they spontaneously generate examples when they encounter concepts and principles presented in a study text. Vermunt (1992) called this habit "concrete elaboration". Is it the case that more clear-cut differences emerge between high and low concretisers when students study expository texts in order to prepare for conducting experiments rather than for preparing for a comprehension text? According to the adaptation versus accumulation explanation, students high on concrete elaboration are expected to focus on the theory paragraphs of the hypertext, and are expected to quickly engage in conducting experiments. A computerized learning environment (Flexible Inquiry Learning Environment; FILE) was used to allow students to conduct experiments. Feedback was used to further explore the theory paragraphs of the text. Students were expected to seek evidence confirming their initial ideas about the relationships between independent and dependent variables, as collected in the initial theory interview. According to the adaptation versus accumulation explanation, students low on concrete elaboration were assumed to focus on the examples paragraphs of the expository text, and were likely to study the text extensively, before engaging into the experimenting part of the task. According to the deductive versus inductive learning explanation, students low on concrete elaboration were expected to quickly start to experiment and use feedback to further explore the examples in the text. Data will be reported during the EARLI meeting.

Symposium
Metacognition

METACOGNITION IN YOUNG CHILDREN

Chair: David Whitebread, University of Cambridge, United Kingdom
Organiser: David Whitebread, University of Cambridge, United Kingdom
                Wolfgang Schneider, University of W?rzburg, Germany
                Shirley Larkin, King's College, Univeristy of London, United
                Kingdom
                Marcus Hasselhorn, University of Gottingen, Germany
Discussant: Marcel Veenman, Leiden University, Netherlands
Chair: David Whitebread, University of Cambridge, UK

The development of metacognitive skillfulness is now recognised as being a significant determinant of educational achievement. This symposium is concerned with the development of metacognition in young children.There is increasing evidence that much of the early work on metacognition, which used laboratory-based and self-report methodologies, may have seriously under-estimated the metacognitive abilities of young children. The papers in this symposium present significant recent European research concerned with the encouragment, identification and analysis of the development of metacognitive abilities in children within elementary education. Findings include evidence of the early emergence in 3 year olds of an impressive range of metacognitive abilities, evidence that theory of mind in 3 year olds plays an important role in facilitating later metamemory, evidence that teachers' own metacognitive experiences and their views of teaching and learning can affect the metacognitive environment of the classroom for 5-6 year old children, and evidence that task specific rather than domain general metamemory significantly contributes to the emergence of memory strategies during the late elementary school years.

Metacognition in young children: Evidence from a naturalistic study of 3-5 year olds

David Whitebread, University of Cambridge, United Kingdom
Penny Coltman, University of Cambridge, United Kingdom
Holly Anderson, University of Cambridge, United Kingdom
Sanjana Mehta, University of Cambridge, United Kingdom
Deborah Pino Pasternak, University of Cambridge, United Kingdom

There is increasing evidence that self-report and laboratory-based methodologies may seriously under-estimate the metacognitive abilities of young children. Recent work related to metacognition has demonstrated the advantages of naturalistic, rather than laboratory-based, studies with young children (Perry, 1998) and of the advantages of using observation schedules and techniques to evaluate metacognitive learning in young children (Winne & Perry, 2000). This paper presents findings from a 2 year study exploring the development of self-regulatory and metacognitive abilities in young children (aged 3-5 years) in educational naturalistic settings in the UK (English Nursery and Reception classrooms). 32 early years educators collected evidence of metacognitive abilities evidenced by children in their classes during learning activities which were constructed to be 'meaningful' for the children and in other ways most likely to facilitate children's articulation of their metacognitive knowledge and self-regulation of their performance. This evidence consisted of metacognitive 'events' recorded by means of field observations, supported by digital photographs, video of children engaged in learning activities and periodic assessments of children against an observational checklist. Altogether over 1000 such events have been collected and documented, with a detailed analysis of the metacognitive processes evidenced within them being conducted. This analysis enabled the construction of an observational schedule and model of metacognitive abilities which appear to be observable within this age group. The paper will present evidence of the reliability and validity of observations of events using the schedule of metacognitive abilities (CHILD 3-5: Checklist of Independent Learning 3-5). Evidence of the relative incidence of these different metacognitive abilities in the 3-5 age range will also be presented, together with examples of the detailed protocol analysis of particular events. These examples will illustrate the ways in which children in this age range evidence emergent metacognitive abilities during meaningful learning activities.

Knowledge about the mind: Predicting metamemory from earlier theory-of-mind
Kathryn Lockl, University of Wurzberg, Germany
Wolfgang Schneider, University of Wurzberg, Germany

This longitudinal study aims to combine aspects of research on theory of mind and metamemory. Despite the fact that both areas aim to investigate the development of Children's knowledge and cognition about mental phenomena, the two research literatures have been surprisingly distinct and unconnected. Therefore, the main goal of the study is to examine longitudinal relations between Children's performances on tests of earlier theory of mind and later metamemory. In total, 183 3-year-old children were recruited for this longitudinal study. Children were tested at three time points, separated by a testing interval of approximately one year. At each time of testing, children completed a set of theory of mind tasks including false-belief, appearance-reality and second-order belief tasks. At Time 3, Children's declarative metamemory was assessed in an interview which contained examples from everyday memory tasks as well as from laboratory-like situations. In order to take into account that the relation between theory-of-mind competencies and later metamemory could be mediated by individual differences in general language or nonverbal abilities we also included the assessment of language competencies and nonverbal IQ. The results demonstrate strong relationships between the domains theory of mind, metamemory, language and nonverbal intelligence. Remarkably, the correlation between theory of mind and metamemory remained significant when the scores for language and nonverbal intelligence were partialled out. Hierarchical regression analyses showed that theory of mind competencies at Time 1 and Time 2 made independent contributions to the prediction of metamemory at Time 3. Overall, the findings indicate that theory of mind plays an important role in facilitating later metamemory.

Creating metacognitive environments in year one and the impact of teachers' beliefs, opinions and knowledge
Shirley Larkin, King's College, University of London, United Kingdom

Metacognition, the ability to reflect on one's own thinking and monitor ongoing thinking develops with age and through metacognitive experiences. Some environments may facilitate metacognitive experiences more than others. In year one classrooms (age 5-6 years) the teacher is in a powerful position to create an environment that facilitates metacognitive experiences for the children. The specific research questions explored here are: Does teachers' knowledge of and beliefs about

metacognition impact on the development of metacognition in the classroom? Do teachers' beliefs and opinions about learning and teaching affect the way that they facilitate metacognition in the classroom? Can teachers' ability to promote meta-cognition be developed through professional development? This research was un-dertaken during a larger cognitive acceleration project (CASE@KS1), one aspect of which was the promotion of metacognition. The quasi-experimental design of the main project meant that experimental school teachers undertook a professional de-velopment programme, which included the theory and practice of facilitating meta-cognition. Five experimental school teachers and three control school teachers were interviewed at the beginning and end of the intervention year. Through thematic analysis teachers were grouped into descriptive categories named: ìprotective, ìchild centred and ìdisciplined. Over 50 classroom observations of case and non-case les-sons were coded for both teacher and student metacognitive behaviours. The results showed that teachers in the ìchild centred category employed more metacognitive behaviours in the case lessons than did other experimental school teachers. How-ever, there were other individual differences and these are described and explored. In general, the results showed that teachers' own metacognitive experiences along with their views of teaching and learning can affect the metacognitive environment of the classroom. The research highlighted methodological issues, which are also discussed.

Developmental relationships between metamemory and memory strategy use: Task specific or domain general
Marcus Hasselhorn, University of Gottingen, Germany
Maren Richter, University of Gottingen, Germany
Michael Lingen, University of Gottingen, Germany

In a longitudinal study the developmental relationships between metamemorial knowledge about organizational strategies and the usage of category organiza-tion as well as between metamemorial knowledge about cumulative rehearsal and children?s rehearsal set size were investigated. In total, 80 9-year-old children were recruited and tested at four measurement points, separated by a testing interval of six months. At each time of testing, children answered a couple of questions aimed to assess either task specific metamemory regarding category organization or task specific metamemory regarding cumulative rehearsal. In addition, children were given two sort-recall tasks and three free recall lists. The mean level of using categorical relatedness during sorting was chosen as a measure of using category organization as a memory strategy. The average rehearsal set size across the three

free recall lists was taken to assess the usage of cumulative rehearsal strategy. The results demonstrate a strong relationship between both kinds of task specific metamemory not before the fourth measurement point. Remarkably, multiple regression analyses for both of the two strategies showed that at the age of 10 years (measurement points 3 and 4) only the related task specific metamemory but not metamemory with regard to the other strategy significantly contributes to predict later strategy use. Only at the fourth measurement point task specific metamemory regarding category organization and task specific metamemory regarding cumulative rehearsal were substantially correlated. Overall, the findings indicate that it is more task specific than domain general metamemory that significantly contributes to the emergence of memory strategies during the late elementary school years.

A 14   23 August 2005   14:30 - 16:30   Room A110

Symposium
Lifelong Learning and Professional Development

INITIATING CHANGES OF TEACHERS' PERCEPTIONS, KNOWLEDGE AND ACTIONS IN VET

Chair:	Fritz Oser, University of Fribourg, Switzerland
	Frank Achtenhagen, University of Gottingen, Germany
Organiser:	Frank Achtenhagen, University of Gottingen, Germany
Discussant:	Els Boshuizen, Open University, Netherlands
	Frank Achtenhagen, University of Gottingen, Germany

Megatrends the global economic, social and political changes as well as increasing heterogeneity of apprentices and students especially caused by the figure of migrants provide new challenges for teaching/training and learning/working processes in the fields of vocational and occupational education and training (VET). This development has also consequences for the teacher training programs in the field. It seems to be necessary to promote teachers perceptions, beliefs, knowledge and actions with regard to the broad field of teaching and training. With proposed symposium is dealing with this overarching issue by especially focussing on three topics:
(1) Conceptual focus: Teacher schemas of perceptions, knowledge and actions as well as teachers beliefs and epistemologies are discussed with regard to their shape and possibilities of change, especially in direction of expertise (Stevenson and Gru-

ber).

(2) Intervention focus: Two central topics of teaching/training and learning/working in VET are thematized: how to cope with the promotion of motivation and how to initiate intercultural learning? (Winther & Achtenhagen and Weber).

(3) Training focus: By especially conceptualized training firms VET teachers shall be trained with regard to sets of competences needed; above all instruments of diagnosing learning (Oser, Schwaller, Steiner & Renold).The three foci stand exemplarily for patterns of revised teacher training programs as one possible answer to the new global challenges and there consequences for VET: We need a revision of concepts, have to develop new and effectives interventions strategies and should also develop new ways of supporting teacher training by thoroughly constructed cases which has to be systematized punctually and permanently within the teacher training curriculum. This symposium shall open the discussion about further necessary steps of the professional development of teachers for VET and, put emphasis and proposals which can be used within the practice of teacher training.

Targeting vocational teacher schemas through analysis of the objects and instruments of inter-related activity systems
John Stevenson, Griffith University, Australia

This paper proposes an inter-disciplinary approach for illuminating the cognitive schemas that need to be developed in vocational teacher education, and for designing appropriate learning experiences. The cognitive schemas are analysed in terms of the objects and instruments of three inter-related activity systems: vocational practice, vocational education learning settings and vocational teacher education. Using cultural historical activity theory, the cognitive schemas needed as instruments in vocational activity are derived from considerations of the objects of contemporary working practice. These instruments, in turn, are assumed to be the objects of vocational education preparing vocational learners for the realities of contemporary and future workplaces. Further, the teaching schemas (instruments) that vocational teachers need in vocational educational practice are suggested as an important object of teacher education, preparing teachers for the challenges of vocational education. The paper uses this analysis to argue that an important object of vocational teacher education learning experiences should be the kinds of declarative, specific procedural and metacognitive procedural knowledge that the teacher can, in turn, use in engaging vocational learners in activities appropriate as preparation for work. The required learning activities in teacher education are mainly examined in terms of Stevenson's (2004) concept of memorable activity. In particular, it is

argued that teacher education in this field needs to involve consequential transitions that interconnect the different forms of cognitive artefacts of vocational and vocational educational theory and practice, including personal knowledge of workplace activity, discipline-based (theoretical) knowledge, encapsulated and scripted expert knowledge and the informal knowledge that new learners bring to the setting. Suggestions are made for engaging trainee teachers in appropriate kinds of memorable activity through consequential transitions. These include explicitly designed experiences of eliciting, rendering and articulating different kinds of tacit and codified, personal and public meanings, and the relationships among them.

How to support vocational teachers to become experts?
Hans Gruber, University of Regensburg, Germany

Teaching in vocational schools can be considered as a complex professional domain in which substantial individual differences in the level of expertise exist. However, research on teacher training so far has paid little attention to research on expertise. In this contribution it is aimed to show both theoretically and empirically that research on expertise provides fruitful ideas how to support vocational teachers. The use of the term "expert" indicates a modern use of the concept of teaching competence (Terhart, 2000). It includes (1) a rich variety of different knowledge forms, (2) smoothly running routines, and (3) the availability of working episodes that can form the base of subjects' experiences. The interplay of these three components helps to integrate knowledge and action. It is argued that a number of principles of vocational student learning can be transferred to vocational teacher training, in particular the combination of theoretical and practical components as in the German "dual system". Supporting professional learning of vocational teachers needs contributions from three theoretical perspectives (DeCorte, 1997): (1) Knowledge, skills, and epistemological beliefs of teachers of different levels of expertise have to be analysed in order to determine the direction of professional development. (2) Mechanisms of successful learning from experience have to be identified. (3) Didactical assumptions have to be developed how to design instruction and practice so that professional learning is fostered. In this contribution, empirical evidence from a number of studies is presented that shows how research on expertise can direct future vocational teacher training.

Measurement of motivation: State-perspective of motivation in learning tasks

Esther Winther, University of Goettingen, Germany
Frank Achtenhagen, University of Goettingen, Germany

A central question of teacher training is how can motivation affect learning? There is need for models of motivation in learning tasks that include motivational as well as cognitive processes and that allow us to study learning as a process and not only the output. To focus on the process dimension of learning is necessary in order to explain differences in the prevalence of learning motivation states associated with vocational schools as compared with learning at the workplace. Data portends a negative trend in the frequencies of self-determined learning at school (Prenzel, Kramer & Drechsel, 2002). On that score motivational influences on the acquisition and application of knowledge in learning tasks should be measured. At the same time it is important not to interfere to much into the learning process. Vollmeyer & Rheinberg (2000; 2003) as well as Boekaerts (2002) proposed instruments that measure students' motivation by indicating their current motivation in a quasi online procedure. That presupposes that learners can regulate their motivation. We took up this idea and put up a measuring instrument for discussion that (1) makes a forecast of students' performance and (2) gives a description of cognitive, metacognitive and motivational interdependences. The aim of our research is to disentangle these different processes and to show how it is possible to measure simultaneously each of these processes. We analyse the motivational potential of learning tasks by contrasting motivational factors and motivational behaviour. 385 students in schools with a focus on business administration participated in this study. Teacher students as well as experienced vocational teachers co-operate in this project for transforming the procedure and the results into an intervention program for VET teachers.

Initiating intercultural learning using a Design experiment"

Susanne Weber, University of Goettingen, Germany

The necessity of intercultural learning is emphasized in lots of contexts. This is especially the case within the field of vocational education and further education. Although at a first glance it seems to be intuitively quite clear what is meant, this construct as well as the corresponding terms and objects of this area get vague and hardly tangible. Thus, it does not wonder that concrete measures and concepts for fostering intercultural learning do not follow a theory rather than practical necessities, normative principles or isolated single concepts. This causes many problems for efficient and effective teaching. But these show only minor effectiveness in

intercultural behavior in practice, as diverse studies make overt. Therefore, in this study the concepts of ìculture, ìintercultural communication as well as ìinterculturality should be illuminate and discussed. On the basis of Engestrom's considerations about ìactivity theory and ìexpansive learning as well as those of Ting-Toomey's ìmindful identity negotiation approach a theoretical framework for ìintercultural learning and development is (re-)conceptualized. In this paper it will be shown how this theoretically reformulated concept guiding the implemented design experiment - can support the change of individual perceptions and believes, but also changes in intercultural behavior. As the research and practice field of intercultural learning is that diffuse this study is not to be understood as a solution for all intercultural problems. But having the necessity of intercultural learning in mind it is the intention in this study to raise and to continue an intensive (inter-) disciplinary discourse for developing a stringent theoretical model as a basis for intervention to foster intercultural learning and development as well as to initiate changes.

Instructional vignettes as basis for diagnosing teachingcompetencies
Fritz Oser, University of Fribourg, Switzerland
Cyril Schwaller, University of Fribourg, Switzerland
Christine Steiner, University of Fribourg, Switzerland
Ursula Renold, BBT, Bern, Switzerland

In our project we developed standards for teachers behavior, especially for diagnosing teachers competence. In a first step we tried to get a consensus between experts. Criteria are: a) Wholeness of intended action (f.i. to organize and conduct group work as an exercise with a transfer task), b) immediate understanding, c) remembering of similar situations, d) easy handling with respect to memorizing details for judging the quality. A first starting point was filming with professional film teams and actors playing school situations; with should solve the problem of instructional ambiguity with respect to understanding of ongoing learning processes. Finally we decided to not use this path and to give more weight to the validity of the situatedness. Thus we decided to work with real teachers and real students. In this presentation we would like to show exemplarily two film vignettes and discuss their exemplarity and rootedness in the daily process of teaching. Secondly we will present the transformation process of these vignettes into a computer based test instrument for measuring the quality of teacher's competence. The items for the teacher in front of such a vignette are: a) descriptive (what happens in this scene, etc.?), b) diagnostic (what will be the problem for the continuation, what kind of difficulties will arrive?), c) oriented towards quality judgments, d) oriented towards

a professional transferability (how many similar situations the person can produce in a given time slot), e) as professional creativity check (how could we reach the same result with a different methods?), and f) as remembering of similar situations. - The third step will be the testing of differences in relationship to the judgment: 40 teaching experts will be compared with 40 non-teachers (laymen). First data will be presented.

A 15   23 August 2005   14:30 - 16:30   Room E003

Symposium
Social Aspects of Learning

COGNITIVE AND SOCIO-MOTIVATIONAL ASPECTS IN LEARNING FROM DYNAMIC VISUALIZATIONS (PART II)

Chair: Peter Gerjets, Knowledge Media Research Center, Germany
Organiser: Katharina Scheiter, University of Tuebingen, Germany
                Peter Gerjets, Knowledge Media Research Center, Germany
Discussant: Stephan Schwan, Knowledge Media Research Center, Germany

Contrary to the widespread use of dynamic visualizations in educational software, only very little is known with regard to their design and their instructional functions. This lack of insight may also explain why current literature reviews often fail to report consistent positive results in favor of learning from animations.
In Part 1 of the symposium we address this issue by presenting empirical evidence for the importance of specific design features of animations which influence the cognitive processing of visualizations. Scheiter et al. will first discuss whether animations should entail concrete objects or should be designed in a more abstract way. Schuh et al. demonstrate how animations can foster problem-solving transfer by supporting abstraction across contextually and structurally variable instances. Huk et al. focus on the impact of three-dimensional animations and visual cues on multimedia learning, whereas Tabbers and de Koeijer investigates how learner control affects the trade-off between effectiveness and efficiency of learning from animations. The second part of the symposium extends this cognitive perspective by incorporating socio-motivational aspects that may additionally influence the effectiveness of learning from animations Linek et al. discuss the design of audio materials for animations from a socio-cognitive perspective by considering the gender of the learner as well as of the presenting voice. Merrill and Atkinson show that

incorporating pedagogical agents as well as animating solution procedures both increase problem-solving transfer. Moreno investigates cognitive and motivational consequences of dynamic visualizations in case-based teacher education. Her results support the claim that more knowledge on moderating factors is needed before animations can be put into practice effectively. Finally, Betrancourt et al. extend the research on animations to collaborative learning scenarios and show that the effectiveness of animations is moderated by the instructional setting in that animations produced positive outcomes only when students learn in a collaborative setting.

Gender-specific design of narrated animations? Effects of using male versus female voices for auditory text
Stephanie Linek, Knowledge Media Research Center, Germany
Peter Gerjets, Knowledge Media Research Center, Germany
Katharina Scheiter, University of Tuebingen, Germany

According to the modality principle advocated by the cognitive theory of multimedia learning (Mayer, 2001) animations with explanatory text are best presented as narrated animations. However with respect to the design of narrations several questions arise, especially which kind of voice should be used. The presented study addressed the impact of male versus female voices in combination with the learner's gender. As experimental material we used a hypermedia learning environment on probability theory with worked-out examples. The worked-out examples were presented as narrations that accompanied dynamic visualizations illustrating the problem statement and the solution procedure. The animations were constructed in a way that made use of the concrete objects mentioned in the example. For every example there was always one animation for the problem statement as well as one for every solution step. Independent variables were the learner's gender and the speaker's gender resulting in a 2x2-design. We measured affective-motivational variables including perception of and motivation towards the speaker as well as cognitive variables including learning success. Results demonstrated that male learners were superior with regard to learning time, cognitive load, and learning success. With respect to the speaker's gender data clearly revealed that learners preferred female speakers. Female voices were rated as being nicer and friendlier than male voices. Learners showed a higher motivation and performed better when listening to female voices. However, no interactions between the learner's gender and the speaker's gender were found. This study demonstrated the importance of voice features for the design of narrated animations. According to our data, we propose to use female voices irrespectively of a learner's gender. Several interpretations based

on the social agency theory will be discussed.

Testing the efficacy of animated versus static worked examples and pedagogical agents
Mary Margaret Merrill, Louisiana State University - Shreveport, United States
Robert Atkinson, Arizona State University, United States

The purpose of this study was to examine the effectiveness of animating worked-out examples and providing animated pedagogical agents in a multimedia learning environment involving proportional reasoning word problems. The animated agents included were designed to direct learner attention to appropriate problem states and consisted of: (a) a fully embodied agent, who assisted learners via both verbal and nonverbal modes of communication, (b) a minimally embodied agent, who provided only verbal instructions in the absence of any nonverbal communication cues, and (c) a no agent condition, in which learners received verbal instructions identical to the former two conditions simply without the presence of an on-screen animated agent. An additional goal of this study was to investigate specific types of worked examples incorporated into the computer-based learning environment. The proportional reasoning worked examples implemented in this study were: (a) animated, where the solution steps were gradually unfolded until the example was presented in its entirety, or (b) static, where the solution steps were all presented at the onset of the worked example. Results indicated that participants exposed to the animated agent conditions outperformed students in the no-agent condition. This experiment provides modest evidence to support the claim that multimedia learning environments encompassing animated agents as virtual learning assistants are superior to environments that only provide verbal instructions. The lack of a significant difference between the FE and ME conditions suggests that while the visual presence of an animated agent fosters learning, the agent's mobility is a less important factor. Additionally, students receiving animated solution steps displayed better transfer performance than their peers presented with static solution steps. This supports the existence of a sequential principle, that is, that animated examples that contain sequentially presented subgoals are superior to static examples that consist of simultaneously presented subgoals.

Using dynamic classroom visualizations for teacher education
Roxana Moreno, University of New Mexico, United States
Ludmila Ortegano, University of New Mexico, United States

How can we help teachers in preparation to effectively apply principles of educational psychology to classroom experiences? One promising technique consists of using cases in teacher education: the presentation of a classroom situation to examine and clarify the concepts involved in teaching practice. In this presentation, we will report the findings of a study which compared the learning and affective outcomes of students who were asked to learn about an educational psychology topic either with or without the presentation of a classroom case. More specifically, we were interested in examining the role of dynamic visual materials when learning from cases. Based on a cognitive-affective theory of learning with media (CATLM; Moreno, in press) we hypothesized that, compared to reading about a classroom case, watching a video or a computer simulation of a classroom case would help student learning by decreasing cognitive load and increasing their motivation. One of the underlying frameworks incorporated in CATLM is cognitive load theory (CLT). According to CLT, dynamic visualizations provide an external visualization of the depicted scenario, therefore leaving students more cognitive resources to connect the materials with their prior knowledge than if they had to create a visual representation of their own. In addition, according to CATLM, a way of increasing learning is to promote students' interest and engagement in the learning task. Similar to other findings on visual aid effects (Moreno, Estrada, & Ahonnen, 2004), we expected students to report investing higher effort and perceiving the learning experience as more interesting and motivating when visualizations are presented in the lesson. To test our hypothesis, we used retention and transfer tests to measure students' learning and a program ratings questionnaire to measure students' affective reactions to each learning condition. The results have theoretical and practical implications for the use of visualizations in case-base learning.

Why did learners in collaborative situation benefit more from animations than in-dividual learners?
Mireille Betrancourt, University of Geneva, Switzerland
Pierre Dillenbourg, Swiss Federal Institute of Technology, Switzerland
Cyril Rebetez, University of Geneva, Switzerland
Mirweis Sangin, University of Geneva, Switzerland

With recent technology advances, computers now offer animated graphic devices, which seem attractive and efficient to instructional designers. However, the research carried out so far failed to establish the advantages of using animated graphics over static ones on learning. Among several problems, animations seem to increase the learners' cognitive load, hence reducing the cognitive resources available for learn-ing. Nevertheless, we believe that, beyond these shortcomings, animations offer unique opportunities to understand dynamic systems. To bypass these shortcom-ings, we need to deepen our understanding of the cognitive benefits that can be expected from animations in order to turn this understanding into design principles. The use of animations is not limited to user-system communication but is also often used in computer-supported collaborative learning. In these settings as well, the empirical studies have not confirmed the benefits that one could intuitively expect from the use of animations. This lack of positive results may be explained either in terms of cognitive load, as in user-system interactions, or may be due to the fact that peers use external representation to ground their mutual understanding. We designed an experiment to investigate the effects of learning from a series of animated sequences or a series of static graphics, in individual or collaborative (pair) situation. The material was a set of two explanative multimedia documents on geological and astronomical phenomena. We found a significant main effect of animation on retention and transfer performances, with participants in the animated condition outperforming participants in the static condition. Additionally, there was a significant interaction between collaboration and animation for the transfer test, in the sense that only the participants form the collaborative group benefited from animation. These results contradictory with previous findings in the literature are discussed in terms of deepness of processing of an animated material.

A 16   23 August 2005   14:30 - 16:30   Room E002

Symposium
Learning and Cognitive Science

CHILDREN'S DRAWING: ITS RELATION TO LEARNING AND INSTRUCTION IN KINDERGARTEN AND PRIMARY EDUCATION

Chair: Nora Scheuer, CONICET - Comahue University, Argentina
Organiser: Eva Teubal, Hebrew University of Jerusalem and David Yellin Te, Israel
                Nora Scheuer, CONICET-Comahue University, Argentina
Discussant: Giyoo Hatano, University of the Air, Japan

The aim of this Symposium is to analyze from different theoretical and methodological perspectives Children's use of drawing, drawing strategies and drawing conceptions with relation to learning and teaching processes. Drawing has been a key object of psychological and educational study along most of the 20th century, but it lost importance in the past 30 years. The decline of interest in drawing as a topic of psychological research might be associated with the loss of vitality of the traditional approaches dealing with it (maturational, psychometric and projective) in the current psychological and educational agenda, concerned with themes as the intervention of metacognitive processes in notational production; processes whereby a child appropriates cultural ways and uses of representation or the ways in which the production of external representations contributes to key sociocognitive processes such as memory, referential strategies, meaning elaboration, explicitation of various components (specific domain knowledge, mental attitudes, self) or representational redescription.Lately, there appears to be a revival of interest in Children's drawing. This is probably due to two factors. First, the fact that drawing is a typical activity which children are highly motivated to engage in. Second, the new forms of cultural production and communication are increasingly characterized by the use of a great variety of graphic texts. However, learners are most often regarded as readers rather than as producers of pictorial images.In sum, there is a need to generate new theoretical and methodological frameworks so as to permit a fruitful re-incorporation of drawing into psycho-educational investigation. This symposium attempts to contribute in such a direction by bringing together five different studies dealing with Children's drawing strategies and conceptions. In order to gain in depth of analysis we will focus on early and middle childhood / Kinder-

garten and primary education.

Developmental Process of Drawing Three Dimensional Objects
Kiyomi Akita, Graduate School of Education, University of Tokyo, Japan
Koike Wakaba, Department of Psychology, Atomi Women's University, Japan

This study focuses on the developmental process of learning mapping rules in drawing. Brenneman, Massey and Gelman (1996) stated that young Children's ideas about drawing and writing are constrained by domain-specific knowledge about words and objects. Representational drawings relate to the perceptual features of objects. Features of margin, color, and number of sides of an object are mapped to the drawings. Young children learn how to represent and map three-dimensional entities on two-dimensional paper. How do children learn these mapping rules? Twenty-three 4-year-old children, nineteen 5-year-old children, nineteen 5-year-and-a-half-old children participated in drawing tasks. They were asked to draw a cylinder. Their drawing processes were recorded. One year later, the same children asked to draw the same cylinder and draw a cube task. Their spatial-cognitive ability was also tested, using WIPPSI. The analysis of developmental changes and the comparison between two drawing tasks showed the following major findings. 1) Most four-year-old children could map the contour figure of the salient sides and color of it on the drawing. But four-year-old children tended to draw only contour, while the older children tended to color the surface area. 2) As for the numbers of sides, Children's preference for realism is seen. Four-year olds and early five year old children tended to draw more sides that could be perceived but the late five-year-old children drew the correct number of sides. 3) Four-year-old children invent how to draw the relation between sides of objects in various ways (unit-division strategy, part-whole strategy, etc), but five-year-old children tended to use authentic drawing, vertical linking figures strategy. 4) An influence of language (naming figures) on drawing strategies was evidenced.

Young children's development of the ability to discriminate between different notational domains- drawing, writing and numerical notation
Esti   Klein, Hebrew University of Jerusalem, Israel
Eva Teubal, Hebrew University of Jerusalem and David Yellin Te, Israel
Anat Ninio, Hebrew University of Jerusalem, Israel

Young children have an increasing ability to use symbol systems to interpret, manipulate, and express meanings. Notations are permanent external symbol systems

that fulfil the above functions in particularly powerful and characteristic ways. Studies of the development of Children's notational abilities are currently viewed as both a way of examining the development of competence with external representational systems and as a means of identifying some of the mechanisms that influence developmental trajectories. There are quite a number of interesting questions related both to Children's ìrecognition and ìproduction of notational systems. The present paper deals with the topic of notation within the framework of ecologically valid tasks: subjects were confronted with tasks which "make sense" to them within different notational domains. Namely, drawing, writing and numerical notation.The questions we asked are: 1)How early do children discriminate between different notational domains as manifested in their production; 2) What is the impact of function of notation upon notational production; 3) When do children become able to use their own notational production in a communicative- referential manner. Ninety-four children from middle class background participated in the study (50 girls and 44 boys). They were divided into three age groups: I) 33 children, average age 44 months; II) 31 children, average age 59 months; III) 29 children, average age 69 months. Children's production and use of notations were assessed across 3 different tasks: 1) production of a birthday card; 2) production of a shopping list (including item names and their prices); 3) use of the self-produced shopping list. The documents produced by the children were coded by eight independent adult judges: four of them were aware of the task context and four were not. We analyze the results from three perspectives: developmental changes, task based changes, and consistency of notations across tasks.

The relation between language, drawing, and sculpturing: A representational view
Esther Adi-Japha, School of Education and Gonda Center for Brain Res, Israel
Tehia Hagoel, School of Education, Bar-Ilan University, Israel
Pnina S. Klein, School of Education, Bar-Ilan University, Israel

Symbolic representation is considered as part of human cognition, originating in the brain. It is agreed among researchers that in different domains a same skill may be expressed differently.In this work we study the links among Children's graphic, language, and sculpture production relating to symbolic development. Two aspects will be studied within these domains: symbolic meaning and form of symbols. Our working hypothesis is that there is a correlation among representational skills. However, we expect individual differences. Within those children with advanced linguistic skills and within those with lower abilities we expect that language and other representational skills will be negatively correlated, because of compensation

mechanisms (Lewis & Beard, 1993).Based on previous research (Adi-Japha, Levin & Solomon, 1998) for eliciting representational meaning of drawings, we study the relation between symbolic representation in drawing, sculpturing and speech. Forty preschool children aged 4; 0-5; 0 years participated in this study and presented with several representational tests. Tests of language include receptive and expressive skills. Tests of drawing and sculpturing rate symbolic meaning (as indicated by the child and by objective judges), and clarity of form. Preliminary results: Using a computational model we have studied the similarity between linguistic and graphic representation in preschool children. Results suggest that individual differences exist: children that draw and speak about the same subjects have one dominant mode of expression. In line with previous research, their total representational score is correlated with language skills.

Children's ideas about different sources for their drawing activity: Looking at the natural world, at a ready-made drawing and into their own mind
Monica Echenique, Comahue University, Argentina
Nora Scheuer, CONICET - Comahue University, Argentina

With the aim of exploring the development of epistemological aspects involved in implicit theories of learning to draw during middle childhood, we interviewed 32 children in first and fourth grade at a public elementary school in Neuquen, Argentina. The main task tapped Children's appreciation of three different drawing sources, depicted on graphic cards: natural world, a culturally validated, ready-made drawing and learner's mental world. Category analysis considered positive and negative choices and the corresponding justifications, in terms of how the informational value of the source and the learner's mental activity were referred to. A Multiple Factorial Correspondence Analysis was applied to study associations among choices, justifications, school grade and sex. School grade achieved test value; sex did not. Three response patterns were distinguished. Pattern 1 reveals the positive choice of the ready-made drawing and the natural source, on the basis of their informational simplicity/stability and of the mental activity of immediate capture of such external sources. First-graders are associated to this pattern. Pattern 2 reveals the positive choice of all three sources, on the basis of the learner's both reproductive and productive mental activity. Pattern 3 selects both the natural and mental sources as the most helpful, due to their potential to promote productive mental activity. The ready-made drawing is rejected, precisely because it does not promote mental production. Fourth-graders lie in between response patterns 2 and 3. We interpret these patterns as indicating different epistemological perspectives

that in turn underlie different implicit theories of learning of drawing. We propose that a better understanding of Children's view about learning to draw may be a fruitful road to enrichen psychologists' and educators' view of this process and hence enable them to promote it in a more comprehensive way.

Children's models in scientific knowledge construction
Maria Arca, Molecular Biology and Pathology Institute, Italy
Andres Acher, University of Barcelona, Spain

This research concerns a long-term study in twenty classes of Kindergarten (ages three to six, Modena) and Primary School (ages six to eleven, Rome, Venice and Turin) in different socio-economical environments. The first aim of the work is to explore how children, involved in scientific modelling activities, represent in their drawings how they imagine what they cant see, about different biological or physical processes. The second step concerns the ways in which teachers can be trained to promote the use of models in their didactical activities. We promoted and analysed pupils' productions collected throughout their complete scholastic period (3 years for Kindergarten, 5 years for primary school). On the basis of action-research methodology, we engaged pupils in long-term, in-depth projects where they were presented with opportunities to communicate and compare their ideas orally verbally and graphically, as well as to modify and exploit the graphic models they had formulated individually or in small groups. We found that in a learning context where ìto think is a value, children learn to freely express their scientific imagination, going beyond the stereotypical images typical of textbooks: they do not imitate adult schemes, but rather construct and express their own ideas about phenomena. We understand models as metaphorical interpretations of reality that show at the same time aspects of facts and of Children's ways of thinking about them. Hence, working with models enables teachers to observe changes in Children's knowledge, their representation of new relations among facts and the emergence of different cognitive strategies. Contrasts among individual models provide the teachers with rich data to reflect on difficulties and acquisitions in Children's thinking and help them in the continuous re-structuring of their didactical project.

SIG Invited Symposium
Metacognition

ACTIVATING METACOGNITIVE PROCESSES IN THE CLASSROOM

Chair: Zemira Mevarech, Bar-Ilan University, Israel
Organiser: Zemira Mevarech, Bar-Ilan University, Israel
Discussant: Zemira Mevarech, Bar-Ilan University, Israel

The purpose of the present symposium is to examine how teachers and students activate various kinds of meta-cognitive processes during the solution of complex problems. The symposium includes four presenters and a discussant. All four presenters will focus on meta-cognitive processes that take place in the classrooms, and all will refer to mathematics complex problems. Yet, each presentation is based on a different methodology, as follows. Bracha Kramarski from Israel examines the development of two groups of teachers, each exposed to a different kind of professional development course: one implements meta-cognitive guidance, and the other introduces the notion of meta-cognition without really training teachers to use it. Kramarski reports substantial differences between the two groups on teachers' pedagogical content knowledge. Marcel Veenman and his colleagues from the Netherlands analyze the roles of meta-cognitive skills in different kinds of learning episodes. Using protocol analysis of high school students solving a series of probability-calculus tasks, Veenman et al show a differentiation in meta-cognitive activities for each kind of Instructional Learning Episodes, along with differences in the contribution to learning outcomes. Eckhard Klieme from Germany examines meta-cognitive processes that high-school students activate during the solution of PISA problems. Klieme focuses particularly on self-regulation as well as the relationships between item features and item difficulty. He finds that complexity of reasoning processes highly correlate with self-regulation. Finally, Ruhama Even from Israel follows the professional development of mathematics during three years. Her study indicates that only when teachers reflect on what they are doing, they improve their pedagogical-content knowledge. The discussant will focus on the theoretical, methodological, and practical implications of all presentations.

Integrating knowledge and practice as a means to raise PD providers' awareness of their own conceptions and beliefs

Ruhama Even, Weizmann Institute of Science, Israel

The aim of this research is to examine the potential of integrating knowledge and practice as a means to raise awareness of providers of PD (Professional Development) for teachers of their own conceptions and beliefs regarding the following two aspects: (1) the nature and quality of school mathematical tasks, and (2) the nature of students' ways of learning and knowing mathematics. Thirty PD providers who participated in the MANOR Program participated in this study. Analysis focused on data related to two multi-stage activities on the above mentioned aspects. Main data sources include questionnaires, interviews, documentation of, and reflection on, Program meetings and PD activities conducted by the participants, and their yearly portfolios. Data analysis indicates that getting acquainted with theoretical background by reading and discussing research papers helped to increase participants' interest in, and knowledge about, the issues. But only when participants were requested to use the theoretical ideas in connection with practice and to reflect on these experiences, did they become aware of their own conceptions and beliefs, and were even able to modify and expand them. Still, analysis of attempts to enact knowledge in practice shows that learning new practices and reflecting on this learning should accompany the more remote from practice work in order to connect the new awareness to a more complex modification of conceptions and beliefs, knowledge and practice. The results of this research point to promising ways of raising PD provides' as well as teachers' awareness of their own conceptions and beliefs, so that knowledge can be enacted in practice.

The role of metacognitive skills in different types of learning tasks in the domain of math

Marcel V. J.   Veenman, University of Amsterdam, Netherlands
Marleen Spaans, Leiden University, Netherlands
Bernadette H. A. M. van Hout-Wolters, University of Amsterdam, Netherlands
Marianne Elshout-Mohr, University of Amsterdam, Netherlands

Instruction Learning Episodes (ILEPs) are different types of learning tasks, characterized by being either productive or reproductive of nature, by being either knowledge or skill based, by being metacognitive or not, and by aiming at near or far transfer. This study focuses on the role of metacognitive skills in different ILEPs within the discipline of math. Twenty 14-15 yrs old secondary-school students com-

pleted a series of probability-calculus tasks while thinking aloud, with each task representing a different ILEP. Metacognitive activities were assessed for each ILEP task through protocol analyses. Separate posttests were administered for each ILEP. Results show a differentiation in metacognitive activity between ILEPs, along with differences in the contribution to learning outcomes for ILEPs.

Effects of general vs specific metacognitive training on teachers' mathematical professional development

Bracha Kramarski, Bar-Ilan University, Israel
Tali Revach, Bar-Ilan University, Israel

The study investigates the effects of general vs. specific metacognitive training on teachers' mathematical professional development. Professional development was measured by teachers' mathematical knowledge, pedagogical-mathematical knowledge and self-regulated learning (e.g., Boekaerts, 1997). Participants were 64 primary school teachers who were exposed to metacognitive professional development programs during one year in Israel. Thirty teachers were assigned to the general meta-cognitive training and thirty four teachers were assigned to the specific meta-cognitive training. The training was based on the IMPROVE metacognitive questioning approach that emphasizes the use of four main questions directed to ìeffective learning/teaching model: Understanding questions; connection questions; strategy use questions; and reflection questions (Kramarski & Mevarech, 2003). The teachers in general meta-cognitive training were exposed to the importance of metacognitive questioning in general, while the teachers in specific meta-cognitive training practiced the metacognitive questioning explicitly in their mathematical discourse. Three measures were used in the study: A pre/post real-life task (OECD, 2003) that assessed teachers skills on algebraic reasoning, mathematical argumentation, and transfer knowledge, a pedagogical task that asked the teachers to plan a lesson for their students on the real-life task and a pre/post self-regulated learning (SRL) questionnaire (Kramarski & Mevarech, 2003) that assessed teachers' strategy use in teaching problem solving, argumentation, planning and reflection on the lesson. Results indicated that the specific meta-cognition teachers outperformed the general meta-cognition teachers on various skills of solving mathematical real-life tasks, mathematical argumentation, transfer and mathematical pedagogical knowledge regarding planning a lesson on real-life task. Findings further indicated that at the end of the study all teachers (specific and general meta-cognition training) improved their self-regulated learning skills but no differences were found on SRL between the two groups. Educational and practical implications will be discussed

at the conference.

Metacognitive regulation and levels of problem solving competence
Eckhard Klieme, German Institute for International Educational Res, Germany

Problem solving is highly popular in the human resources literature as well as in educational policy, pedagogy and even in curriculum development. In recent years, several attempts have been made to invent measures of problem solving competence. In order to understand the meaning of the scale, test developers do in-depth task analyses and try to explain item difficulty by task demands. Within the ALL pilot study (N=2102 adults from five countries) most important features were (a) the number and connectivity of information elements and (b) the cognitive complexity of the reasoning, both rated by experts. Within PISA 2003, the number of constraints or variables as well as the number of representations used were identified as most important task demands. In many of the most difficult tasks, students had to consider a rather large number of aspects (conditions to be fulfilled, variables, temporal and other restrictions to be taken into account). Constructing a solution for those items will most probably require the student to work back and forth between his solution and the conditions laid out in the problem description. Students have to organize and monitor their thinking while working out their solution. Thus, the degree of mental load and the complexity of self regulation during problem solving contribute to the difficulty of the task. To sum up: Independent studies came to the conclusion that the amount of metacognitive regulation needed to solve an item has a large effect on item difficulty in the assessment of cross-curricular problem solving competence. Especially, the top level of problem solving competence in each of these assessments is characterized by the ability to coordinate a great number of task components (variables, constraints, representations). Metacognition seems to be crucial for problem solving competence as it is measured in these large scale assessments.

Symposium
Education for Citizenship

TEACHING AND LEARNING IN CITIZENSHIP EDUCATION

Chair: Nava Maslovaty, Bar Ilan University, Israel
Organiser: Nava Maslovaty, Bar Ilan University, Israel
Discussant: Cees Klaassen, Radboud University Nijmegen, Netherlands

Citizenship education is an important issue in many countries. Different theoretical concepts are used and different types of practices are emerging. Theories of moral development and democratic education are part of these concepts. Research into processes of teaching and learning in citizenship education is necessary to support these practices. In this symposium we will present four papers from different parts of the world.

The inclusion of roma children from the belgrade deponija enclave into mainstream education
Macura Milovanovic Suncica, University of Belgrade, Yugoslavia

This paper describes an action study that investigates the inclusion process of Roma children from iDeponija enclave (Belgrade, Serbia) into mainstream education system. The aim of a study is revealing, defining and explaining the key points/obstacles in the Roma children inclusion in the education system; understanding the meanings that main research participants attribute to the phenomena that go along with the inclusion process. The study method is an action research. Research participants are 60 Roma children of primary school age, their families, the school headmaster and teachers, members of the research team.
The design of action research includes four cycles, carried out during two school years, for a period of 32 months (Oct. 2000 - June 2003). Each cycle consists of defining the general problem or the question, creation of the action plan, action implementation and monitoring, outcomes evaluation, outcomes analyses and interpretation. Based on the reflections of the previous cycle, in the next cycle the problem is being redefined, as well as the action plan, followed by its implementation, evaluation, etc. The study describes an application and evaluation of the holistic model of inclusion, with a concept of linking all relevant actors of inclusion within

the process; and their educational and psychological empowerment, in order to motivate them for participating in finding solutions for the problem of Roma children education exclusion. Upon the third research cycle, the results indicate that Roma community have acquired motivation for their children to be included in schooling, but that within the social context of teaching/learning yields one of greatest obstacles for integration.

Upon the fourth research cycle, the results reveal teacher's awareness of Roma Children's improvement in school achievements, but unchanged Roma Children's lowest sociometrical status indicate that their teachers lack interpersonal competencies needed for creating safe and accepting environment in multicultural classroom.

Teacher approaches to civic education in Mexican primary schools: an ethnographic case study
Romali Rosales Chavarria, Department of Educational Researches, Mexico

Education for democracy is high on the international agenda but also has direct implications for teachers and student in the classroom. The structure of the Mexican education system constrains the way in which teachers approach civic education in their everyday work. This paper presents and analyses how teaching of civic education contents is organized in public primary schools from an ethnographic perspective. Teachers put their practical knowledge into practice in order to cope with some of the conditions of civic education. Civic education can hardly compete with the sheer weight of subjects like Language and Mathematics, especially when there is a lack of time available for teaching purposes and overburdened teachers. There are no textbooks or teaching materials provided to the teachers, so they look for materials they can use for this subject with their students. During the classes, children and teachers interact with a variety of texts in the constructions of school knowledge. Knowing more about the way in which civic education takes place in specific school contexts can contribute to the understanding the way in which the content being taught define some teaching decisions and strategies. It can also contribute to the understanding of teacher thinking, instructional strategies, classroom discourse and social aspects of teaching.

The contribution of professional background, perceived ideal student and school context in explaining teachers' innovative and democratic teaching strategies

Nava Maslovaty, Bar Ilan University, Israel
Yinon Zadik, Bar Ilan University, Israel

This study aims to examine the contribution of teachers' professional background, professional beliefs and the school context in explaining their choice of teaching strategies. Two approaches to teaching are examined: the traditional-authoritative and the innovative-democratic. Teachers' belief systems affect their modes of thinking and hence their teaching strategies. Teachers' perceptions of the ideal student provide an opportunity to examine how teachers' beliefs are manifested in their work. The effect of the subject discipline on teacher's thinking and teaching processes show that, mastery of knowledge, beliefs concerning the nature of the knowledge structure, and the way knowledge is constructed by students are of particular importance in choosing teaching strategies. The school context affects teachers' beliefs and teaching strategies. A questionnaire was administered to 170 teachers in 9 Israeli high schools. Findings: 1. Low to moderate correlations between the four ideal student indices and innovative teaching strategies. Positive correlations between higher-order thinking, social, and emotional competencies and innovative strategies. 2. Differences were found between teachers who taught biology, chemistry and physics and those who taught computer science, electronics and mathematics with respect to innovative strategies. 3. The four school context indices: teacher community, care for students, professional commitment, satisfaction, were positively correlated with innovative strategies. Correlations were found between technical culture, high expectations and professional commitment, and conservative strategies. 4. The indices that predict innovative strategies are: care for students, higher-order thinking, and professional commitment. It would be more accurate to view teaching strategies as located on two parallel continua, innovative- democratic and traditional-authoritative that are neither dependent on nor related to each other.

Interactive Poster
Computer-supported Learning Environments

**ASYNCHRONOUS MEDIATED COMMUNICATION IN LEARNING CON-
TEXTS: COMPARING METHODS**

Chair: Maria Beatrice Ligorio, University of Bari, Italy
Organiser: Maria Beatrice Ligorio, University of Bari, Italy
                    Stefano Cacciamani, University of Valle dAosta, Italy
                    Donatella Cesareni, University of Rome, Italy
Discussant: Robert-Jan Simon, IVLOS, Netherlands

Asynchronous mediated communication has many potentialities for educational
contexts. Environments, such as forums, seem to suit schools needs and constrains
and well serve educational aims, such as collaborative learning and knowledge
building. Several methods can be used to analyse forum based discussions, depend-
ing on features of the software, participants' goals, nature of the task, and so on.
This symposium aims at comparing different methods and at discussing critical
points concerning the relationship between methods, aims, and nature of the data.
The papers here included are looking at different aspects of the learning process
and for each of them a specific method is proposed. Cacciamani's et al. paper fo-
cuses on a set of methods inquiring metacognitive skills, awareness of knowledge
building in university students, and relationship between virtual identity and learn-
ing. Veermans and Lallimo's contribution presents three case-studies of students
with different learning profiles. Traditional instruments (such as questionnaires) are
combined to the analysis of on-line performances. The third proposal (Chan and
Aalst) describes the embedded and concurrent assessment, a complex strategy able
to analyse individual and collective advances and to mix computer-based tools and
in-classroom pedagogical principles. Mamalougos and Kollias's paper proposes a
method to deeply inquire cognitive and conceptual changes on the domain of psy-
chics. All the papers intent to capture the complexity of discussions fostered by
sophisticated asynchronous tools. In fact, two common points can be outlined:
a) All papers inquiry about web-based platforms designed upon strong theoretically
principles. The implicit assumption is that, when virtual space is well designed and
fully integrated into a well organized setting, which includes also face-to-face tools
and materials, than discussion occurring in the forum is rich, deep, and valuable;
b) Discussions triggered through and within asynchronous spaces promote new di-

mensions of the knowledge building process. These dimensions call for new methods.

Complex methods to analyze asynchronous interactions: The CKBG research experience
Stefano Cacciamani, University of Valle dAosta, Italy
Donatella Cesareni, University of Rome, Italy
Maria Beatrice Ligorio, University of Bari, Italy

The Collaborative Knowledge Building Group (CKBG) is an Italian community of researchers from different fields (sociology, educational psychology, pedagogy, economy, and political study) and teachers (from kindergarten up to university professors) interested on studying the use of technologies in educational and training fields. This group meets into the Knowledge Forum (KF), a discussion forum designed by Scardamalia and Bereiter (1999). KF is a tool with specific features designed upon socio-constructive principles, such as for example introducing scaffolds into the notes to guide writing and reading. The CKBG uses KF as virtual space to meet but at the same time as a tool upon which reflect collectively. This paper is aimed in particular at giving a survey of the three main directions through which the research activity of this community developed during the last two years: a) use of the metacognitive reflection to study personal representation of the activity undertaken in a Knowledge Building Community, b) on-line collaborative knowledge construction at University level with reference to the Progressive Inquiry Model (Hakkarainen, 2003) and to the argumentation strategies (Pontecorvo and Girardet, 1993), and c) the relationship between digital identities and learning, including the perspective of dialogical self and mediated identities (Hermans, 2004). For each of these research directions the method of analyzing web-forum interactions will be presented and the main methodological issues will be discussed. From the methodology array presented, activities taking place into a web-forum environment emerge as a specific way of discussing and the relationship between research questions and methodology used will be out-lined.

Multimethod approach for analyzing students' motivational profiles and their participation in virtual collaboration
Marjaana Veermans, University of Turku, Finland
Jiri Lallimo, University of Helsinki, Finland

In the new complex learning settings, the conventional research methods are not entirely applicable, and new means for investigation are needed. Conducting research that combines qualitative and quantitative methods has been characterized as the multimethod approach. The aim of this study was to explore how (49) students with different motivational and individual profiles participate in a distance-learning environment. Collaborative learning occurred asynchronously, and two teachers were tutoring the students throughout the entire course. Three types of questionnaires were used, in addition, a selection of learners' postings for the group assignments were analyzed. A cluster analysis was used to classify students on the basis of the questionnaire variables. The results clearly showed that each of the three groups had a rather distinct motivational profile. A more detailed analysis of the nature of students' participation was conducted for three cases, each of them representing different motivational profile. The individual cases showed that students with different motivational profiles had different participation patterns, different learning paths, which ended up at same grading level of course performance. This may indicate that problem-based/inquiry-based learning makes possible for the students to choose different types of learning paths. However, in order to understand the dynamics of context-sensitive constructs, such as interest and motivation, application of multi-method approaches may not be enough as such, but they should be used in a holistic way. With the holistic view we mean treating the concept/phenomenon under investigation as one whole that is comprised by interrelated, and changing dynamics between parts; an event or action is explained by identifying its place in a pattern that characterizes the ongoing processes of change in the whole system.

Assessing knowledge building using embedded and concurrent assessments
Carol K.K. Chan, Faculty of Education, China, Peoples Republic of
Eddy Lee, Raimondi College, China, Peoples Republic of
Jan van Aalst, Simon Fraser University, Canada

This study examined the assessment of knowledge building in the context of asking students to assess their own knowledge advances on Knowledge Forum (Scardamalia & Bereiter, 2002). Specifically, we sought (a) To design an embedded and concurrent assessment approach to characterize knowledge building in classroom

context, and (b) To investigate the roles of the assessment approach in fostering students' knowledge building and conceptual understanding. 120 students studying in three Grade-Nine classes in a regular high school in Hong Kong participated to the study. An embedded and concurrent assessment approach, examining multiple aspects of knowledge building, was designed. Three components were included: (1)Participation, Engagement, and Collaboration. A software called Analytic Toolkit (ATK) showing quantitative indices of database usage (e.g., number of notes read, written, revised etc.) was used by the teacher to monitor student participation and growth, (2) Individual Knowledge Advances. Students contributed computer notes rated for depth of inquiry and discussed different models in class, and (3) Collective Knowledge Advances. Students produced an electronic portfolio identifying and documenting how clusters of notes reflected collective knowledge advances in the computer discourse. To investigate the assessment approach, different design conditions were examined in three classrooms using: (a) Knowledge Forum, (b) Knowledge Forum with portfolios; and (c) Knowledge Forum with portfolios guided with knowledge building principles. Results showed different patterns of collective knowledge advances as reflected in students' portfolios - ideas were viewed as artifacts that were examined and improved. Students in the Grade 9 classroom using knowledge building portfolios outperformed other students working on participation, depth of inquiry, and conceptual understanding. These findings suggested that giving students the agency to assess their community's knowledge advances may scaffold their metacognitive understanding of the knowledge-building process and provide an alternative approach for assessing and scaffolding knowledge building in computer networked environments.

Design a methodology to analyse structured discussions stored in the asynchronous space of SYNERGEIA

Nektarios Mamalougos, University of Athens, Greece
Vassilios Kollias, University of Thessaly, Greece

In this study, knowledge building inquiry and discourse among 8th grade students are examined. The Web based CSCL software ´Synergeia[a] was used and students dealt with scientific questions included into school courses on electric circuits. During the design of the analysis we looked at: knowledge building, collaboration, and development of metacognitive skills. Mainly, attention was given to conceptual understanding of scientific concepts, such as models for the flow of electricity, role of battery in a simple electric circuit, and relevant energy transformations. Main features of the collaborative computational environment, which was extendedly

used, are: the asynchronous discussion tools, that allowed storing the dialogues; and participants labelling of each of their contributions by using a ìthinking type categorization. Beside the discussion data bases, tests were administrated before and after the proposed activities. Also, some classes participated as control groups. Results so far indicate that progresses were made on conceptual understanding and collaboration. Methods used to analyse the data will be here presented and discussed. We found out that some new indicators were needed when deeply analyzing the data bases of discussions. For the type of activity we proposed, a special teacher/technology structure was necessary to monitor and analyze a learning environment for collaborative knowledge building. This structure allowed assessing the depth of the investigation and the strategies found to resolve difficulties; allowed monitoring students' role in searching interaction sources. Discourse occurring between pairs working at the computer was recorded, transcript, segmented and categorized. A segment can take on many purposes: it could provide explanations of phenomena, especially causal explanations that refer to possible mechanisms; it could also include arguments, and finally it could also function as monitor, referring to a procedure of controlling one's own or others' understanding. A segment could also provide many other functions socially oriented.

A 20   23 August 2005   14:30 - 16:30   Room A018

SIG Invited Symposium
Research Methodology

QUALITATIVE AND QUANTITATIVE APPROACHES TO LEARNING AND INSTRUCTION - OPENING A NEW SIG

Chair: Heinz Mandl, University of Munich, Germany
Organiser: Guenter Huber, University of Tuebingen, Germany
                Philipp Mayring, University of Klagenfurt, Austria
Discussant: Mechthild Kiegelmann, University of Tuebingen, Germany

This is the opening symposium for the newly installed EARLI-SIG "Qualitative and quantitative approaches to learning and instruction". The aim of the symposium is to discuss the role of research methods in the study of learning and instruction. Modern instructional sciences are strongly oriented in their empirical work toward quantitative approaches (experimental designs of intervention research, correlational studies, large scale questionnaire studies). On the other hand the quantitative

approach often had been criticized and more exploratory and descriptive studies are claimed (qualitative turn and interpretive turn of social sciences). Many researchers argue that a strict dichotomy between qualitative and quantitative approaches is misleading and unproductive and are looking for combinations and integrations of qualitative and quantitative research. The symposium tries to balance the possibilities and limitations of qualitative and quantitative approaches to learning and instruction and to discuss the role research methods.

Learning from learners
Ference Marton, Goeteburg University, Sweden

The descriptive approach of Phenomenography has in recent years been developed to a theory with explanatory aims. This theory has been tried out in about 150 so called Learning studies in Hong Kong. The model of the Learning study builds - in addition to the theory - on the idea of the Japanese Lesson study and the methodology of Design experiments. A Learning study is carried out by a group of teachers, who teach the same subject at the same level,and one or more researchers. First, a topic is chosen that is important, difficult and can be dealt with in one lesson-or in a few lessons. A pretest consisting of open-ended questions is administered to the participating students. From their answers, their difficulties are identified in form of "critical features", distinguishing between mastering and failing to master what is expected to be learned (the object of learning). A lesson design is developed, aiming at creating the necessary conditions for appropriating the object of learning. These conditions are defined- in accordance with the theory- in terms of patterns of variation and invariance. After the lesson the test that was previously used as pretest is administered again as posttest. On the ground of the pre- and posttest differences and the course of the lesson, the group of teachers and researchers may revise the lesson plan and the previous sequence of pretest-lesson-posttest-discussion is repeated. Up to 4-6 such sequences might be carried out before the study is finished by being documented. The results are so far truly remarkable.

Processes and products as objects of research on learning and instruction
Guenter Huber, University of Tuebingen, Germany

Since decades, on the one hand the majority of teaching/learning studies is focused on products of learning, and on the other hand critics demand that learning processes should be considered additionally. This paper outlines the E-L-I-T-E model of learning research, which tries to reconcile research routine and critique. The cycle

of questions addresses expectations of teachers, who determine learning situations, which - depending on individual differences of learners (competencies, preferences, orientations, etc.) - allow various transactional processes between learners and subject matter that lead to learning effects, which in turn may modify teachers' expectations. Based on concrete empirical examples, the presentation will concentrate on a discussion of methods matching the stages of this cycle and promising answers to the questions linked to the model's components. Some of these answers can be found most probably by quantitative methods, while others demand a qualitative approach. This rises a pivotal further question, whether findings of mixed-methods studies can be generalized at all or which of these findings may be generalized and thus applied to resolve practical problems of learning and instruction. The presentation will approach this problem by analyzing, what "generalization" means within various types of practical problems, that is, questions of learning and instruction investigated in a range of research designs.

The problems and potentials of mixed methodology in the study of learning and instruction
Philipp Mayring, University of Klagenfurt, Austria

The central aim of the conference is integrating multiple perspectives and reflecting different approaches to enhancing our knowledge of learning processes. This paper tries to contribute to that aim by discussing the possibilities on a methodological level. The potentials of the mixed methodology approach in the study of learning and instruction is elaborated. First the theory of science background of the qualitative-quantitative debate is elaborated, analyzing the different paradigm conflicts in social sciences (natural versus human science approach, positivism debate, constructivism, interpretive turn). We conclude, that an overcoming of the strict qualitative-quantitative dichotomy is necessary, but a theoretical background for mixed methods approaches is needed (pragmatic, dialectical or constructivist theory). In the next part we try to give an overview about mixed methods models. We can differentiate between combination models (e.g. sequence models, pilot study models, generalization models), which put together methodological approaches in an additional, complementary sense and integration models, which try to put the different qualitative and quantitative approaches under one general study design (e.g. triangulation approaches). We can see, that a broad range of different models of mixed methodology had been developed within the last years. The potentials and problems of mixed methods models are demonstrated by examples in the field of learning and instruction (e.g. PISA studies, Qualitative Content Analysis). Mixed methodology

seems to be a promising solution of paradigm conflicts in social sciences. We have to collect examples and exchange experiences in such mixed methodology projects to come to methodological knowledge and technical rules of such combination and integration models.

Forms of learning in the rhythm of education
Hannu Soini, University of Oulu, Finland
Mark Flynn, University of Saskatchewan, Canada

In this presentation the authors propose that the critical incident technique offers a promising means of studying learning from the perspective of students, particularly in higher education. The potential contribution of the critical incident technique is significant because it can illuminate the authentic aspects of students' personal learning experiences. Authentic learning experiences are defined as the concrete personal experiences of students as described by themselves, independent of the abstract theoretical presuppositions of researchers. The second aim of our presentation is to consider how these authentic descriptions of personal learning experiences might be consistent with Whitehead's (1942) concept of the rhythm of mental growth. Whitehead has pointed out that, what is learned should be grounded in the experience and involvement of the learner. Moreover, there is a rhythm in the learning process where the learner freely contemplates experience, disciplines their thinking, and then freely and creatively applies what has been learned. There appears to be a natural symmetry between the descriptions of learning provided by students in the study and Whitehead's description of the rhythm of mental growth. For example, the fact that emotional significance constituted the most important single aspect of learning for students seems to be consistent with Whiteheads idea that romance - emotion - is always present in any real learning experience. We also found the importance of autonomous reflection - freedom - in the student's description of learning very interesting. Our analysis leads us to conclude that Whitehead's theory of mental growth has merit and could inform research in psychology and the formulation of new theories of learning that take greater account of: (i) human aesthetic experiences such as emotions; and (ii) the importance of extended periods of freedom or autonomy in the learning process.

SIG Invited Symposium
Reading

ASSESSING READING COMPREHENSION SKILLS AND STRATEGIES: TOWARDS AN EUROPEAN FRAMEWORK

Chair: Eduardo Vidal-Abarca, University of Valencia, Spain
Organiser: Eduardo Vidal-Abarca, University of Valencia, Spain
               Jean-Francois Rouet, University of Poitiers - CNRS, France
Discussant: Bernadette van Hout-Wolters, University of Amsterdam,
               Netherlands

There is a great concern in all European countries about students' reading comprehension difficulties. Those difficulties are more apparent now than before because of the great distance between the skills that the Knowledge Society demands and what the education system is able to provide with. A specific problem in this regard is that classical comprehension assessment tools are not helpful to orient educators about which comprehension skills and strategies should be assessed, and how it should be done. Reading comprehension research has produced advances in the last ten years to contribute to remediate this situation. There is now data to provide the educators with guidelines about new reading comprehension skills and strategies and about how they could be assessed. This symposium is aimed at dealing with this issue. More specifically, three are the main topics:
1) Methods to asses reading comprehension skills and strategies, e. g., question-answering, on-line measures, etc. More specifically, possibilities, limitations, and compatibility among new and classical methods will be discussed.
2) New reading comprehension skills and strategies for new tasks and settings (e. g., constructing spatial and interpersonal mental models, detecting inconsistencies, finding a hierarchical order in the text, searching information, etc), and new measures to assess these new comprehension skills and strategies.
3) From research to practice. Could the new methods and tasks inspire the development of new assessment tools to be used by practitioners? How could it be done?
Researchers from four different European countries are exchanging research results and ideas about these three topics. It is the first step to elaborate a general framework to asses students' reading comprehension difficulties at the European level.

Assessing different sub-abilities in reading comprehension: An Italian project
Pazzaglia DeBeni, University of Padova, Italy

Research in the last decades has demonstrated that reading comprehension is a complex task which requires both cognitive and metacognitive abilities. Reading comprehension develops throughout life with the acquisition of new competencies, knowledge and strategies. One of the primary tasks of school education is to enhance reading comprehension from the first phase of learning to the acquisition of advanced competencies. In pursuing this goal, the assessment of different abilities involved in comprehension is crucial. The present paper presents an Italian project - New Guide to Reading Comprehension, by Rossana De Ben et al.- that aimed to improve reading comprehension in 8- to 14-year old children. In this project the reading comprehension's unitary process was subdivided in 10 different sub-abilities, shown by research to be relevant to comprehension and varying from the more traditional (i.e. finding text's characters, places and times) to more innovative tasks (i.e. constructing spatial and interpersonal mental models, detecting inconsistencies, finding a hierarchical order in the text). Achievement in each sub-ability was assessed by means of specific reading comprehension tests, which differed for content and difficulty level, so that the entire project had 10 comprehension tests (one for each specific sub-ability), each proposed in 2 levels of difficulty, for a total of 20 tests. They were administered to a sample of 1155 children from schools situated in different geographical areas within Italy. Participants were divided into two groups: 782 (399 m., 383 f.) aged 8-11, and 373 (130 m., 143 f.) aged 12-14. Tests were analysed for their psychometric characteristics (developmental trend, reliability, external validity, factorial dimension) and criteria of reference were given for each level. Results evidenced that the tests' reliability and external validity were satisfactory and that their use was particularly fruitful within educational interventions for improving reading comprehension.

LIRALEC: A Web-based resource for the assessment and training of reading comprehension skills
Jean-Francois Rouet, University of Poitiers - CNRS, France
Antonine Goumi, University of Valencia, France
Audrey Maniez, University of Poitiers - CNRS, France
Anthony Raud, University of Poitiers - CNRS, France

We discuss the skills that underlie reading literacy, considered from a functional perspective. We introduce LIRALEC, a set of Web-based resources aimed at assessing and training reading comprehension skills in middle school students. LIRALEC provides facilities for the creation and the performance of text-based tasks according to various scenarios. Exercises can be assembled in series tailored to the need of students. A full size field study is presently being conducted over a school year with the participation of about 200 students. The purposes are (a) to find out if consistent patterns of difficulties emerge over a large number of trials and (b) if individualized training series result in significant improvement of literacy skills by the end of the school year.

Processing of diagnostic text information as a component of reading comprehension ability
Stephan Dutke, University of Kaiserslautern, Germany
Christiane Baadte, University of Kaiserslautern, Germany
Andrea Hohnel, Technical University of Dresden, Germany
Ulrich von Hecker, Cardiff University, United Kingdom
Mike Rinck, University of Maastricht, Netherlands

The mental model of the situation described in a text gradually unfolds as incoming text information augments the propositional text base and activates background knowledge. Some times the model is ambiguous. An efficient comprehension strategy is to search the text input preferably for information disambiguating the situation model (diagnostic text information) as opposed to information that simply adds to the initial situation model without providing any opportunity to check its global consistency (nondiagnostic text information). Three experiments investigate how readers recognize and process diagnostic text information and to what extent these processes were related to working memory capacity. The experimental procedure required eight narrative texts to be read. Each text consisted of about 50 sentences and described a social situation involving six individuals. This situation was ambiguous with regard to whether this group of individuals consisted of two or three

cliques. Later in the text, a critical pair relation was presented that was compatible with either (a) the two-clique situation, (b) the three-clique situation, or (c) both situations (nondiagnostic relation). Analyses of subjects' reading times demonstrated that sentences presenting diagnostic relations were read more slowly than sentences presenting nondiagnostic relations (Experiments 1-3), irrespective of whether the diagnostic information confirmed the initial situation model or required the initial model to revised (Experiments 1 and 2). After reading each text, the participants indicated the number of cliques (Experiments 1 and 2) or evaluated six different clique structures (Experiment 3). The results showed that the situation model was updated according to the diagnostic information found in the text. Using diagnostic text information in updating the initial model seemed to be related to working memory resources. The recognition and processing of diagnostic text information are discussed as a component of reading comprehension ability as well as of new methods for its assessment.

Behavioural on-line measurements to assess reading comprehension skills and strategies: From research to practice
Eduardo Vidal-Abarca, University of Valencia, Spain
Tomas Martinez, University of Valencia, Spain
Ramiro Gilabert, University of Valencia, Spain
Pilar Selles, University of Valencia, Spain

Behavioural on-line measurements record data of reading and rereading times while reading the text, and also on the sequence of reading, at the same time that they preserve the natural course of reading. Those data give an account of the reader's strategies. Researchers have extensively used computerized tools that record behavioural on-line data to analyze the reader's skills and strategies in a great variety of comprehension tasks. A computerized test to assess school Children's skills and strategies called TEC-e (Test on-line de Estrategias de Comprensi?n, On-line Test of Comprehension Strategies) based on a research tool that records behavioural on-line data called Read&Answer is presented. TEC-e has been used to capture reading comprehension strategies of 5th, 7th and 9th graders when they read a text and answer questions. TEC-e automatically generates a report which includes: (a) comprehension scores, (b) on-line measures, and (c) pattern of reading comprehension strategies. Results show that TEC-e is useful to assess the student's comprehension skills and strategies.

Analysing think-aloud protocols of beginning readers: a two layered system
Gonny Schellings, Radboud University Nijmegen, Netherlands
Cor Aarnoutse, Radboud University Nijmegen, Netherlands
Jan van Leeuwe, Radboud University Nijmegen, Netherlands

In the present study, we examined the reading behaviors of young readers, while reading an expository text. A total of 24 third graders was administered a think-aloud task on two occasions. Their protocols were analysed by a coding system that captured two levels of the reading process: the word identification level and the reading comprehension level. Three indices reflecting three different reading behaviors were discerned: reading errors, reproduction, and activities referring to reading strategies. Correlational analyses showed the reading strategy index to be related to reading comprehension as measured by standardized tests. The think-aloud task constitutes a valuable instrument for examining strategic reading among young readers.

A 22   23 August 2005   14:30 - 16:30   Room B107

Expert Panel

INTERDISCIPLINARY RESEARCH IN EDUCATION: PROBLEMS, PROSPECTS, AND PROMISES

Chair: Andreas Demetriou, University of Cyprus, Cyprus
Organiser: Andreas Demetriou, University of Cyprus, Cyprus
Participants: Denis C. Phillips, Stanford University, USA
                Monique Boekaerts, Leiden University, Belgium
                Erik De Corte, University of Leuven, Belgium
                Fritz Oser, University of Fribourg, Switzerland
                Roger Saljo, Gothenburg University, Sweden
                Stella Vosniadou, University of Athens, Greece

In the recent years research and theorizing crosses the boundaries between fields and disciplines much easier than in the past. This approach is reflected in the emergence of new terms, such as cognitive science, neuroscience, personality science, etc., which indicate the shift of emphasis from a particular field of study to a class of phenomena and problems that are approached from the perspective of all disciplines concerned. This epistemological and methodological shift already started to

shed line on complex phenomena that cannot be understood from the limited perspective of a particular discipline. Education is a vast space where practically every phenomenon is by definition complex, multidimensional, and variable, thereby necessitating a multidisciplinary approach. This round table discussion will focus on interdisciplinary research in education with the aim to highlight its present status, point to the weaknesses that must be removed if will be able to have an educational science as successful as cognitive science or neuroscience, and point to the directions that must be taken en route to this successful educational science. The discussants, coming from different fields, such as philosophy of education, educational psychology, cognitive science, developmental science, will attempt to open the discussion that EARLI will have to foster and cultivate for many years to come, in its will to function as a catalyst for new developments in research, theory, and practice in education.

This expert panel is organized under the auspices of the International Academy of Education.

| B 1 | 23 August 2005 | 17:00 - 18:20 | Room A109 |

Paper Presentation
Assessment and Evaluation

STUDENT ASSESSMENT

Chair: Leonidas Kyriakides, University of Cyprus, Cyprus

Developing and validating a questionnaire on Student Perceptions of Assessment
Bruce Waldrip, University of Southern Queensland, Australia
Darrell Fisher, Curtin University, Australia
Jeff Dorman, Australian Catholic University, Australia

The overall aim of this study was to investigate relationships among students' perceptions of their assessment tasks, teacher-student interactions and attitude towards science in middle school science classes. There has been a substantial amount of research into types of assessment but very little research into students' perceptions of assessment. By including students in the teaching - testing - grading cycle, the validity of the assessment processes can be enhanced and invalid assessment in-

struments that result in very high failure rates can be avoided. This phase of the project involved the development and validation of an instrument, the Students' Perceptions of Assessment (SPA) questionnaire to assess students' perceptions of their assessment tasks in science classes. After examination of relevant literature, the following scales were adopted: Congruence with Planned Learning, Diverse Methods, Authenticity, Student Consultation, Transparency, and Accommodation of Student Diversity. Factor analysis of 94 middle school classrooms confirmed the presence of six scales. The internal consistency/reliability and scale item mean of each of the SPA scales provided alpha coefficients that ranged from 0.50 to 0.84 confirming that each SPA scale has acceptable reliability, especially for scales containing a relatively small number of items. Correlational analysis shows distinct but somewhat overlapping scales. The higher year levels perceived less Student Diversity, and Diverse Methods. The student interviews therefore examined the veracity of the students' perceptions. When we interviewed the students about the extent of degree of Congruence with Planned Learning, the students perceived that it was important that the assessment tasks align with the goals, objectives and activities of the learning program. Overall, this study has shown that identifying the components of assessment using students' perceptions of their assessment is worthwhile and that further study employing the SPA would be valuable.

Development and validation of a questionnaire for measuring students' capability for effective learning
Angela Ho, Hong Kong Polytechnic University, Hong Kong
Kenneth S.H. Tam, Hong Kong Polytechnic University, Hong Kong
Kam Por Kwan, Hong Kong Polytechnic University, Hong Kong

This paper reports the development and validation of the Capability for Effective Learning Questionnaire (CELQ). The CELQ uses an empirically emerged model of learning to learn as its framework and attempts to measure students' capability for effective learning in the following domains: (1) contextualised goal-setting, (2) cognitive strategies, (3) metacognitive strategies, and (4) collaborative learning. Questionnaire items were derived from the interview data from an earlier research on students' learning-to-learn needs (Ho, Chan, Sun, & Yan, 2004) and with reference to other relevant instruments from the literature. The questionnaire was piloted with a sample of over 700 students from 16 academic departments from a university in Hong Kong. Data was factor analysed and reliability for each scale was estimated. Items with low structural coefficients and poor internal consistency were either removed or rewritten. Two iterations of piloting were carried out and

81 items remained in the final questionnaire. The resulting questionnaire obtained a high reliability for all four scales with alpha values between 0.84 and 0.93. Concurrent validity of the questionnaire was established by correlating its scores with that of a theoretically comparable validated instrument (Study Process Questionnaire) (Biggs, Kember, & Leung, 2001) and through a known group comparison procedure. It was concluded that the CELQ possesses satisfactory psychometric properties for a reliable and valid measurement of students' capability for effective learning, but further work needs to be done to enhance the sub-scales to provide more detailed diagnostic information on student learning capabilities. The theoretical underpinnings of the CELQ and its applications are discussed and recommendations for further work proposed.

Student assessment: Analysis of teachers' understanding and interpretation of what is said and demonstrated by students
Tali Wallach, Weizmann institute of Science, Israel
Ruhama Even, Weizmann institute of Science, Israel

This study aims to examine the structure and content of teachers' understanding and interpretation of students' talk and action while engaged in mathematical problem solving. Participants are 12 elementary school teachers in an in-service workshop on mathematics teaching. Data collected include the workshop leader's journal, written work prepared by the teachers, and video-tapes of the following: all workshop sessions, the pairs of students' problem-solving sessions, individual interviews with each teacher that centered on episodes that the teacher chose from the videotape of her students, two focus-group interviews. Data analysis is based on the Phenomenological Hermeneutics method and the Grounded Theory method. Structural analysis of the individual interviews data centers on two dimensions: types of interpretation and focus of interpretation. A two dimensional analysis of the teachers' interviews reveals four structural profiles of interpretation, defined as follows: (1) local-cognitive interpretation - focus on the event (the students' work) with little connections to external contexts, together with an emphasis on cognitive aspects of the students' work, (2) local-varied - focus on the event with reference to different aspects of the students' work, (3) connected-cognitive - using external contexts to explain the event or inferring new insights, together with an emphasis on cognitive aspects of the students' work, and (4) connected-varied - using external contexts with reference to the different aspects. Content analysis of the data suggests two categories of characteristics related to teacher hearing (i.e., understanding students' talk and action). One category is defined as compatibility of teacher hearing with

what the students are saying/doing. In this category the following characteristics were identified: over-hearing, under-hearing, no-hearing, and compatible-hearing. The second category is defined as the complexity of teacher hearing, and includes the following characteristics: flexible-hearing, firmed-hearing, complex-hearing.

Students' assessment preferences in relation to their study-results in new learning environments.

Gerard van de Watering, University of Maastricht, Netherlands
David Gijbels, University of Antwerp, Belgium
Janine van der Rijt, University of Maastricht, Netherlands
Filip Dochy, University of Leuven, Belgium

In the present study students' assessment preferences are topic of research. Two questions are central in this study: (1) Which assessment and item format do students prefer and which cognitive processes students prefer to be assessed within a new learning environment? (2) In which way are assessment preferences related to students' study results? Students' assessment preferences were measured by means of the Assessment Preference Inventory. Students' study-results were measured by means of their final exam, which consisted of both multiple-choice and open-ended questions. The new learning environment used in this study concerned problem-based learning (PBL). 208 first-year Law students following a PBL-course on the topic of public law participated in the study. Results were analysed by means of descriptive statistics for the measures used in the present study and analysis of variance were conducted to probe into the relationships between students' assessment preferences and their study results. Results indicated that students preferred written tests wherein they are allowed to use supporting materials like notes and books. Oral tests, computerised tests and portfolios were not preferred by the students as a way to assess their knowledge and skills in a problem-based learning course. Students' assessment preferences were related to their final (written) exam results: On the one hand students who preferred written assessments obtained lower marks for the total assessment than students who did not prefer written assessments at all or were neutral towards written assessments. On the other hand students who did not prefer alternative assessments like portfolios and papers or projects obtained higher scores on the part of the (traditional) assessment with multiple choice questions. Several explanations are discussed in the paper.

Paper Presentation
Assessment methods

ENHANCING TEACHING AND LEARNING

Chair: Constantintos Papanastasiou, University of Cyprus, Cyprus

Peer assessment as a tool for learning: a meta-analysis
Nanine A.E. Van Gennip, Leiden University, Netherlands
Mien Segers, Leiden University, Netherlands
Harm Tillema, Leiden University, Netherlands

Changes in the current view of learning have led to changes in the nature of assessment. The implementation of new modes of assessment in order to increase learning outcomes in new and dynamic learning environments appears more and more. These changes in assessment are moving from testing to multiple and integrated assessment. Peer assessment is an example of such a new mode of assessment. This meta-analysis examines the relation between peer assessment and learning, or the development of professional competences. This relation is of great importance, because of the learning benefits assessment can offer. Additionally, the conditions that affect this relation, such as social factors, the perceived validity of peer assessment and prior experiences with peer assessment, are examined. The results of this meta-analysis showed that the studies examining peer assessment and learning can be categorized in at least three sub-categories: (1) qualitative versus quantitative studies; (2) experimental versus non-experimental studies; and (3) subjective and objective measures of learning. Especially the relation between peer assessment and subjective learning appeared to be a strong one. The sub-categories and the conditions that appeared to affect the relation between peer assessment and learning will be discussed.

Design-based multi-level assessment for enhancing discourse
Gita Taasoobshirazi, University of Georgia, United States
Dan Hickey, University of Georgia, United States
Dionne Cross, University of Georgia, United States

Accountability-oriented reforms have highligted enduring tensions for classroom

instruction in all domains, including mathematics. In many countries, schools are under pressure to deliver continually increased scores on criterion-referenced tests. Particularly in the US, these gains are expected for all students, but are also not expected to come at the expense of other valued outcomes that are not assessed on those particular tests (e.g., classroom discourse, deeper understanding, performance on other tests, graduation rates, etc). This paper describes an approach that extends existing research on assessment to attain these seemingly conflicting goals for educational reform. The approach features at least three levels of assessment (i.e., close, proximal, distal), each using an increasingly formal representation of knowledge (ìcultural, ìcognitive, and ìbehavioral,). Formative and summative functions within and across each level are iteratively refined across three increasingly formal cycles of design research (implementation, experimentation, and evaluation). This framework extends existing research on assessment and testing in several ways. At the close level, innovative formative feedback rubrics for each quiz item are used along with ìfeedback conversations that build on students shared knowledge of specific curricular activities. These conversations provide feedback to teachers that is ideal for informally guiding student discouse and understanding. At the proximal level, formal classroom assessments provide evidence of the impact of the close level activity on individual understanding, and provide teachers with feedback useful for remediating specific students or specific topics, and formally refining the curriculum. The distal-level assessments provide valid evidence of the impact of these refinments, and can be adminstered to comparison groups. Results from a pilot project involving seven hours of third-grade fractions curriculum are presented. A three-year study recently funded by the US National Science Foundation is introduced.

Enhancing teaching and learning by using an interactive assessment file for professional development
Christian Fantoli, HEP-VD University of Education, Switzerland
George Hoefflin, HEP-VD University of Education, Switzerland

According to the Bologna declaration (BA, MA process), implementation of systematic summative assessment in the Swiss Universities of Education (HEP) requires new methods for the evaluation of teaching. This paper specifically investigates further steps of implementation of a portfolio for the assessment of teaching provided by the Special Education section of the University of Education of the canton of Vaud in Switzerland (HEP-VD). This portfolio has developed into an ìinteractive assessment file that shows important effects on the professional develop-

ment of trainees working in the field of special needs (Hoefflin & Allal, 2004). Further exploratory research investigates whether teaching is qualitatively enhanced by increased interactivity between trainers and trainees. In Switzerland, special needs training is provided to former ordinary teachers (BA) who start teaching in special needs school classes and simultaneously follow a specific academic curriculum of three years. After analysing the advantages and disadvantages of using formative assessment to evaluate professional development in the field of special needs, this paper will consider qualitative improvement of teaching ìdidactic and disciplinary skills (French and mathematics).

Critical thinking dispositions inventory as the tool for evaluating instructional alignment
Patrick Lai, Educational Development Centre, Hong Kong
Alex Wong, The Hong Kong Polytechnic University, Hong Kong
Priscilla Chan, The Hong Kong Polytechnic University, Hong Kong

Constructive alignment has been the guiding principle on instructional design. Basically it calls for an integration between assessment, learning objectives and the learning-teaching activities. For the elicitation of effective learning, the assessment methods so employed have to address the learning outcome. Taking into consideration of the importance of this principle in curriculum design and assessment, some means has to be developed to evaluate whether a certain program and subject has fulfilled the alignment principle. This study employs the presage-process-product model as the theoretical framework to evaluate whether the assessment methods employed by a university subject has addressed elements of the critical thinking. The Critical Thinking Disposition Inventory (CCTDI) was administered to students at the start of the subject. Students were classified into positive, ambivalent, or negative categories in the different sub-scales of the inventory. Assessment scores of students in the different sub-groups were compared to find out whether there was any significant difference in group means. Two focus group interviews were conducted to investigate students' perception of the learning, in particular the assessment environment. Results showed that the positive sub-group of the open-mindedness sub-scale of CCTDI scored significantly higher than their negative counterpart in the project performance. Interviews also indicated that students agreed that projects served as means to help them learn and interact. As a conclusion, the results indicated that the project assessment method has facilitated students to engage in an open-minded thinking mode. This study is the first of its kind to use the CCTDI as a tool to evaluate whether instructional alignment has occurred. It might well serve

as a springboard for similar studies to be conducted so as to further develop quality assurance procedures for curriculum development.

B 3   23 August 2005   17:00 - 18:20   Room A110

Paper Presentation
Language Education

APPROACHES TO ENHANCING LANGUAGE DEVELOPMENT

Chair: Jonas Emanuelsson, Gothenburg university, Sweden

Validity of indicators to study the alignment equivalence of two Language Arts curricula
Dany Laveault, University of Ottawa, Canada
Carol Miles, Carleton University, Canada

The purpose of this study is to compare Francophone and Anglophone students of Ontario on how they use rubrics to assess writing. Equal opportunities to understand rubrics are crucial in making sure that each respective Language Arts curriculum of Ontario, the French as well as the English one, are aligned properly (La Marca, 2001). If it can be shown that, despite separate curricula, the ability of Francophone and Anglophone students to develop good writing skills is not influenced by different ways of interpreting rubrics, we may then assume some degree of ìalignment equivalence between both curricula. Three indicators were developed to measure this construct: (1) the discrepancy between a student's own rating and the province's established achievement level of a series of writing exemplars, (2) the severity and (3) the student's confidence level. Our hypothesis is that these variables may be used to compare the two Arts programs, in terms of their respective alignment and of in terms of their impact on students' achievement. Results show that the curricula for the Francophone and Anglophone students may be considered as aligned in approximately equivalent ways. A multiple regression of the three indicators on the school marks in writing shows that the most significant predictor is the discrepancy score. Multiple Rs for each group are statistically significant and both equations of prediction include the same variables with comparable weights. This study shows that the indicators used for this research, specially the D score, may be used as early indicators of differential test functioning. It may help bring up the attention of teachers and school boards to differential understanding of rubrics and to their

potential impact on students' achievement.

Modes of talk and their relation to interaction patterns in language lessons in the seventh grade
Hayuta Yinon, Haifa University, Israel
Lily Orland-Barak, Haifa University, Israel

Classroom discourse is a unique kind of discourse, which is shaped through interaction patterns, namely, through reciprocal communication systems amomgst participants. These interaction patterns, and mainly the IRE/F sequence, shape rule systems, which, in turn, define and regulate classroom activity, and determine how to talk in the classroom. Despite this understanding, research has paid little attention to the relations between interaction patterns and modes of talk This study aims at filling this gap in the specific and unique context of frontal language lessons in one seventh grade classroom in northern Israel, by exploring three questions:
1. What characterize existing modes of talk in the classroom?
2. What are the rule systems, that define and regulate modes of talk in the classroom, and how are they shaped through interaction patterns?
3. What interaction patterns contribute / impede to the preservation of rule systems, which define modes of talk in the classroom?
The research paradigm of the study is qualitative, naturalist and interpretive, and it integrates ethnography and classroom discourse analysis. The data was collected through three sources: interviews, observations of lessons and collection of school documents. Data analysis followed by grounded theory procedures.
The findings of this study lead to several understandings. First, the study extends the potential of the use of the IRE/F sequence to the exmination of modes of talk in the classroom. Second, the study points to the existence of more flexible discourse patterns in frontal lessons in the Israeli classroom, challenging the common belief that pupils seldom take an active part in the lesson. Third, the study reveals that investing   effort in determining modes of talk in the classroom, in creating rules to sustain it and in "talking about it" with pupils, does not necessarily lead to the accomplishment of classroom management.

Following phonemic awareness traces in Spanish
Francisca Serrano Chica, Univesidad de Granada, Spain
Sylvia Defior-Citoler, Univesidad de Granada, Spain
Carmen Gonzalez Trujillo, Univesidad de Granada, Spain

This study aims to evaluate the development of phonemic awareness skills, the deepest level of Phonological awareness (PA), before and after reading instruction. Participants were 105 Spanish children, followed in a three year longitudinal study (from preschool age until first year of primary school). Children were evaluated twice in each academic year (November and May), using a phonemic awareness task, where the linguistic complexity of the items was manipulated (number of shared phonetic features and initial consonant cluster versus single phoneme). Results show emergent phonemic awareness skills at an early age of development. However, in the first year of primary school these abilities improve considerably. The linguistic complexity of the items influence children performance. Implications for the predictive value of phonemic awareness skills are considered.

A somatically enhanced approach to creating a language-learning environment
Felicia Zhang, University of Canberra, Australia

Research has shown that traditional methods of teaching pronunciation in foreign language learning have not been as effective as might be desired. This is largely because many of the teaching methodologies are designed along the idea of working from a database of errors that learner typically make and then trying to find solutions to correct those errors. The teaching pedagogy described in this paper starts from the opposite end and deals with training students' perceptual mechanisms so as to enable them to have better pronunciation in an L2 from the beginning. This paper describes a significant innovation in language teaching pedagogy. Language should be learnt not through a process of manufacture but through discovery. In effecting this change, curriculum and learning environment design should consider learner needs and desires as primary without sacrificing the objectives of producing proficient speakers of the target language. The primary technology that contributes to the learning process in this environment is the 'body'. Together with the body, CD-ROMs, a speech processing tool which enables voice comparison mechanism for audio files, and the internet constitute 'machines' in the learning environment (which are waiting to be activated by learners). Finally, the paper briefly reports on an experiment for teaching Mandarin to English speaking learners using this unique teaching methodology in an Australian university. Experimental results demon-

strate that Mandarin Chinese L2 learners, after a mere 65 face-to-face contact hours in this environment, not only achieve a faster rate of acquisition of the segmental system of Mandarin Chinese, they also exhibit a higher level of motivation, initiate their own learning activities and organize their own process of learning. They also develop a positive attitude towards Chinese culture and become able to cope in a wide range of Chinese speaking contexts.

B 4   23 August 2005   17:00 - 18:20   Room A111

Paper Presentation
Science Education

CLASSROOM STRATEGIES

Chair: Theodora Kyratsi, University of Cyprus, Cyprus

Group work and conceptual growth in science: Taking account of post-group effects
Christine Howe, University of Strathclyde, United Kingdom

Research has repeatedly shown that conceptual understanding in science can be promoted by group work between learners. However, the research is inconclusive over the mechanisms by which group work impacts upon individual understanding. One popular account sees learners as constructing collective insights during group work that are superior to their starting points, and then assimilating these insights into their individual knowledge. However, assimilation cannot account for conceptual growth that is stimulated by group work but: a) occurs despite collective views that are inferior to individual starting points and that are unrelated to the extent of progress; b) requires a post-group interval of several weeks to become apparent. Delayed conceptual growth of this kind has been reported on many occasions, and the project to be summarised in this paper explains why it occurs. The project involved studies with primary school children aged nine to twelve, and addressed mastery, subsequent to group work, of the factors relevant to floating and sinking. The group task used in the studies required children to predict which, from sets of small objects, would float and which would sink, test their predictions by immersion in a tank of water, and interpret outcomes. Mastery of factors was established by paper-and-pencil tests that were administered to whole classes as pre-tests prior to the group tasks and as post-tests eight weeks afterwards. The results show that

delayed conceptual growth occurs when group work 'primes' children to make productive use of relevant events that are experienced during the post-group interval. In addition to their theoretical implications, these results have practical implications for how teachers interpret group interaction, and for how they support its consequences over the succeeding weeks. The latter will be discussed in detail.

Examining the Reliability of Using Science Notebook as Assessment Tools
Min Li, College of Education, University of Washington, United States
Maria Araceli Ruiz-Primo, Stanford University, United States

Student notebooks have been proposed and investigated as an instructional and unobtrusive assessment tool (e.g., Aschbacher & Alonzo, 2004; Harmelink, 1998; Ruiz-Primo & Li, 2004; Shepardson & Britsch, 1997). Furthermore, policymakers and researchers have started considering the inclusion of different sources of assessment information into accountability system, such as, curriculum-embedded assessments, class projects, notebooks (e.g., Shavelson, 1999; Wilson, 2004). To evaluate the technical soundness of using notebooks as assessment tools for both instruction and accountability, this paper focuses on using Generalizability (G) theory to examine how notebooks can be analyzed consistently and efficiently for supporting credible interpretations of student performance. G theory allows to estimate the amount of score variance due to the inconsistency between notebook entries or raters and to determine scoring procedures of optimizing the number of raters or entries needed to minimize measurement error (Shavelson & Webb, 1991). A random stratified sample of thirty-six notebooks selected from twelve science classrooms was independently scored by four well-trained raters. All the raters were teachers with several years of experience in teaching the curriculum and using notebooks in their classrooms. For each notebook, four out of the 12 investigations in physical science required by the curriculum were scored. Student x entry x rater G studies were performed to examine the reliability of the notebook scoring. The analyses will address the following questions: (1) Can well-trained raters reliably score a sample of students' notebooks entries? (2) Is there a difference in notebook scores between two types of scorers, own teachers versus outside scorers? And (3) how many entries and raters are necessary to obtain reliable notebook scores for student performance? Preliminary analyses found that scoring several entries could provide reliable interpretation of student performance though reliability coefficients varied across the investigation sub-aspects and across the dimensions focused by the scoring procedure.

The impact of integrated illustrated instructions on cognitive load and understanding within secondary school science practical work
Carolyn Barr, University of Auckland, New Zealand
Richard Hamilton, University of Auckland, New Zealand

This study looks primarily at improving the understanding and learning from practical work actually performed by students in secondary schools by modifying the presentation of the instructions students are required to follow to complete these practical tasks which involve integrating information from two different mediums (written instructions and electrical equipment). The instructions were modified using guidelines from Cognitive Load Theory and Theory of Multimedia Learning. This study also looked at the effect of gender on understanding and learning in a practical context in science. 96 junior secondary school students who were unfamiliar with content knowledge and the equipment commonly used in practical work on electricity took part. One group was given modified instructions containing integrated text and illustrations and the other group was given conventional instructions containing text only. A series of MANOVAs found that modified instructions produced significantly higher levels of performance on task, lower time to completion, lower perceived cognitive load and task difficulty and higher post test scores than conventional instructions. Significant gender effects were found for the time to completion and on all performance measures. No significant treatment X gender interactions were found on any measure. This data suggests that for practical work in science, when learners are inexperienced and the information is complex that physically integrating mutually referring sources of information reduces split attention and hence cognitive load, and therefore makes instructions easier to understand. The treatment effects were also robust, i.e., not moderated by gender. These results indicate that subject's understanding was facilitated to a higher degree in the modified instructional treatment and are consistent with the notion that the annotated, integrated illustrations made the instructions easier to understand and were successful in eliminating any split attention effect. In addition, the modified instructional materials facilitated greater learning as indicated by the post test scores.

Expertise in the Domain of Science Discuss Processes of Change in Their Thinking
Hava Greensfeld, Michlalah Jerusalem College, Israel
Ilana Elkad-Lehman, Levinsky College of Education, Israel

This study is a part of a wide-scale research which examines the reasons underlying

changes in the way teacher educators in specific domain (science or literature) perceive their thinking about their discipline, their manner of instruction, or both. This presentation will focus on the processes of change in the thinking of science teacher educators, which were examined against recent changes in the education system, the development processes of teachers and of teachers in academia, and processes of change in science and in science education. We used qualitative methods to examine the extent of teacher educators' awareness of the processes of change in their thinking. The main research tool was a semi-structured interview that stimulates reflective thinking. Seven teacher educators were selected, and the narratives of some of them will be presented. The data was processed using qualitative research tools and methodologies from the fields of discourse study and literary research. Our study reveals a complex, multi-varied picture regarding the factors involved in the processes of change in thinking. We found that motivation and metacognitive abilities are an indispensable condition for change in thinking processes. These abilities propel change in the domain-specific knowledge of science and in teaching, while cognitive conflict, which had been presented as a central cause of change, provides only a partial explanation for changes in thinking as these related to science teacher educators. More over, from the perspective of examining changes in thinking through introspection, our study reopens the question of the fruitfulness of "conceptual change" as a term to describe changes in learning processes of teacher educators. The research findings may contribute new knowledge and insights regarding the thinking process of science teacher educators when relating to their domain-specific knowledge.

B 5   23 August 2005   17:00 - 18:20   Room A112

Paper Presentation
Early Childhood Education

LANGUAGE AND CREATIVE THINKING

Chair: Chrystalla Papademetri, University of Cyprus, Cyprus

The creative thinking of young children in a community of enquiry
Hanneke Jones, Newcastle University, United Kingdom

The aim of this study was to investigate to what extent the Community of Enquiry could stimulate and support creative thinking in children aged 5-7. The main research questions for this research were: 1. How could aspects of creative thinking, expressed by children during Community of Enquiry sessions, be identified and investigated? 2. How did that creative thinking develop in the course of a school year? 3. How did that development in creative thinking compare to the Children's creative thinking as expressed in two Torrance Tests of Creative Thinking? Methodologically, analysis was carried out of both quantitative data: The Torrance Tests of Creative Thinking, carried out in October and July. 17 transcribed Community of Enquiry sessions. ïEach of the responses was categorised as either reproductive, tangential, original or reasoning, and Qualitative data: ïPersonal observations; Children's opinions; General classroom observations; Microgenetic analysis of several of the session transcripts. Main findings: On average, a higher percentage of the responses was productive in the second half of the year, than in the first half of the year. The response category indicating the highest level of creative thought (reasoning) had risen the most. A high correlation was found between disagreement and reasoning. Patterns indicative of interactive creativity were found. Relevance: The research is relevant to two Conference Domains: Learning and Cognitive Science: Knowledge creation and creativity are central to this study, which indicates how creative thinking in young children can be conceptualised and assessed. Teaching and Instructional Design: The Community of Enquiry is an effective pedagogical framework in which many children savour the opportunity to display and develop their creative thinking.

Adults and pre-school children talking science in three learning environments
Monica Strang, Gothenburg University, Sweden
Lisbeth Aberg-Bengtsson, Gothenburg University, Sweden

This paper presents some tentative results from a study of ten 5-year-old pre-school Children's talking about scientific phenomena with adults in different learning environments (a science center, their pre-school, and a guided conversation with a researcher). Taking a socio-cultural perspective, the aims of the study were to illuminate and describe strategies used by adults when talking with children about science in the different settings and to point out communicative patterns between the interactors in the activities. Moreover, the enhancing (if any) of particular components of the scientific content and the use of scaffolding were looked for. At the time of the study the children had taken part in a theme-work about water at their pre-school. They visited a science center at the end of the theme-work period. The collected data include audio and video recordings from (a) the visit to the science center, (b) circle time at the pre-school, and (c) the guided conversation with the researcher. The analysis shows that the adults in the three different settings used different strategies when talking about science with the children and that these strategies were important as to how the communicative patterns were shaped. In addition, Children's familiarity with the scientific phenomena, as well as their ability to use it along with the new information, were closely related to their level of communicated knowing. The analysis also indicate the importance of the adults' scaffolding the Children's construing of their ìstory. In the present paper, the results will be related to theories within the socio-cultural framework and to some previous research. Moreover, some educational implications will be further discussed in the paper.

Kindergarten children producing humor: A combination of artistic and conceptual incongruities with language use in the process
Eleni Loizou, University of Cyprus, Cyprus

This study aimed in investigating the ability kindergarten children to produce humor and the role of language in this process. Semi-sructured interviews and the actual drawings of ninety kindergarten children were the main sources of the data. The children were asked to draw a funny picture and then describe what made their picture funny. This study was developed on the basis that humor involves an incongruous event and the data was examined against McGhee`s stages of humor development. Findings of this study suggest that children are capable of producing one or more incongruities when drawing a funny picture. This is in coherence with

McGhee`s stage 3 of humor development; conceptual change. More specifically the incongruities used by the children in their drawings were categorized into 1. Artistic incongruity (based on color or features), 2. Conceptual Incongruity (animism and combinations) and 3. Humorous symbols (clown, gestures, laughter, joke). In reference to the role of language in the process of producing a funny picture, the findings show that a. children use language before, during or after drawing their picture; b. language helps them describe their thoughts and drawings in terms of humor; and that c. they use either a list of information, or a story to describe their funny picture. This paper asserts the importance of considering multiple perspectives(cognitive, linguistic and artistic) in examining children`s knowledge and in providing for their learning.

Supporting oral language development in nursery schools: challenges and choices
Julie Dockrell, Institute of Education, University of London, United Kingdom
Morag Stuart, Institute of Education, University of London, United Kingdom
Diane King, Institute of Education, University of London, United Kingdom

There is a growing concern about the limited oral language skills of some children on entry to school. The current project addressed this problem by devising an oral language intervention based on current models of language acquisition. The intervention, Talking Time, focussed on three core language skills: vocabulary, inferencing and oral narrative. Both oral comprehension and expression were targeted. Progress for the children in the Talking Time intervention (N= 53) was contrasted with a comparison group who received the same amount of exposure in a Story reading intervention (N=41) and a control group who received typical good nursery practice (N=48). The 'intervention' took place in small groups, twice a week in the nursery setting and was delivered by nursery staff. Both the Talking Time and Story Time intervention continued over a 6-month time frame. Adherence to the intervention programme was monitored. Language skills were measured prior to the start of the interventions and on completion of the intervention period. All groups improved over the six-month period. Differential improvement patterns were evident for some targeted language skills. 'Talking Time' enhanced comprehension, naming vocabulary and sentence repetition. Gains for a general verbal measure were also evident for the 'story reading' intervention in comparison to the control. Expressive narrative language was not differentially improved and the Children's performance in this area remained depressed. The results are discussed in relation to current theories of language development and the ways in which such models can support language programmes that are aimed to address Children's needs and

progress. Issues of viability, fidelity and training are explored in relation to pre-school intervention.

B 6   23 August 2005   17:00 - 18:20   Room E002

Paper Presentation
Reasoning

REASONING AND ARGUMENTATION

Chair: Gunilla Petersson, Stockholm university, Sweden

Immediacy and intuitive reasoning in probability judgment
Tali Brecher, Tel-Aviv University, Israel
Reuven Babai, Tel-Aviv University, Israel
Ruth Stavy, Tel-Aviv University, Israel

Stavy and Tirosh (2000) have observed that students react in similar ways to a wide variety of conceptually non-related tasks that differ with regard either to their content area and/or to the type of reasoning required, but share some common, external features. Based on these observations, they proposed the Intuitive Rules Theory, which explains and predicts students' responses to mathematics and science tasks. Many responses, often described as ìalternative conceptions, may be interpreted as evolving from a number of intuitive rules, which are activated by specific external task features. The motivation behind this study was to empirically address the immediacy characteristics of intuitive responses in the context of science and mathematics. For this purpose, we employed the framework of the Intuitive Rules Theory and compared the reaction times of two types of responses: those that are regarded as intuitive and those that are viewed as counter-intuitive. We found that the reaction times of the former were, indeed, shorter than the latter. Accordingly we are currently studying if specific teaching methods, in accordance with the Intuitive Rules Theory, will promote students' ability to overcome their intuitive mistakes.

Thinking, arguing, and counter-arguing: The effects of issue relevance and minority influence on the choice of argumentation strategies
Carlo Tomasetto, University of Bologna - Faculty of Psychology, Italy
Francesca Romana Alparone, University of Chieti - Dpt of Bio-medical Sciences, Italy
Angelica Mucchi-Faina, University of Perugia - Dpt of Institutions & Soc, Italy

The relationship between argumentation and reasoning has received much attention in educational psychology, as argumentation is considered the tool that supports any cognitive activity. Nevertheless, being confronted with conflicting points of view does not guarantee a cognitive progress, since different argumentation strategies can reflect more or less accurate cognitive elaboration. In that, we make a parallel between argumentation and hypothesis testing tasks, where confirmatory biases, anchoring effects, etc., are examples of a general focussing effect (i.e., a tendency to consider only the elements already present in one's cognitive field and to ignore any divergent information), while falsification of alternatives witnesses a decentering tendency that ensures the use/acquisition of more advanced cognitive skills. We propose that the same focussing and decentering tendencies can be retrieved also in the field of argumentation. In fact, when arguing about an issue, speakers can hold their position either a) enforcing some statements they already agree with, or b) trying to confute alternative standpoints. Developing this parallel, we also predict that socio-cognitive conditions that are proved to foster decentering in hypothesis testing, will favour the appearance of counter-arguing strategies. In particular, we hypothesize that high personal relevance, and confrontation with a minority source of influence, should enhance the use of counter-arguments, whereas low relevance of the issue, and exposure to majority influence, should favour the enforcement of already shared arguments. In a 2 (relevance: high vs. low) x 2 (source of influence: majority vs. minority) experimental design, 114 university students were asked to develop three arguments in order to express their point of view about the introduction of a final comprehensive exam, choosing between confirmatory and disconfirmatory arguments. Results confirm the predicted source*relevance interaction. Implication for the design of argumentation activities in education will be discussed.

Individual differences in young children's proportional reasoning problem-solving and explanations
Fiona Reynolds, University of Melbourne, Australia
Robert Reeve, University of Melbourne, Australia

Proportional reasoning involves understanding relations among quantities and is central to understanding rational number, and success in high school mathematics. Many researchers have used aggregate analysis (usually age-based) to characterise proportional reasoning development. However, aggregate analysis may not be the most appropriate means of describing proportional reasoning development because of substantial within-age variability in understanding. It may be more appropriate to explore the significance of such variability by using methods that allow identification of different patterns of understanding. In this study we examined proportional reasoning understanding (using Noelting's Orange Juice task) to address two questions: Can we identify distinct profiles of proportional reasoning understanding on the basis of (1) variations in problem-solving performance, and (2) explanations of another person's problem-solving? If we can identify such profiles, what, if any, relationship exists between them? Ninety-five 6- to 9-year olds participated in a pretest-intervention-posttest study in which children were required to exhaustively share a quantity among n recipients. The pretest and posttest comprised 18 trials where quantities of juice, or juice and water, were to be distributed among two, four, or three recipients. Children were asked to choose which of four options (one correct, three common errors) showed one person's ìfair share of the distribution. In the intervention, children were told that another child had solved similar problems and were asked whether, and why, that child was right/wrong. Hierarchical cluster analyses identified distinct problem-solving competency profiles, and distinct explanation profiles. The sets of profiles were significantly related. Both sets of profiles were well-ordered, representing different forms of proportional reasoning understanding. The educational implications of this study are that it is possible to diagnose levels of proportional reasoning understanding in terms of both problem-solving competence and explanation ability. Further, the identified profiles indicate different developmental progressions in the acquisition of proportional reasoning understanding.

Investigating speech therapists' clinical reasoning: Analysing think-aloud protocols and integrating multiple-source data
Barbara Howarth, University of Newcastle, United Kingdom
Kirsty Hoben, University of Sheffield, United Kingdom
Julie Morris, University of Newcastle, United Kingdom
Rosemary Varley, University of Sheffield, United Kingdom
John Lee, University of Edinburgh, United Kingdom
Richard Cox, University of Sussex, United Kingdom

We report results from pilot studies of speech and language therapists who used a web-based case-based teaching resource (www.patsy.ac.uk) to diagnose previously unseen patient cases. The aim was to identify sources of impasse in their clinical reasoning. Pairs of therapists collaborated - they were encouraged to `think aloud' and were videotaped. Other data were derived from the PATSy system logs. The time course and sequence in which students administered standardised language tests to the (virtual) patient were determined from the log data. The think aloud discourses and the PATSy log data were triangulated. A coding scheme for the think aloud protocols was also developed. This required, inter alia, making decisions about the grain size of analysis. Together, the two sources of rich data provided useful insights into students' clinical reasoning. The results will inform subsequent stages of the project, specifically: 1. by elucidating the extent to which domain-specific knowledge versus more general reasoning heuristics are involved, and 2. by identifying topics around which structured task-directed discussion (TDD) exercises can be developed. The TDDs will be used in the next project phases as a principled method for eliciting educational dialogues for re-use as vicarious learning resources.

B 7   23 August 2005   17:00 - 18:20   Room E005

Paper Presentation

EMOTION AND EDUCATION

Chair: Philip Mayring, University og Klagenfurt, Austria

Children's emotions
Maria Eracleous, University of Cambridge, United Kingdom

Emotions have been a subject of study from very early on. There is evidence even before Plato that emotions were an issue of reference. The present study aims to examine Children's emotions in the educational context. More specifically, this is case study of a pre-school class in Cyprus which explores Children's emotions. Research Questions: The research questions can be articulated as follows:
ï What are the ways that children express their emotions? ï What are the different situations that evoke Children's emotions. ï What are the ways that children deal with their emotions? A range of research methods was used in the study, for methodological as well as practical reasons. More specifically, the research methods were interviews, drawings, research diaries, observations and video extracts. Data Analysis: The analysis of the data was qualitative with some quantifiable data. The analysis of the data was multidimensional due to the various sources of information. The first phase contained the data from each individual method whereas the second phase consisted of the data that emerged from all the different methods as a whole. Findings: One important conclusion drawn from the study concerns the complexities and difficulties of undertaking research concerning Children's emotions. The study has also shown the impact of cultural norms upon the perceptions of emotions as well as perceptions of research procedure. As regards the findings concerning Children's emotions the study showed that important themes regarding children and emotions emerged from the data analysis. The study showed that children consider facial expressions as an important source of information regarding emotions. In addition, the children seemed to have mingled various emotions and the situations that evoke those emotions. Last but not least, the study provided a small amount of evidence regarding possible ways of dealing with one's emotions and helping mechanisms.

Children's understanding of emotion: Initial validation of Italian test of emotion comprehension (TEC)

Ottavia Albanese, University of Milano Bicocca, Italy
Carla Antoniotti, University of Milano Bicocca, Italy
Eleonora Farina, University of Milano Bicocca, Italy
Caterina Fiorilli, University of Milano Bicocca, Italy
Ilaria Grazzani Gavazzi, University of Milano Bicocca, Italy

The Emotion Comprehension Test (Pons, Harris, 2000) is an instrument designed to evaluate Children's understanding of emotion between the ages of 3 and 11 years. More specifically, it allows to examine Children's understanding of the nature of emotions, their causes and the possibility of control. We wish to present preliminary data of Italian validation in relation to a group of subjects within the overall sample. Validity was assessed using a sample of 100 children (6 to 10 years old) recruited in elementary schools located in two big cities from northern and central part of Italy. There were 20 subjects (10 males and 10 females) in each age group (age range: +/- 3 months). All were normal children, with no learning, language and developmental problems. A cognitive test (MT Test, Cornoldi et al., 1991) was also administered. Statistical analysis revealed a trend in Children's understanding of emotion that supports empirically developmental trajectories described by Pons, Harris and de Rosnay (2004). A significant correlation was found between the MT test and the TEC. Results will be discussed in terms of their theoretical and educational implications, underlining the possibility to apply specific training in Children's metacognition of emotion.

Enjoying teaching: Enthusiasm and teaching behaviors in secondary school mathematics teachers

Mareike Kunter, Max Planck Institute of Human Development and Educ, Germany
Yi-Miau Tsai, Max Planck Institute of Human Development and Educ, Germany
Martin Brunner, Max Planck Institute of Human Development and Educ, Germany
Stefan Krauss, Max Planck Institute for Human Development, Germany

This presentation explores teacher enthusiasm and how it relates to teaching behaviors. We distinguish between teachers' enthusiasm for 1) the subject matter of mathematics and 2) teaching mathematics to their class, and examine how both types of enthusiasm relate to teachers' behavior and class context variables. A total

of 288 teachers and their 9th grade classes participated in this study. Teachers' motivations were measured with teacher questionnaires (enthusiasm for mathematics, enthusiasm for teaching a class, general job satisfaction, and self-efficacy beliefs) and student rating of their teacher's enthusiasm. Teacher behaviors were assessed using teacher questionnaires (use of social co-construction, peer tutoring, cognitively stimulating tasks, classroom management) and student questionnaires (ratings of teachers' elaboration in teaching, cognitive stimulation, discipline). Class context variables were represented by the class means of students' achievement, social background, and motivation scores. Validity analyses show that subject matter enthusiasm and teaching enthusiasm can be considered distinguishable concepts. Furthermore, teachers who were more enthusiastic about teaching showed more innovative and elaborative teaching behavior and experienced fewer disciplinary problems in their class - both self- and student reported. By contrast, enthusiasm for math as a subject correlated only with teachers' self-reported behavior, and not with student observations. As regards context variables, teachers from the higher track showed more enthusiasm for mathematics than teachers from lower track, and teachers in classes reporting higher interest in math were more enthusiastic about teaching. The value of enthusiasm as an additional concept reflecting teacher motivation is discussed in terms of its theoretical and educational implications.

B 8　　　　　23 August 2005　　　17:00 - 18:20　　　　　　Room E003

Paper Presentation

PHENOMENOGRAPHY AND VARIATION THEORY

Chair:　　　　Ference Marton, Gotenborg University, Sweden

To limit the time: How we can use variation theory to improve pupils learning to tell elapsed time
Anna Wernberg, Behavioural science, Sweden
Mona Holmqvist, Behavioural science, Sweden

The aim of this paper is to describe how teachers, by using the variation theory in a lesson, enable students to build new learning patterns. The variation theory focuses on the distinction between an ìenacted object of learning and ìlived object of learning, where the enacted object of learning consists of how the teacher actually teach the object of learning and the lived object of learning taking account of how the pu-

pils understand this object of learning. In this study, the participating teachers had felt that learning to tell the time, and especially elapsed time, was experienced to be a difficult concept for pupils 9-10 years old. Hence the object of learning became elapsed time. Praxis-oriented basic research is a growing field in educational science and teaching research. One method used in praxis-oriented research is learning study which has a focus on an object of learning, not teaching methods. In our learning study, three similar teaching situations were designed and the analysis of the classroom data was on what features of the object of learning varied, varied simultaneously, or remained invariant. The analysis shows which aspects of telling the time were focused, focused simultaneously or left unfocused, made impact on the pupils' learning-outcome, i.e. the lived object of learning. The purpose of this research was to find out what pupils learn in the classroom. The point of departure was that the entanglement of what teachers do in the classroom concerning the object of learning is crucial for the learning outcome. The result from the study shows that when teachers plan a lesson, taking the variation theory into consideration, it has a positive effect on the pupils learning outcome.

Teachers matters!
Mona Holmqvist, Kristianstad College University, Sweden

This study aims to describe the ways teachers' instructions affect learning outcome by the students when learning English as a second language in class four in a Swedish nine-year compulsory school. The learning object is in this study the infinitive verb to be in present form (am, are, is). The theoretical framework is the variationtheory, and the method used is learning study. The results show how the learning outcome did change according to the instructions the teachers gave during the three different lessons. By using the variationtheory, the teachers managed to catch the critical aspects of the learning object, shown by an increased learning outcome in lessons two and three. However, even if the learning outcome did increase, some errors were still made. In this study it is possible to see the connection between these errors and the kind of instruction the students were offered in the lessons. Even in this part of analyse the variation theory is used. While the connections are strong, it is possible to encounter the teachers a strong importance of the learning possibilities in a classroom. To use a theory about learning, in this study the variationtheory, seems to develop insights about the students' learning which the teachers have not experienced before. To develop such insights are crucial in a powerful teaching situation.

Meanings of and relationship between meanings of commonly used expressions, when discussing everyday physical events
Christer Alvegard, Learning Lund, Sweden
Elsie Anderberg, Department of Education, Sweden
Lennart Svensson, Department of Education, Sweden
Thorsten Johansson, Department of Philosophy, Sweden

Students' conceptions within the domain of classical mechanics have been investigated many times, but usually the relationship between expressions and meanings have not been problematized. During the last decade an interest has emerged concerning relationships between expressions, meanings and conceptions made possible by an intentional-expressive view of language. This paper presents empirical findings from a study made in this latter tradition. A number of students at Chalmers University of Technology, Sweden, were asked to describe a situation concerning the physical movement of a body. In the special dialogue-structure used, the student also reflected upon his/her expressions. This made the distinction between expression and meaning possible, and thus made it possible to reveal the student's meanings of expressions used. We present results concerning the relationships between expressions and meanings, and between these relationships and conceptions. Classical mechanics and everyday life share many expressions, such as acceleration, force and energy. In this paper we examine in depth, from the student's point of view, the use and meanings of these expressions. Our analytic distinction between expressions and meanings makes it possible to analyse students' conceptions in terms of meanings separated from expressions. Earlier research has shown that students often use the above-mentioned expressions in common sense ways, even in a disciplinary context. In the dialogues we have found instances of this, as well as of disciplinary meanings of non-disciplinary expressions or expressions shared by the disciplinary and everyday contexts. Example of this latter relationship is when the expression force is given the disciplinary meaning energy. From an educational point of view this is quite different from giving the expression force the everyday meaning of force. In the paper we discuss and categorise relationships between meanings and expressions used by students, as well as the educational implications.

Highly structured open inquiry labs
Jonte Bernhard, Linkoping University, Sweden
Anna-Karin Carstensen, Jonkoping University, Sweden
Oskar Lindwall, Gothenburg University, Sweden

According to several studies MBL is very effective in fostering a good functional understanding of physics. By using video recordings of students' interaction, we have made in-depth analyses of students' courses of action in two introductory mechanics courses and in an electrical circuit theory course. We have explored the different ways students orient to, interpret, and participate in MBL. Traditional taxonomy of laboratory instruction styles often suggests that there is a dichotomy between labs characterised as structured and open inquiry. We question this dichotomy and based on our empirical data we will show that students' courses of action in some dimensions are framed by encounters with the instructions, the technology, the teacher, and other peers wile they in other dimensions are free to explore. Therefore we propose that MBL-tasks could best be described as being both highly structured in some aspects and open inquiry in other.

B 9   23 August 2005   17:00 - 18:20   Room E004

Paper Presentation

SPECIAL EDUCATION AND STUDENTS AT RISK

Chair: George Spanoudes, University of Cyprus, Cyprus

Directionality of metaphor in language/learning disabled and typically developing children
Christina Karefillidou, University of Cyprus, Cyprus
Demetrios Natsopoulos, University of Cyprus, Cyprus

This study was conducted in order to examine Language/Learning Disabled (LLD) Children's comprehension of conventional metaphors when compared to chronological-age-matched (CA-matched) children. The study sample consisted of 50 children who were categorized as LLD by the cognitive referencing criterion, and 50 matched controls. That is, each LLD child was required to have a significant discrepancy between his/her Performance IQ (PIQ) and Verbal IQ (VIQ) with PIQ>VIQ. Children in the control group (typically developing children, TDC) ex-

hibited an equal PIQ (standard score) that is at least the average 100 in comparison with their peers whereas they scored above average on the VIQ scales. In the experiment presented here, children (aged 8:8-11:9) were provided metaphorically related terms with the instruction that they be assigned a-term (i.e., source) or b-term (i.e., target) status in the construction of metaphors. Children's representations of conventional metaphors in their long-term lexical or semantic memories were examined in three conditions: (a) in feature-target pairs, (b) in feature-source context1, and (c) in feature-target context2. The results indicated that overall the TDC group scored significantly higher on comprehension. Children with LLD consistently performed poorly on the metaphor comprehension task. The groups did not appear to respond differently to changes in condition. The group of LLD demonstrated the same comprehension pattern as PIQ-matched controls for the three conditions. Context variations had a statistically significant effect on Children's performance. Taken together, the results of this study appear to indicate the nonreversibility of metaphors in either group.

Educational psychology practices in cyprus: the process and value of early identification of children at-risk for learning difficulties
Timothy Padopoulos, University of Cyprus, Cyprus
Merope Iacovou- Kapsali, Ministry of Education and Culture, Cyprus
Michalis Ioannou, Ministry of Education and Culture, Cyprus

The present study piloted the administration of a set of tests that have been previously used only for research purposes, in an attempt to testify their suitability of meeting the Educational Psychology Service's (EPS; Ministry of Education and Culture) needs for early diagnosis of learning difficulties, attention problems, behaviour difficulties and mild mental retardation. Among the administered tests were the following: the WISC-III-Revised (Wechsler, 1992), the Cognitive Assessment System (CAS; Naglieri & Das, 1997), a set of phonological awareness, rapid naming speed, orthographic knowledge, and reading accuracy measures, as well as two checklists for teachers, the Attention Checklist (ACL, Das, 1986; Greek adaptation by Papadopoulos, Panayiotou, & Georgis, in preparation) and a subscale for hyperactivity (based on the diagnostic criteria of DSM-IV; APA, 1994; previously used by Papadopoulos, Panayiotou, Spanoudis, & Natsopoulos, 2004). Participating children (9 males and 5 females), drawn from the EPS records, attended kindergarten (n = 6) and grade 1 (n = 8), deriving from 11 schools and 2 school districts, representing cases being at-risk for or exhibiting (1) learning disabilities, (2) attention problems, (3) learning disabilities and attention problems, (3) behaviour difficul-

ties, (4) learning disabilities and behaviour difficulties and (5) mild mental retardation. Results showed that the cognitive and behavioural profiles of the participating children were distinctly different. Also, overall, the ratings given by the classroom teachers appeared to coincide with those obtained by the administration of the psychometric tests. Discussion centres on the differential diagnostic functionality of the used tests emphasizing the relation between the abilities measured by these tasks and the aspects of school performance represented in the given population.

Students with Special Needs in Norway's National Assessment of Writing Proficiency
Ragnar Thygesen, University of Stavanger, Norway

There are reasons for concern as to what such testing will mean to students with special needs. The presentation describes the assessment, its policies and practices for accommodations, and results from the 2005 administration of the test. Issues in implementing large-scale, high-stakes assessments are also discussed.

Predicting which students might be academically at risk in higher education
Lin Norton, Liverpool Hope University College, United Kingdom
Bill Norton, Liverpool Hope University College, United Kingdom

Aim: This paper reports on findings from work in a university college in the UK, using Meyer's (2000) Reflections on Learning Inventory (RoLI) as part of a programme designed to enhance students' meta-learning awareness. The research aims to identify patterns from RoLI scores that might predict which students would be successful and which might be at risk of failure in their studies. Method: As part of a compulsory module on Personal Development Planning (PDP), all first year students complete the RoLI, and then are given information on what their scores mean in the context of the expectations of studying for their main academic subjects. In 2002 and 2003, students were asked if they would be willing to submit their RoLI scores for research purposes. 230 students from the 2002 cohort and 380 from the 2003 cohort submitted completed questionnaires, which were matched to the students' records for measures of academic performance, gender and age variables and details of subjects studied. Outcomes: These data will be explored using factor analysis, multiple regression analysis and structural equation modelling to identify predictive patterns for students who do well and students who may need additional support. Methods of using the RoLI as a diagnostic tool will then be developed taking into account age, gender and subject which will enable students at risk of

failure to be targeted through institutional student support mechanisms. It will be equally important that if patterns are identified predicting success that this is conveyed to students thus giving them advice, which is evidence-based. Significance: The findings from this research will be discussed in the context of how understanding indicators of success and struggle can be used to build more effective learning environments.

B 10   23 August 2005   17:00 - 18:20   Room E010

Paper Presentation
Teacher Education

PREPARING FOR THE FIRST YEARS OF TEACHING

Chair: Xenia Hadjioannou, University of Cyprus, Cyprus

What is a good 'teachership' about? Student teachers' early professional identity
Kirsi Pyhalto, Helsinki University, Finland
Tiina Soini, Tampere University, Finland
Maijaliisa Rauste-von Wright, Helsinki University, Finland
Satu Eerola, Tampere University, Finland

A teacher's professional identity development is - or should be - a vital concern of teacher education programs. The early professional identity of student teachers orients them toward their future profession and act as an active basis for meaning-making and new learning. It is also the framework through which student teachers view their training and find personal meaningfulness in the profession. Accordingly, knowledge on the part of teacher educators and mentors about professional identity and its formation is important, because it provides them with a better understanding about professional development, and tools for guide and support the process. During the last decade, teachers' professional identity and identity-development has emerged as a separate research focus. Despite of this recent extensive research interest, the concept of the professional identity of teachers is still vague, and is defined variously in different studies, or sometimes is not defined at all. This implies that to be a functional tool in understanding and guiding the professional identity development more attention should be paid in defining and thus understanding the concept, as well as the interactive role of teacher education as a context of profes-

sional identity formation. This paper analyses and discusses central aspects of the professional identity formation of student teachers. These aspects are analysed both theoretically and empirically within the frame of a pragmatic constructivist learning theory. An examination of the professional identity concept and it's role in student teachers' professional development, in the context of teacher training as a learning environment is followed by an analysis and discussion of two empirical case studies about first year student teachers' analyses of teachership. The study provides an outline of one approach to understanding and guiding the professional identity of student teachers.

Micro-politics in the relationship between a beginning teacher and his pupils
Steven Janssens, University of Leuven, Belgium
Rita Romont, University of Leuven, Belgium
Saar Van Hool, University of Leuven, Belgium

"Micro-politics" refer to processes at the school level through which individuals or groups use power to realise desirable working conditions (professional interests). They perform micro-political actions (strategies and tactics) and show a degree of "micro-political literacy" (they "read" working conditions as "coloured" by a struggle between different interests). The development of micro-political literacy is part of a (beginning) teacher's professional growth. Traditionally, the concept of micro-politics refers to the school level. In this study it is extended to the classroom level, more specifically to the relationship between a (beginning) teacher and his pupils. The present study is meant to answer five research questions:
(1) what do beginning teachers know about micro-politics at the classroom level?
(2) which professional interests do they identify with respect to themselves?
(3) which strategies do they use to realise these interests?
(4) which interests do they identify with their pupils?
(5) which strategies do these pupils (according to them) use to realise these interests?
Eleven beginning teachers were interviewed three times. The "September" interview was mainly introductory. The "November" interview focused on micro-political knowledge and the "Christmas" interview on micro-political interests and strategies. Beginning teachers show detailed knowledge about "power in the classroom". They aim for three "didactical" interests: stimulation of learning processes, motivating pupils and keeping discipline. More generally, they stimulate the development of values. The interviewees link the strategies they use with these interests. "Revision", "being patient" and "structuring" are important for the stimulation of

learning processes. For the development of values, beginning teachers try to be "a good role model". The interviewees identify several interests and strategies from the side of the pupils. Pupils "argue" and "ask questions" to "postpone or prevent something they dislike". "Asking questions" however helps as well to "slow down the class" and to "make it more pleasant".

Anxiety of future teachers - self-report and projective data
Yvona Mazehoova, University of South Bohemia, Czech Republic
Iva Stuchlikova, University of South Bohemia, Czech Republic

The aim of the study is to investigate the anxiety of future teachers. Self-reported anxiety is compared with and projective data assessment. As the rules for negative emotions expression are rather strict for helping profession, there is an assumption, that the self-report of anxiety of future teachers could be distorted toward low anxiety. Self-report (Spielberger's State Trait Anxiety Inventory) and projective measures of anxiety (coloured self-portrait and colour modification of Wartegg's drawing test) were administered to 174 teacher students (136 women, 38 men). The social desirability was controlled by Marlowe Crown Social Desirability Scale. The repressors subgroup was identified using Wienberger's combination of low self-reported trait anxiety (STAI) and high social desirability (MCSD). Results shows that self-report scores of anxiety were lower then population norms based assumption, whereas composed projective scores indicated higher than normal anxiety. Incremental differentiation power of proposed projective assessment of anxiety was assessed via comparison of repressors and truly low anxious. Discriminant analysis based on projective criteria yielded significant differentiation between repressors and true low anxious students. Future teachers seem to present themselves as low anxious whereas in projective assessment they show remarkable amount of anxiety. The combination of the two approaches - self-reporting and projective assessment provided more elaborated view on student teachers anxiety.

Student teachers' action-control beliefs across teacher education
Lars-Erik Malmberg, University of Oxford, United Kingdom
Todd D. Little, University of Kansas, United States
Brigitte Wanner, University of Montreal, Canada

We investigated student teachers' action-control beliefs about making children learn, subdivided into agency, control and means-ends beliefs. Four intra-agent (effort, ability, personal characteristics, structure), four inter-agent (esteem-supportiveness,

realistic feedback, performance enhancing, and linguistic awareness), two extra-agent (supporting collaborative learning and creating a positive relationship with parents), and two external causality belief constructs (luck and unknown) where included in the Teacher's Control, Agency and Means-ends (TCAM) questionnaire. Construct reliability and structural validity of the constructs were satisfactory. Student teachers were followed up in a cross-sequential study at a teacher education department, 2000-2003. When changes in action-control beliefs across teacher studies were investigated, using individual growth models (in MLWin) from entrance exam to the fifth year among 191 student teachers, it was found that agency and control beliefs declined slightly from the entrance exam and then began to increase to a high after the second year of studies. Means-ends beliefs showed an upward trend across teacher education. Further, we inspected effects of gender, age, entrance exam points, accumulation of credits across the studies and stability of well-being. Older student teachers where more agentic, entrance exam observations and stability of well-being predicted higher levels of agency beliefs, and entrance exam interviews both agency and means-ends beliefs.

B 11   23 August 2005   17:00 - 18:20   Room A009

Paper Presentation

INSTRUCTIONAL DESIGN AND DESIGN RESEARCH

Chair: Lucy Avraamidou, University of Cyprus, Cyprus

Design based research: Design principles and learning processes
Sten Ludvigsen, University of Oslo, Norway

In this paper I take a socio-genetic approach in order to understand human reasoning and to show how categories are a fundamental part of learning in a specific type of institutional practice. The scientific categories are built into a web-based discussion forum (FLE2) as part of a pedagogical and technological design. The scientific categories are based on the concepts of the progressive inquiry model for knowledge construction. On the basis of the theoretical framework and the empirical analysis, I argue that the categories in the progressive inquiry model could under certain conditions stimulate the students towards a more systematic orientation when solving problems. An important question to consider in analyses of design experiments such as the project Design of Collaborative Telelearning Artifacts (DoCTA NSS); is how

we should understand the activities that unfold. When we challenge the schools and the students practices with ideas about fostering higher order knowledge and skills, we create tensions. Between what most of the students usually do, and the interactional work with what new types of artifacts - prompting categories - can afford. As analysts we should try to identify both the historical traditions in the schools and the transformative practices that evolve through the design experiment. Design experiments provide rich opportunities to focus on specific educational problems and create models that point towards improvement of practice.

Towards a robust pedagogical design for 'blended learning': A model for individual and group activities in a virtual learning environment (IGVLE)
P.J. van Eijl, University Utrecht, Netherlands
Peter de Voogd, University Utrecht, Netherlands
Albert Pilot, University Utrecht, Netherlands
Wilfried Admiraal, University Utrecht, Netherlands

Both teachers and educational designers attempt to construct higher education courses that function well both under different circumstances and for different groups of students. Whenever such an attempt is realised, we consider it as a robust pedagogical design. However, it turns out to be quite a difficult task to account for all the success factors provided by educational research about the effectiveness of virtual learning modes and aids. In the present research, a model has been evaluated in which a virtual learning environment (VLE) is combined with face-to-face learning into blended learning, in which individual and collaborative learning are integrated in a steady rhythm of weekly activities and assessments. The effects of the characteristics of different student groups (team learners, individual learners, part-time working students, and commuting students) on learning, satisfaction, and on the learning results have been investigated. The outcome of this research is that, for these groups of students, the IGVLE-model turns out to be a robust pedagogical design. This robust design is meant to be a source of inspiration for teachers to apply a VLE effectively in their own courses and to realise a sustainable quality improvement. For educational researchers it contributes to an area of research to models of pedagogical design that are so successful and robust that their application can improve the educational practice in higher education in a significant way.

Theory into design into theory: Two pedagogical conversations

Peter Goodyear, University of Sydney, Australia
Maarten de Laat, University of Southampton, United Kingdom
Victor Lally, University of Sheffield, United Kingdom

This paper reports on research in the area of networked (online) learning at the university level. More specifically, it considers relationships between theory and practice in teachers' educational design activity. We summarise the outcomes of our recent research using (a) pedagogical design patterns (b) critical event-based interviews with teachers, to focus on the theorisation of educational design practice and on the capacity of practice to be informed by theoretical constructs. We situate educational design activity as a complex praxis (that is, theory-laden practice) and examine the conversations between theory and design praxis. In so doing, we pay special attention to the influence of forms and representations of theoretical knowledge - concluding that the affordances of these forms and representations play an important role in shaping this field of educational design praxis. In short, educational design praxis is distributed across minds, tools, texts and other artefacts. In our specific context of design for networked learning, the tools, texts and artefacts come to hand in distinctive ways. Additionally, some of the interim outcomes of design activity take on a persisting physical/digital form and are available to scrutiny and reflection (by their creator, and others) at later times. This situated and distributed design praxis sits in a different relationship to theory than is the case in educational design praxis more generally - at least as it is conceived and represented in the literature drawn on for staff development in higher education.

Self-organized and reflective learning with technology: An exploratory design study

Priya Sharma, Pennsylvania State University, United States
Sebastian Fiedler, University of Augsburg, Germany
Ying Xie, Pennsylvania State University, United States

This paper reports on the results of a qualitative exploration of learners' practices, uses, and lived experiences of personal Webpublishing technologies to support self-organization and reflective thinking. Developing students to become responsible, independent learners requires that they become self-organized and reflective and engagement in self-organization requires one to be able to observe, reflect on, and review processes of learning. To meet the requirements for this type of learning, we designed specific interventions using individual Weblogs and RSS Webfeeds

to support learners' ability to record and return to thoughts and feelings. In this exploratory design study, existing Personal Webpublishing technologies were adapted to support self-organized learning and reflective thinking. Data were gathered from two designed implementations. In the first implementation, five participants engaged in Weblogging over the course of 12 weeks and gathered data included interviews with individual participants as well as existing Weblog document data. Based on the design evaluation of and data collected in the first implementation, we modified the design of the second implementation to include more modeling and encourage group discourse. Eight participants were interviewed and their Weblog data was gathered. Initial data analysis of these 13 interviews and Weblogs reveals different levels of self-organization in the two implementations. However, both were marked by lack of consistent interactive conversation between participants, with time, privacy, and perceptions of writing emerging as significant influences on self-organized and reflective practice. An evaluation of design of the learning environment identified the need for more structured initial introduction to the technology, followed by need to encourage dialogue among learners. Research, practice, and design implications for supporting the design of learning environments for self-organized and reflective learning are presented.

B 12   23 August 2005   17:00 - 18:20   Room A010

Paper Presentation

INSTRUCTIONAL DESIGN

Chair: Elaine Munthe, University of Stavanger, Norway

The clia-model: a framework for designing powerful learning environments for thinking and problem solving
Erik De Corte, University of Leuven, Belgium
Chris Masui, Limburg University Center, Belgium

A major challenge for education and educational research is to build on our present understanding of learning for designing environments for education that are conducive to fostering in students self-regulatory and cooperative learning skills, transferable knowledge, and a disposition toward competent thinking and problem solving. Taking into account inquiry-based knowledge on learning and recent instructional research, this paper presents the CLIA-model (Competence, Learning, Interven-

tion, Assessment) as a framework for the design of learning environments aimed to be powerful in eliciting in students learning processes that facilitate the acquisition of productive knowledge and competent learning and thinking skills. Competence refers to the components of competence in a domain; Learning pertains to the characteristics of effective learning processes; Intervention relates to principles guiding the design of learning environments; and Assessment refers to instruments for monitoring learning and teaching. Next, an intervention study is described that embodies major components of this framework, and focuses on the acquisition of metaknowledge and self-regulatory skills in university freshmen. Starting from a constructivist perspective on learning, several aspects of competence, namely metacognitive and affective skills and related metaknowledge, were integrated into the real instructional context of an experimental group (E) of 47 first year students in business economics. The study yielded promising support for the CLIA-model by showing that CLIA-based learning environments are indeed powerful in facilitating in students the acquisition of higher-order learning results, especially the acquisition and transfer of self-regulation skills for learning and problem solving. The study also proves to be supportive for promises of design-based research put forward by the Design-Based Research Collective in the 2003 volume of the Educational Researcher, namely the exploration of the potential of novel learning environments, and the development of contextualized theories of learning and instruction.

New learning and types of learning environments in dutch upper secondary education
Jos de Kock, University of Amsterdam, Netherlands
Peter Sleegers, University of Amsterdam, Netherlands
Rinus Voeten, Radboud University Nijmegen, Netherlands

In this study, the results are presented of a large-scale survey in which Dutch secondary geography, English, and physics teachers participated. The survey aimed to find out what types of learning environments are dominant in contemporary Dutch upper secondary education and to what extent those types meet the conditions for New Learning. For this aim, an instrument (the QALE) was developed with subscales on teacher-learner roles (three scales), learner-learner roles (one scale), and learning goals (two scales). On the basis of cluster analyses two, about equally sized, groups of teachers are identified, reflecting two types of learning environments. Type 1 largely appears to fit New Learning features. This first cluster includes teachers who tend to strive for intrinsically motivated competence, for self-regulation by students, for cooperation between students, and for developing social

skills more than teachers in the second cluster. The second cluster is better charac-terized by traditional features of learning environments. Also, teachers in the first cluster implement the developmental and apprenticeship model of teacher-learner roles more than teachers in the second cluster do. There are no large differences between clusters with regard to the realization of the behavioral model. Importantly, cluster membership appears unrelated to the kind of subject a teacher teaches. A statistically significant relationship, however, is found with the grade level at which a teacher teaches; higher grade levels show a higher proportion of seemingly new learning environments. Even though the first cluster shows features of New Learn-ing, it must be said that, all in all, there appears to be only a limited degree of inter-est in acting according to New Learning principles.

A professional change that made a difference: An analysis of an innovative instruc-tional design
Mary Pearson, University of Sherbrooke, Canada
Francois Larose, University of Sherbrooke, Canada

Aims: This study examined the innovative practice of a teacher in a low-income school who restructured his teaching to provide his 23 pupils with the right tools to learn: a classroom environment supported by ICT within an interdisciplinary, project-based perspective. The research question was posited to examine the ef-fects of such an approach to teaching and didactical and pedagogical mediation of a socioconstructivst orientation on teacher- pupil interactions and on the building of cross-curricular competencies. Methodology: Based on a theoretical perspective consistent with the cultural anthropology of Vygotsky (1978), the study focused on the social interaction of pupils who embarked on a three- year adventure to enhance their learning through computer skills and developing cross-curricular competen-cies. The research design allowed us to see developmental changes and witness the development of behaviour in individuals participating in the study (Bordens and Abbot, 2002). In order to link the data collected to the research question, a prag-matist paradigm was used to incorporate qualitative and quantitative approaches: lexicometrical analysis of teacher discourse and video observation of behaviour. Since the study relied on multiple sources of evidence, specific approaches were used to collect and analyze data (Yin, 1994). Three distinct samples were used: 1) the pupil sample (N=23); 2) 47 elementary teachers with characteristics similar to the teacher targeted (N=48); 3) a documentary sample relevant to the instructional device (lesson planning, pupils' work, etc.). Outcomes/Theoretical and educational significance: At the end of the study, the 23 pupils fared better on district tests in

reading and writing than the 600 pupils combined and compared well in Mathematics - an exemplary feat for a teacher whose professional decision tested the socio-constructivist theory and shed light on how children learn.

Instructional design and class discussions for computer tools in mathematics education
Michiel Doorman, Freudenthal Institute, Netherlands

The use of computer tools influences the process of students' mathematical sense making and the role of the teacher. In this paper we present results of a design research project on the use of computers in mathematics education. We focused on the contribution of the use of computer tools to the students' learning and on ways for supporting the teaching. Specific computer lessons were designed together with a scenario for the teacher. The activities and the scenario were tested during teaching experiments in two tenth-grade classes. We collected data by video and by audio taping whole class discussions and group work. The data was interpreted in terms of what preceded the lessons and the tools provided. The qualitative analyses showed that the students used a variety of strategies of trial and error during the computer lessons. As a result, the teacher had difficulties in discussing the computer activities and connecting them with the following activities. In a second teaching experiment we added open-ended activities before the computer lessons. These activities were designed to support students to contribute to the understanding of a problem that has to be solved, and to the invention of representations which might be helpful for solving the problem. In addition, after the computer lessons we added small group activities and a scenario for a class discussion to exchange experiences. The changes in the instructional design had as a result that students used more qualitative reasoning during the computer lesson. Their activities were more productive as a result of the compatibility between the representations in the tools and the students' current reasoning. In addition, the teacher was able to guide the students in both their understanding of a global problem, and in the relation between the tools and the solution of this problem.

Paper Presentation
Higher Education

TEACHING IN HIGHER EDUCATION

Chair: Sari Lindblom-Ylanne, University of Helsinki, Finland

Academics' recollections of the reflective processes they engage in when learning
about teaching: An analysis across two ìdisciplinary groups
Carolin Kreber, University of Edinburgh, United Kingdom

One consideration guiding this study was whether due to the nature of their disci-
pline academics might engage in reflection on teaching differently. Specifically,
the study compared academic teaching staff in the natural and life sciences to aca-
demic teaching staff in the humanities and social sciences with regards to the ex-
tent to which they engage in the reflective processes suggested by transformative
learning theory (Mezirow, 1991) when thinking about their teaching. The three
reflective processes distinguished by Mezirow's transformative learning theory are
content, process and premise reflection, which in essence are three different lev-
els of reflection.   Individuals engaged in premise reflection, by questioning the
presuppositions underlying the problem they encounter (critical reflection), may
re-frame teaching problems they encounter in new ways and as such arrive at a
transformed, and possibly more discriminating and integrative, conceptualization
of teaching and learning. Mezirow's three levels of reflection were applied to three
domains of teaching knowledge: 1. instructional methods, 2. student learning, and
3. educational purposes. Thirty-six academic staff in the natural and life sciences
and eleven academic staff in the humanities and social sciences participated in a
semi-structured interview to identify the extent to which they engaged in content,
process and premise reflection in the three domains of teaching knowledge. Data
were analyzed primarily deductively using the three levels of reflection as a priori
codes. The greatest difference between the two groups of staff was found in relation
to premise reflection, with humanities and social science staff engaging in this proc-
ess seemingly more often than science staff. Most reflection occurred in the domain
of instructional methods followed by reflection on student learning and develop-
ment. Reflection on educational goals and purposes was observed less often but
was identified more frequently with humanities and social science staff than with

natural and life science staff.

How do academic disciplines influence the teaching knowledge used by university professors?
Denis Berthiaume, McGill University, Canada

Academic disciplines are generally believed to influence teaching and learning at the university level. Yet, little is known about the specific impact they have on the teaching decisions of university professors. Shulman's notion of pedagogical content knowledge (PCK) is often used to explain how teachers use particular strategies to teach particular subjects in particular contexts. However, attempts at empirically applying PCK to university teaching have revealed the inadequacy of the concept. This may be due in part to the difference existing between Shulman's notion of content and the nature of academic disciplines in higher education. Therefore, a new constructódisciplinary pedagogical knowledge (DPK)óis envisaged to better represent the nature of teaching within university disciplines. The overall purpose of the study is to devise a conceptual framework that would describe the various sources contributing to the formation of DPK and their interrelations. As such, the aim of the presentation is to introduce the DPK conceptual framework, to describe its various components and their interrelations, as well as to provide illustrations from particular cases in university teaching. Using a multicase approach, data were collected from four university professors teaching in four different disciplines in order to build the DPK conceptual framework. Preliminary results seem to point to three grand sources of influence in the formation of DPK, namely the professor's teaching knowledge base, his/her personal epistemology, as well as the discipline's sociocultural characteristics and epistemological structure. In addition to refining our understanding of the impact of academic disciplines on teaching at the university level, this study contributes a framework for identifying ways to better support university professors as they grow as teachers within their discipline of instruction, a need identified in the faculty development literature.

Differences in an experience of difference itself: A study of teaching approaches in senior accounting classes
Lynne Leveson, La Trobe University, Australia

As professional accounting programs are often criticised for failing to produce adequately prepared graduates, good quality teaching at the senior levels, is considered essential to a faculty's reputation and future prospects. Critical appraisals have

prompted accounting education researchers to investigate more closely their course structure and delivery, although only recently have attempts at understanding this from the teachers' perspective received attention. This paper describes a study into the teaching approach of a group of Australian academics teaching senior classes in accounting undergraduate degrees. Anecdotally, there is a belief that student characteristics and challenging curricula mean that better quality learning occurs at the senior level and that teachers will adopt more sophisticated teaching approaches as well. The study described here explores this assumption on an empirical basis. It adopts a phenomenographic approach to investigate the ways in which a group of academics experience teaching their senior compared to their junior accounting classes. The variation in this experience is described in two ways, on an intra-individual and an inter-individual basis and the results are presented within a two dimensional outcome space. Contrary to anecdotal evidence, no lecturers' accounts were interpreted as adopting a more complex teaching approach at the senior level. However, within the group this ìconsistency was experienced in a number of qualitatively different ways. The results highlight the two orientations to teaching, broadly known as teacher and student-centred. Another factor which appears to sharpen the distinction between these orientations was also identified. This is the perceived relevance of students' experience in the learning process. That considered relevant by the teacher-centred lecturers concerns experience gained through exposure to subject content whilst the student-centred lecturers also recognised and used their students' personal life experiences as well.

Curriculum development in Higher Education: Participatory analysis of core content

Lena Levander, University of Helsinki, Finland
Minna Mikkola, University of Helsinki, Finland

Designing and managing the teaching content has traditionally been to a large extent a private issue of the individual university teacher. There are, of course, educational goals and written syllabuses for the degree programmes but within the programmes individual teachers do not necessarily have to communicate the content of their teaching in sufficient detail. However, there are pressures to break this tradition. There is an increased interest in enhancing the quality of student learning, and questions about public accountability of higher education. At the same time there is growing international competition as well as demands for promoting mobility in higher education. This paper examines the outcome of dimensional core content analysis of courses taught in the degree programmes at the Faculty of Agriculture

and Forestry, University of Helsinki, Finland. Our aim is to review especially how the core content was presented in the descriptions. This analysis process was an integral part of an educational development project called Development of Structure and Content of Teaching. The aim of this project was to compact and clarify the curriculum in the degree programs. An electronic course questionnaire was designed for the description of the scientific and professional knowledge and skills as analytical dimensions. The resulting descriptions were stored at a teaching data base for the teachers to browse and study. However, we discovered that the quality of the descriptions varied. The generation of comprehensive and thorough descriptions was impacted by the application of the participatory process when developing content for higher education courses. The narrowness of some descriptions calls for further elaboration of the process. The electronic description instrument used by the teachers seems to be a feasible solution for the sharing and managing the core content of degree programmes.

B 14   23 August 2005   17:00 - 18:20   Room A107

Paper Presentation
Student Learning in Higher Education

PROBLEM BASED LEARNING

Chair: Vermunt Jan, University Utrecht, Netherlands

Change in student skills following the implementation of a PBL curriculum
Benoit Galand, University of Louvain, Belgium
Etienne Bourgeois, University of Louvain, Belgium
Mariane Frenay, University of Louvain, Belgium

Instructional practices inspired by Problem-Based Learning (PBL) are more and more often implemented in Higher Education throughout the world (Evensen & Hmelo, 2000). In spite of its growing popularity, evidence regarding the efficacy of PBL to improve student learning is mitigated (Newman, 2003). The aim of this study was to assess change in student skills following the introduction of a new PBL curriculum in a School of Engineering. The implementation of this new curriculum provided the opportunity to assess the impact of long-term (two years) enrolment in a PBL environment on student skill development. A criterion referenced test was developed to assess several skills and not only factual knowledge acquisition. This

test was completed by four cohorts of students, two of them who had completed the lecture-based curriculum and two who had completed the PBL curriculum. Taken together, 393 students participated to this study. Comparison of student performance before and after the curriculum change indicates several differences in favour of students from the PBL curriculum and no differences in favour of students from the lecture-based curriculum. Results of the present study suggest that the introduction of a new PBL curriculum had no negative effect on student knowledge and skill development. On the contrary, they suggest that students attending the PBL curriculum have developed new skills compared to students from the previous curriculum. Despite its limitations, this study shows that a curriculum change guided by PBL principles is possible and could foster the development of some skills among students, apparently without deleterious effect on other forms of learning.

The effects of university teachers' approaches to teaching on students' approaches to learning in a problem based learning environment
Jeannette Hommes, University of Maastricht, Netherlands
Mien Segers, University of Leiden, Netherlands
Wim Gijselaers, University of Maastricht, Netherlands

Educational innovations like Problem Based Learning should create a learning environment which encourages students to higher order learning activities. Nevertheless, recent meta- analysis on the effect of Problem based learning do not present conclusive results. It is argued that problem based learning has a strong positive effect on the application of knowledge but not a strong effect on the level of knowledge of the students. The question arises if all the conditions for educational innovations are met. One of the influencing factors on student learning is the teachers' approaches to teaching and learning. In this research a case study in a problem based learning environment is presented. A quantitative exploration of the teachers approaches to teaching and student approaches to learning showed a significant higher preference for Conceptual Change Student Focussed (CCSF) teaching approaches instead of Information Transmission Teacher Focussed (ITTF) teaching approaches. The results from the students' questionnaires showed a significant higher preference for deep learning approaches instead of surface learning approaches. These results indicate that teachers in an innovative educational environment have a teaching approach which is consistent with the aim of the innovation. However, only low correlations were found between Conceptual change student focussed teaching approaches and deep learning approaches of students. On the basis of the results, it can be argued that more factors have an effect on students' approaches to learning.

Support and development of teachers' conceptions of teaching and learning and support for construction of courses and assessment, which are coherent with their conceptions, are a necessary prerequisite in education al innovations.

PBL in architecture revisited
Erik de Graaff, University of Delft, Netherlands

In 1990 the faculty of Architecture in Delft introduced Problem-Based Learning (PBL) as the core method of a new educational programme. Important objectives of the curriculum innovation were to integrate theoretical oriented learning with architectural design practice and to strengthen the cohesion within the programme in order to facilitate management of the curriculum. Despite some difficulties with the management of change in an existing programme, the implementation was quite successful. However, the new PBL curriculum was short lived. A little over ten years after the introduction the last remnants referring to were removed from the curriculum. Based on faculty documents and interviews with key players in the educational management of the past ten years, this study will describe the process of disintegration, trying to analyse the factors resulting in the eventual break down.

An authentic task in an Informatics course in higher education
Hanne ten Berge, IVLOS, Utrecht University, Netherlands
Stephan Ramaekers, IVLOS, Utrecht University, Netherlands
Sjaak Brinkkemper, ICS, Utrecht University, Netherlands
Albert Pilot, IVLOS, Utrecht University, Netherlands

A recent review of literature we carried out gave insight in the design features of authentic tasks that provoke higher-order learning in higher education. Usually, these cases refer to complex situations, containing open-ended, ill-defined or even hidden problems and often require a multidisciplinary approach. Confronted with such tasks, students start off with an analysis of the case to establish which (theoretical) questions should be answered in order to address the underlying problems and issues adequately. In the process of analysis, gathering information, constructing and testing possible solutions, they supposedly develop the competencies that are needed to deal with the kind of problems and issues that arise in professional academic practices. Cases with a good design can offer powerful learning environments. Authenticity, structure, complexity and challenge appear to be important features in the design. To gain insight in the concept of the four design features in characterising the design of courses that contain authentic tasks, we explore these

features and their coherence more closely. This will lead to a better description of the component of authenticity in courses in higher education. Furthermore, we draw a provisional conclusion to the positive and negative implications of the use of authentic elements in the course design on learning. Ultimately, our aim is to be able to give course designers principles and guidelines on the design of authentic tasks in higher education. For more specific and detailed research we focus on a Master course called Informatics Business, which is designed around a fictive software enterprise and teaches students what developing their own software product and starting an own software enterprise entails. We describe the design of the course and search for answers to some questions on the design features.

B 15   23 August 2005   17:00 - 18:20   Room A018

Paper Presentation

PROFESSIONAL DEVELOPMENT OF SCHOOL TEACHERS

Chair: Christopher Clark, University of Delaware, United States

Fostering teachers' professional development through a project-based research learning environment and performance assessment
Miriam Welicker, Oranim College of Education, Tivon 36006, Israel

The researcher conducted three workshops on research methodology for teachers (n=43), with the aim of investigating and exploring a school project, and fostering reflection on it. They studied educational research methodology (both quantitative and qualitative) and conducted their own chosen project-based "field" research, some of which was action research. The constructivist learning environment was multi-staged, with student-student-instructor interactions. The teachers' research portfolio served as a diagnostic and formative performance assessment strategy. The research goals were to investigate the teachers' perceptions of their professional development and their attitudes towards the learning environment and the portfolio procedure. The research procedure included content analysis of the teachers' interviews and reflections in the portfolios, as well as quantitative and qualitative analysis of their answers in the questionnaire. Research outcomes revealed that the teachers ascribed great importance [M=3.88, out of 4) to the project-based learning environment and formative assessment strategy. They pointed out its contribution to their self-confidence and pedagogical maturity and their acquisition

of applicable research skills. They discussed their growth regarding a deep and multi-dimensional comprehension of the investigated project, academic improvement throughout the rewriting procedure, and awareness of their professional development, and of the need for life-long learning. Despite difficulties - mainly the 'hard labor' process which accompanied the performance assessment, most of them felt highly motivated autonomous learners (which indicates their internal locus of control and professional development), within this challenging constructive learning process. Some reported that the research procedure contributed to their social and professional status at school, but this was sometimes accompanied by frustration and difficulties in leading the change process (related to their project). As part of their research conclusions and insights, they raised some specific alternatives for coping with these difficulties. This study widens the perspective on constructivist theory and its implications on cognitive and professional development.

Design and evaluation of critical thinking scaffolds to support action research for teacher professional development
Steven J Coombs, Bath Spa University College, United Kingdom
Sarah Fletcher, Bath Spa University College, United Kingdom

The action research mode of enquiry-based learning is one the most important paradigms that validates' classroom-based research and on-the-job professional enquiry of teachers' and trainers in schools and colleges. Indeed, action enquiry has recently been supported by the OECD (2002) as a useful means through which applied research schemes can improve the teaching profession and cited the UK's Best Practice Research Scholarship. However, the action research qualitative process is generally seen as being less systematic when compared to more traditional positivist experimental methodologies. This paper proposes a systematic and transparent experimental approach to support teachers' carrying out classroom-based enquiries through action research (Lee & Coombs, 2004) and adopts the pedagogy of critical thinking scaffolds (CTS) (Coombs, 2000). CTS can be applied as a professional development toolkit to help scaffold and enrich systematic enquiry through developing enabling heuristics that deliver personal project management. The systems thinking conversational science paradigm of Self-organised-Learning (S-o-L) (Thomas & Harri-Augstein, 1985) has been applied to an action research paradigm from which the toolkit has been designed. Case study evidences drawn from teacher professional development prototypes will be illustrated from which a generic pedagogical design protocol has emerged.

What can be learnt from beginning teachers' narratives
Orna Schatz Oppenheimer, Hebrew University, Israel

The aim of this research paper is to learn about the teacher's professional world during the first year of work and to examine the components typical to the critical stage of the entry to the professional world and, through them, to find ways to prepare teachers to deal with the professional reality and help them become better teachers. The paper presents the beginning teachers' world as reflected through their stories, from their point of view and from their experiences and experiments. From a nation-wide Life Stories Competition held amongst beginning teachers in Israel, 80 stories were chosen. These stories were used for narrative research. The hypothesis is that stories are a reflection of the story-teller's consciousness and, therefore, through them, we can learn of the professional problems with which the beginning teacher has to contend. Ten stories were discussed in this research. Five judges from the academic world made the selections. The criteria were based on quality and relevance to the first year as a beginning teacher. The subjects under discussion were analyzed for content and the central theme of each story was revealed. Afterwards, one theme that recurred in all of the stories was chosen.

Secondary school teachers' concept-maps and beliefs regarding active & self-regulative learning
Inge Bakkenes, IVLOS, Utrecht University, Netherlands
Jan Vermunt, IVLOS, Utrecht University, Netherlands
Theo Wubbels, PDI, Utrecht University, Netherlands
Jeroen Imants, Nijmegen University, Netherlands

Based on current knowledge on learning and teaching, the importance of active and self-regulative learning is emphasized. Secondary school teachers are expected to focus more on facilitating, supporting and monitoring learning and less on merely transmitting subject matter knowledge. This change of focus appears to be difficult. Many teachers are still looking for suitable didactics to promote active and self-regulative learning. They are in the middle of learning processes! Research groups at the universities of Utrecht, Leiden and Nijmegen now collaborate to gain insight in the learning processes of secondary school teachers within the context of active and self-regulative learning. Together they perform a study in which teachers are followed in different learning environments. Part of this large study is describing (changes in) teachers visions and beliefs regarding active & self-regulative learning. The research questions that are addressed in this paper are 1) whether and

in what way teachers differ in their visions on active and self-regulative learning, and 2) whether and in what way these differences are related to teachers beliefs on learning and teaching. In order to gain insight in teachers visions on active and self-regulative learning, their tacit knowledge was studied using concept-maps. Concept-mapping traditionally is a time-consuming method. To be able to study the concept-maps of a large group of teachers (N=100) we developed a computer program that enables teachers to sort, select and relate relevant concepts on their own. To elicit and interpret the concept-maps, network analysis was used. Teachers' beliefs were measured with the help of a questionnaire. The questionnaire consisted of eight sets of items representing dimensions that are relevant for active and self-regulative learning. The analyses show that teachers differ markedly in the structure and content of their concept-maps and that these differences are related to teachers' beliefs on teaching and learning.

B 16   23 August 2005   17:00 - 18:20   Room E009

Paper Presentation
Curriculum Studies

CURRICULUM DEVELOPMENT AND IMPLEMENTATION

Chair: Gert Rijlaarsdam, University of Amsterdam, Netherlands

Action research in curriculum development: Integrating movement into current activities of kindergartens
Asher Shkedi, The Hebrew University of Jerusalem, Israel
Hagit Shkedi, Kibbutzim Educational College, Israel

In recent years researchers and educationalists have increasingly recognized that movement and its cultivation are a significant factor in child development but do not receive the attention that they warrant. In response to this deficiency we felt a deep sense of obligation to create a curriculum that would enable kindergarten teachers to bring movement to their students in an effective manner.Using action research methodology, we worked with kindergarten teachers over a period of time, carefully observing their behavior and their reactions in both the workshops and the kindergarten activities. The participants' reactions, comments, and insights influenced the content of the new curriculum. We identified fundamental problems involved in teaching movement in kindergarten as well as different approaches to

incorporating movement in kindergarten activities. We discerned that most movement activity that takes place is random and episodic with no clear relation to the broader framework of kindergarten activities. Although the teachers had expressed positive attitudes to movement in the kindergarten, they did not regard movement as an integrated part of the ongoing learning activities that take place. After working with the curriculum which was developed during the study, the teachers expressed that it facilitated their ability to integrate movement activities in their daily program by providing them with skills and confidence.

On curriculum implementation and student learning
Maria Araceli Ruiz-Primo, Stanford University, United States

Kennedy (1998, 1999) strongly proposes documenting paths of influence from policy manipulations to student outcomes as a strategy for better understanding the process of education and, more specifically, the links between instructional practices and student achievement. This paper proposes and empirically tests a framework for studying the implementation of a middle-school inquiry-based curriculum. We focus on the link between the intended and the achieved curriculum (the measured student learning). Our basic premise is to help explain the student outcomes measured as well as to discern differential effectiveness based on the variations observed in the enacted curriculum. The following questions guided the study: To what extent does the implementation of the curriculum by the teachers in the study correspond to what the curriculum developers intended? Do the instructional practices observed reflect the objectives of content and pedagogy expressed in the curriculum? Does the fidelity of the implementation have an effect on student performance? We tracked down the types of curriculum using a multi-method strategy and different sources of information: curriculum materials, teachers, observers, and students. We collected data across 12 teachers and 298 students in six states across the US. Teachers were videotaped on every session in which they taught the curriculum. We collected classroom artifacts and students' science notebooks. Students were pre- and post-tested with an integral battery of multiple-choice items, predict-observe-explain prompts, short-answer questions, and performance assessments. Each classroom was visited once over a two or three-day period focusing on small groups work. The paper will triangulate information across sources of information to provide a profile that describes the variability of the enactment of the curriculum and how this variability relates to students learning.

The same teacher and the same intended curriculum: Is it the same implemented curriculum?

Tammy Eisenmann, Weizmann institute of science, Israel
Ruhama Even, Weizmann institute of science, Israel

The aim of this research is to study the role of the class in curriculum implementation. We examine a case study composed of a teacher who teaches the same intended mathematics curriculum in two seventh-grade classes from schools with different socio-cultural backgrounds. Data sources include: observations of a whole learning unit in each class; teacher and students interviews; and artifacts produced during the school year. Data are analyzed both qualitatively and quantitatively. We mainly use the ìGrounded Theory method and methods used in the two TIMSS video studies. The findings of this study show that in general the implemented curriculum in the two schools was similar and compatible with the intended curriculum. In both classes the teacher taught the same mathematical content, assigned mainly tasks aimed at introducing new concepts and ideas and at advancing mathematical understanding and conceptual knowledge. She also organized her instruction in similar ways. In spite of the above similarities, three major differences in instructional organization were identified. The first is related to the way the teacher launched students' small group work; the second to the way she conducted whole class discussions, and the third to the coverage of tasks in class. These differences are related to the schools' more general culture (for example, the intended curriculum guidelines fit one of the schools' common practices in subjects other than mathematics, but not the other) and students' characteristics (for example, in one of the schools students tended not to complete small group tasks). The findings of this research contribute to the theoretical body of knowledge in highlighting the role of the class and the school in curriculum implementation. They also provide important information for curriculum development and for professional development for teachers that take into account the ìspace where the curriculum is implemented.

Paper Presentation
Learning and Instructional Technology

PEDAGOGICAL ISSUES

Chair: Rich Mayer, University of California, Santa Barbara, United States

The structuration of group interaction and its effects on the co-construction of knowledge
Wouter Van Diggelen, Utrecht University, Netherlands
Maarten Overdijk, Utrecht University, Netherlands
Jerry Andriessen, Utrecht University, Netherlands

The notion of structure is a central concept of social constructivist perspectives on learning. Structures arise and evolve from the symbolic, tool mediated discourse within a student group and give meaning and direction to that discourse. The objective of our study is to investigate how structures emerge during face-to-face and tool mediated communication within student groups and how these structures shape the co-construction of knowlegde. In this paper we built upon the concept of structure by referring to structuration theory (Giddens, 1986) as it has been applied in group dynamics. To examine how structures emerge and influence the co-construction of knowledge, we analysed the students' (inter)actions on a mirco-level. The research has been carried out at a secondary school with a 5th grade class of 21 students. Our focus is on student face-to-face and computer mediated interaction while engaged in small-group discussion about solutions for a societal problem. A process analysis of students' participation has shown that, in contrast to oral, face-to-face communication, the computer mediated interaction is less constrained to one dominant course of action. A content analysis showed that all student computer mediated contributions were related to the co-construction of knowledge. This may be due to the fact that the students could also communicate face-to-face. An analysis of face-to-face interactions revealed that this mode was mainly used for the planning of the task, providing support or telling jokes. We can also conclude that the computer mediated communication was mainly used to remove uncertainty caused by ignorance or imprecision of a shared interpretation of the situation. The communicative acts were directed at acquiring new information that enables the students to form a precise interpretation. Negotiations that are triggered by conflicting viewpoints

were rare, and if they occur they were never properly completed.

E-pedagogies for networked learning
Maarten De Laat, eLearning Research Centre at the University of Sou, United Kingdom
P. Robert-Jan Simons, Utrecht University: IVLOS, Netherlands

We would like to put the pedagogical approach to online teaching and learning to the centre of our attention and describe how pedagogies in e-learning since the emergence of this field have developed. In this contribution we will compare and discuss pedagogical models used in education and indicate how over time our understanding of e-learning has evolved. De Laat & Simons previously described and reviewed group learning theories and developed some first principles of how collective learning could be supported and implemented. This work is further developed by a review on empirical research on networked learning practices. In this review, studies carried out in asynchronous networked learning communities have been synthesized to develop a body of knowledge of current findings in the field CSCL. This way we aim to develop an evidence based pedagogical model of networked learning that can critically engage with theories of learning as well as produce a set of principles to inform the current e-pedagogies. In this paper we will present an overview of pedagogical models for networked learning, describe how they have evolved over time and develop, based on research, directions for the future.

Situated pedagogic expertise in technology-integrated mathematics and science teaching
Sara Hennessy, University of Cambridge, United Kingdom
Kenneth Ruthven, University of Cambridge, United Kingdom
Rosemary Deaney, University of Cambridge, United Kingdom

This paper reports on a project which sought to elicit the evolving pedagogic expertise for creating effective learning environments with information and communication technologies (ICT) in secondary school mathematics and science. The research aimed to distinguish transposable components and situational variants in pedagogical thinking across a range of classroom settings and to illuminate how teachers both reframe their goals and actions in response to the affordances offered by new technologies and adapt to the constraints imposed (Wertsch, 1998). Exemplary cases were carefully selected through a multi-stage process. Focus group interviews with recommended subject departments solicited teachers' examples of

successful practices integrating the use of ICT. Five practices were subsequently investigated through 19 case studies: dynamic geometry and graph plotting in mathematics; multimedia simulation, interactive whiteboard, and data capture and analysis in science. Cross-case analyses drew on in-depth data from two lesson observations and semi-structured post-lesson teacher and pupil interviews in each case. The findings illustrate how contextual factors shape practitioners' use of ICT. For example, while teachers used unanticipated software behaviours as learning opportunities, their rhetorical endorsements of idealised forms of use supporting pupil-regulated experimentation were largely unrealised in practice. Such investigative use was constrained by existing patterns of practice and pedagogy associated with systemic school and subject cultures, curricular and assessment frameworks, time limitations and other pragmatic considerations. Teachers nevertheless configured use of ICT to fit their own settings, strategically managing the mode and extent of use according to perceived software complexity and pupil capability. Careful sequencing and design of lesson activities typically harnessed visual affordances of the technology to support knowledge building and consolidation. Exemplars illustrate responsive, pedagogical adaptations of practice including development of collaborative, dialogic interaction and bridging between informal and formal models, using the technology as a dynamic, manipulable object of joint reference.

The role of the eTutor- Evaluating tutor input in a virtual learning community for psychotherapists and psychologists across Europe
Chris Blackmore, University of Sheffield, United Kingdom
Emmy van Deurzen, University of Sheffield, United Kingdom
Digby Tantam, University of Sheffield, United Kingdom

SEPTIMUS is a new one-year postgraduate training course combining internet-based theory teaching and face-to-face supervision and personal experience, primarily targeted at psychologists and psychotherapists across Europe. The course has been taken by over 150 students from 14 European countries in the last 3 years. A review of the course after its first year led us to implement a more collaborative learning approach, and to provide eTraining to our tutors in this. We present the results of course evaluations undertaken before and after the implementation of collaborative learning, focusing particular on the role of the course tutor and the effects of different cultural styles of learning in the 8 countries where participating training institutes were based. Our results show that there was a change in tutor style between the first and second year, corresponding to the introduction of the collaborative learning approach. This had significant effects on student satisfaction but not

on self-reported level of understanding. We cannot be sure that these changes are due to the introduction of collaborative learning, as there were also differences in the two student intakes, and there may also have been an effect of tutor familiarization with what was to many of them a novel way of teaching. The results do support evidence from other studies that the nature and frequency of tutor engagement with students is a crucial factor in the success of eLearning programmes. International tutor training has therefore proved essential, as the role of tutor has been interpreted in different ways in different countries.

B 18   23 August 2005   17:00 - 18:20   Room A019

Paper Presentation
Educational Technology

ICT IN EDUCATION

Chair: David Wray, University of Warwick, United Kingdom

Ict in the new emerging teacher education, - an ecological perspective on learning and assessment
Knut Steinar Engelsen, Stord/Haugesund University College, Norway

This paper is based on an analysis of a three year holistic, ICT-oriented action-research project in teacher-education at Stord/Haugesund University College in Norway. I have, from an ecological perspective, studied the roles of ICT as part of the innovation process, in an interplay with other artefacts and innovative didactic agents. My analysis indicates that a core premise for the use of ICT to be legitimated in the activity of learning, seems to be that the actors experience that the tools give them substantial help in their teaching and learning so that they can achieve more overall learning outcomes. My study also shows that competence-development within the field of ICT in learning seems highly depended on ICT having an academic focus and basis and be accorded legitimacy through ordinary academic activities. As an example of academic contextualisation my study takes a closer look at the role of ICT in developing new portfolio-based assessment models. This part of the study is mainly based on an empirical analysis of four different subject-oriented portfolio-models. My conclusions here support other studies that seem to indicate that portfolio-based assessment could be a strong innovative artefact. In addition it shows that digital tools and infrastructure could be central agents for

developing portfolio-models, which to a great extent are collaborative in nature and are characterised by a high degree of student involvement, and which emphasise meta-cognitive aspects like self-assessment and reflection. This seems to be an example of how ICT is legitimated through the assessment models, and that the symbiosis of portfolio based assessment models and ICT could have some backwash effect on the structure of the learning environment in general. My findings will be discussed in light of a socio cultural perspective on learning, with special attention to Etienne Wengers concepts participation, reification and negotiation.

Towards a framework for designing ICT-support for reflective learning activities in competency-based, multiprofessional education
Ilya Zitter, Utrecht University, Netherlands
Robert-jan Simons, Utrecht University, Netherlands
Olle ten Cate, University Medical Center Utrecht, School of Medic, Netherlands

Increasingly professionals are confronted with situations which require them to co-operate with professionals from other backgrounds to reach optimal results. Multi-professional situations place serious demands on cooperative abilities. Educational institutes are struggling with the question of how to prepare students for these demands. The research aims to result in a framework, which is expected to be usable for educational designers or teachers with experience in educational design. It should be suitable to assess and/or design effective ICT-support for competency-based, multiprofessional education. The aim is not to design The Ideal ICT-Support, but to find guidelines for ICT effectively supporting learning activities in such education. The proposed framework consists of the following elements:
(1) The educational setting, which aims to develop the competencies needed to work in multiprofessional situations.
(2) Learning activities: we believe reflection on one's perspectives and the perspectives of others will help professionals from different backgrounds to connect. Explicit reflection may help to make implicit representations explicit. Explicit representations will help to establish shared context.
(3) ICT-support: Our assumption is that well-designed ICT-support will persuade students to reflect explicitly on their own perspectives and on the perspectives of students from other professional backgrounds, resulting in making implicit representations explicit.
On the basis of preliminary research and literature research, a version of the proposed framework was made. Consequently, a Delphi-study was carried out. The contributions of 3 panels (in total 17 participants) were analysed and summarised

into 19 guidelines. Subsequently, the guidelines were assessed by the panels. In addition to the above, guidelines to (re)design usable ICT-support were collected from literature. Future research will include expert validations, which will be used to evaluate the framework, afterwards, case studies will be carried out.

A framework for investigating school development through ict
Liisa Ilomaki, University of Helsinki, Finland
Minna Lakkala, University of Helsinki, Finland

The research on ICT in education has concentrated on pedagogical aspects, but ICT has influenced radically a school community as well. ICT seems to foster features characteristics for advanced school communities. A knowledge-creating school is an absorbing idea, which combines the positive effects of ICT in education, and the results of research about learning organizations to an entity, which is a more effective and capable school for the information age. The purpose of the present study was to develop a generic framework for investigating the relationship between ICT and school's working culture and practices, and to investigate schools by using the framework. The study was conducted in nine schools in Finland. In the study, a framework was created, which helped to observe schools from several points of view. The framework consisted of six research phenomena: The goals of the school, Expert-like working culture in the school, Leadership, Teacher community's working culture, Pedagogical practices, and The ICT resources. The data consisted of interviews of the different actors, questionnaires, classroom observations, and formal and informal documents. The schools differed from each other radically in all dimensions investigated. It was typical for schools on good ICT level that several teachers used ICT, it in many ways. Teachers had more common visions and goals, and commonly agreed working manners. These schools had more networking, and they supported common development work. It is obvious, that a meaningful use of ICT in a school demands many years' practice and development. The model for the study proved to be a powerful tool to analyse schools. The method was, however, labour-intensive, and there is need to further specify the content of the investigated dimensions, in order to concentrate on the most important factors of the relationship between school development and ICT.

Practices of computer use in elementary education: Perceived and missed opportunities
Tirupalavanam G. Ganesh, University of Houston, United States
David C. Berliner, Arizona State University, United States

This research endeavor reports on a large qualitative dissertation study of eight upper elementary grade (4/5/6) teachers' computer uses in education. Long-term data collection occurred during the 2001-02 and 2002-03 school years in eight classrooms located in seven Arizona (United States) sub-urban schools in a large public school district with 25 elementary (K-6) schools and over 25,000 students. The goals were to identify what local school administrators considered successful educational technology practices and examine the observed practices in relationship to expectations for technology's potential to transform education. The study was set in classrooms that functioned under typical conditionsóone or two computers in the classroom with periodically scheduled access to the computer lab, which is the norm in the nation's public schools. The study revealed that computer technology uses as designed, supported by school district administration, and as enacted by classroom teachers were primarily to improve teacher efficiency and student productivity. Computer technology was seldom used for instruction and curricular technology integration was symbolic. The school as an institution largely served as a barrier to teacher innovation with regard to technology integration. A perceptible focus was on the appearance of modernity. The efforts to infuse and support computer use manifested in a shiny well maintained computer lab and a part-time computer resource technologist for each elementary school. Yet, students' access to computers in school was only 1% of the entire school-year's instruction time. Classroom teachers' computer use was defined by use of software programs in reading and mathematics and its uncritical acceptance as a tool to manage students' reading practices and learning in mathematics. This reliance on computer technology to manage, assess, and track students allowed for the production and documentation of students' progress with ìcomputerized reports, a hallmark of efficiency, modernity, and preparation for life in an industrialized society.

Paper Presentation
Web-based learning

PARTICIPATION IN ONLINE LEARNING COMMUNITIES
Chair: Richard Joiner, University of Bath, United Kingdom

Patterns of participation in online learning communities
Jimmy Jaldemark, Mid Sweden University, Sweden

This paper focuses on patterns of participation in on-line teaching. It is about initiation, turn taking and the maintaining of a dialogue; it uses data from a on-line course in higher education; and it contrasts online practices - as retained on the course server - with the IRE model of classroom discourse discussed, thirty years ago, by Sinclair and Coulthard. The heart of the paper reports and discusses the patterns used by three teachers and fifteen students. Particular attention is given to the difference between academic and social discourse. The subsequent discussion focuses on how the affordances offered, on paper, by the course design yet were swamped by other constraints in the actual learning environment. The paper concludes with a discussion of the gap between the practices revealed in this study and the idealizations of the inner life of learning communities that are presented in the international literature. In effect, this paper is a validation, if not a confirmation, of Wallace's claim that teachers' uses of the Internet are far from the deep and engaging activities implemented by research projects' (2004, p. 448).

Comparing knowledge construction in two cohorts of asynchronous discussion groups with and without role assignment
Tammy Schellens, Ghent University, Belgium
Hilde Van Keer, Ghent University, Belgium
Martin Valcke, Ghent University, Belgium

This paper describes the impact of learning in asynchronous discussion groups on students' levels of knowledge construction. The choice for a design-based approach made it possible to compare the results of two cohorts of students (respectively N = 223 and N = 286) participating in the discussion groups during 2 consecutive years. Multilevel analyses were applied to uncover the influence of student, group, and task variables on the one hand and the specific impact of the assignment of roles to

group members on the other hand. The results for both cohorts of students indicate that a large part of the overall variability in levels of knowledge construction can be attributed to task characteristics. As to the impact of student characteristics, more intensive and active individual participation in the discussion groups as well as adopting a positive attitude towards the learning environment is positively related to students' achieved level of knowledge construction. As to the impact of task characteristics, significant differences between the consecutive discussion themes were found. The results showed a significant decrease in levels of knowledge construction. Further analysis however illustrated that this significant decrease in levels of knowledge construction disappeared when correcting for task complexity. As to the impact of role assignment, no significant overall differences in students' mean levels of knowledge construction between the role and no role condition was observed. However, additional analyses revealed (1) that the distribution patterns of the levels of knowledge construction differed: students in the role condition more often reached the highest level; and (2) that assigning students the role of summariser resulted in significantly higher levels of knowledge construction. Comparisons between the 2 consecutive cohorts revealed that the introduction of roles lead to higher levels of knowledge construction. An effect size of 0.5 was detected.

Learning together or alone? - Social skills and Web-based environments in higher education
Hannele Niemi, University of Helsinki, Finland

The session focuses on the question of how to advance collaboration in higher education through the Web. The aims of the session are (1) to introduce the theoretical framework a Web-based tool ìThe IQ Team which is an interactive on-line assessment and support system to learn social skills needed in co-operative work, (2) to describe data collection using the IQ Team in virtual environments, and (3) to present the empirical results of on-line students' social skills in different groups, and (4) to present what kinds of different social orientations students have in their learning. The data (N= 275) was collected from on-line students in different disciplines in universities and polytechnics: Theology, Social and Behavioural Sciences, Business, Health Sciences, Teacher education, and Technology and Science. Gender could be identified in certain groups (67 males, 163 females), as well as a breakdown in HE institutions (university students 82, polytechnic students 48). The on-line survey data was analysed using exploratory and confirmatory factor analysis, estimating the goodness-of-fit, e.g. a chi-square (? 2), and examining the homogeneity with Cronbach's alpha. Means, standard deviations and t-test were es-

timated for different student groups, as well as correlations between social dimensions. The results indicate that the most of on-line students have high social skills. The data also gave evidence that there are six different social types among students. There were no significant differences between university and polytechnic students. The gender roles seem to be traditional also in on-line courses. The results revealed that students need different strategies: individualistic, competitive and collaborative orientations in joint knowledge creating processes and they must learn to use them in a strategic way to achieve joint objectives.

Graduate students as peer tutors in asynchronous discussion groups: Exploration of individual tutoring styles
Marijke De Smet, Ghent University, Belgium
Hilde Van Keer, Ghent University, Belgium
Bram De Wever, Ghent University, Belgium
Martin Valcke, Ghent University, Belgium

This paper focuses on the implementation of peer tutoring in asynchronous discussion groups in order to stimulate freshmen to negotiate and exchange thoughts while resolving six successive tasks. In the literature on CSCL prominent evidence is found that scripting collaborative activities advances the ongoing interaction. The present study affiliates with the assumption that collaboration not necessarily and automatically leads to learning. A positive impact on learning strongly depends on the quality of the discourse, more specifically on the content of the arguments and their invitation to construct knowledge. To optimise the quality of the interaction in online discussion groups, trained tutors were introduced to facilitate knowledge building and problem-based learning. As a part of their internship, fourth-year graduate students Educational Sciences' acted as cross-age tutors. The tutor-student ratio within a single discussion forum was two to ten, namely one tutor dyad towards approximately ten freshmen. Tutor contributions were explored by means of a content analysis scheme, stressing three dimensions, namely tutors' (1) social and organisational support in the learning community, (2) support with regard to the learning content, and (3) support related to argumentative knowledge construction by the students. Additionally, tutors' gradual transition from model to coach, as a result of freshmen's growing learning experiences, was incorporated in the inquiry. Studying tutor activity in the context of e-learning offers possibilities to discuss and optimise learning processes under accompaniment of tutors. This study specifically contributes to a better understanding of supportive interventions of a peer in CSCL-environments. In the result section of the paper, tendencies in the evolution

of tutors' modelling and coaching activities throughout the discussion themes are reported and a typology of tutoring styles in asynchronous discussion groups is portrayed.

B 20   23 August 2005   17:00 - 18:20   Room E103

Paper Presentation

PROFESSIONAL DEVELOPMENT

Chair: Hans Gruber, University of Regensburg, Germany

Written restitution: A tool to sustain expansive learning
Valentina Ghione, University "La Sapienza" of Rome, Italy

The study of the construction processes of professional competences in teachers, and the experimental research of practices and tools to sustain and to promote such processes finds a useful theoretical-methodological frame in the socio-cultural approach and in particular in the Activity Theory and in Developmental Work Research (Engestrom, 1993, 2000). Research was carried out on the self-development practices in teachers of a ìSecond Chance School for drop-out students (Project Chance, Naples, Italy) and was based on the analysis and promotion of the construction of professional competence among operators. The collaboration was structured as a co-configuration work (Engestrom, 2004) and needed the definition of dialogical and reflective tools to make all the participants aware of the knowledges distributed in the system, to share these knowledges and to construct new competences by experimentation through practice (Shon, 1983). Written restitution of the observed elements permitted the experimentation of a form of controlled communication between the researcher and the operators, able to sustain the construction of intersubjectivity (Wells, 1993), which is an essential presupposition for the activation of change processes both in individuals and within the group. Moreover, written restitution permitted the construction of an area of reflection on professional activity that sustained the expansive learning processes within the activity system. The possibility of anchoring reflective thought to a shared object makes this artefact particularly useful in the building up of communities of practices (Wenger, 1997). Bringing out emerging elements of collective practice is useful in contexts aimed at the empowerment and development of self-evaluation abilities because it can help the enhancement of self-esteem, of the sense of effectiveness,

and of the personal and professional identity of individuals and groups.

Development of counsellors' conceptual skills
Josef Strasser, University of Regensburg, Germany
Hans Gruber, University of Regensburg, Germany
Daniela Geissler, University of Regensburg, Germany

To establish a helpful working alliance, psychological counsellors have to develop an adequate view of their clients' problems. Counsellors have to decide what treatment program is appropriate, to what extent it is applicable, or in what way it has to be adapted. These decisions are guided by a counsellor's case conceptualisation. Little is known, however, about the development of counsellors' conceptual skills. Research on expertise and professional performance in other domains revealed that there are substantial differences between novices and experts as to the speed and way they process information. To become an expert, a minimum amount of at least ten years of deliberate practice is needed. In the present study, counsellors of different levels of expertise were analysed during working on a computer-based case presentation. Processes of problem understanding and hypothesis formation were analysed in order to investigate whether evidence from related domains can be found in counselling as well. Specifically the following aspects were focused: (1) duration and extent of problem understanding and solving; (2) extent and elaborateness of case conceptualisation; (3) thematic reference of information processing; (4) aspects of hypothesis formation. The results suggest expertise-related differences in the development of counsellors' conceptual skills. Experts in counselling develop a working model of a case that fits the specific situation of the client. This model has constantly to be adapted to new information gathered. Therefore expert counsellors try to stay open to new information by producing more general hypotheses. Experience helps them to recognise more relevant information, so they can express more aspects when working on the case and when explaining it. These results imply consequences for the design of learning environments that foster counsellors' conceptual skill development.

Measuring different aspects of transfer from training in OSH
Wolfgang Gallenberger, BG Institute Work and Health, Germany
Kati Masuhr, Technical University Dresden, Germany

Professional training should result in a transfer to the workplace (Simons, 2004). But until now there was a lack of instruments to measure the transfer from participants who attended seminars with different learning goals. Therefore an approach was created to measure the transfer independent from training content and to differentiate between several aspects of transfer. The survey refers to three theoretical approaches, the four levels of program evaluation (Kirkpatrick, 1998), the framework model of Baldwin and Ford (1988) and the four criteria for evaluating transfer suggested by Stiefel (1976). 171 training participants who had visited different seminars at the German BG-Institute for Occupational Work and Health responded to this questionnaire. The results indicated that half of the participants estimated to utilise 50 percent or more of that learnt in training. The practical relevance of the course content and the work environment, for example supervisory support, have been identified as variables that have a high impact on the amount of knowledge that may be transferred at the workplace. The assumed correlation between the four levels of program evaluation could also be replicated in this study. A factor analysis of the 25 items that measured the several aspects of transfer from training, indicates that the transfer from training could be described by four dimensions. Thus, transfer can be described firstly by the application benefit, secondly by the skill enhancement, thirdly by the detection of new problems in the occupational activity and the motivation for advanced vocational training, and finally through the communication (e.g. to colleagues) of what a participant has learned. The study shows that transfer is a multidimensional construct which can be measured with the revised questionnaire.

Paper Presentation

ENVIRONMENTAL EDUCATION RESEARCH

Chair: Kostas Korfiatis, University of Cyprus, Cyprus

Using theoretical concepts in practical situations: A study of pupils' work on freshwater pollution
Karolina Osterlind, Department of education, Stockholm university, Sweden

The paper reports a study of five pupils learning about freshwater pollution. The pupils, aged 13-14, in the upper level of compulsory school, co-operate in a group. The instruction is organised so that includes explanations of theoretical concepts and processes, like drainage basin and water pollution, and fieldwork at a lake that are used to explore these concepts. Data consists of tape-recorded conversations among the pupils in the group and the pupils' written material. The result shows that the pupils experience difficulty in applying the theoretical knowledge in the practical contexts. These difficulties are of two kinds. One is a problem of linking an abstract concept, like drainage basin, to a concrete reality. The other is a problem of linking a micro level to a macro level of description in the understanding of water pollution. The pupils interpret the practical activity within a practical context, which make up a context for interpretation other than a theoretical context. The pupils' difficulty in learning the theoretical concepts is seen as a problem of contextualization, a view that is then related to ideas of concept formation within former research.

Environmental knowledge and attitudes of secondary school students in Turkey
Elvan Alp, Middle East Technical University, Turkey
Hamide Ertepinar, Middle East Technical University, Turkey
Ceren Tekkaya, Middle East Technical University, Turkey
Ayhan Yilmaz, Hacettepe University, Turkey

The aim of the present study is two fold: (1) to determine 10th grade high school students' environmental knowledge and attitudes in Ankara, Turkey (2) to examine whether there are differences between 10th grade students, exposed to an environmental science course and those not exposed to this course, on environmental attitudes and knowledge. The data was obtained by the administration of Turkish

version of Children's Environmental Attitudes and Knowledge Scale as measuring instrument to 559 high school students exposed to a one-year environmental science course and 484 high school students not exposed to this course. The students had favorable attitudes toward the environment while their knowledge on environmental issues was fragmentary and incorrect. The environmental science course had a significant effect on students' attitudes toward the environment in favor of 10th grade students exposed to this course. On the other hand, no statistically significant effect of environmental science course was found on environmental knowledge of the students. The positive impact of the environmental science course was desirable for students' attitudes toward the environment. However, it must be considered that it is needed to prepare environmentally literate students who would protect the environment through making informed decisions.

Exploring students' learning in environmental education
Cecilia Lundholm, Department of Education, Sweden
Mark Rickinson, National Foundation for Educational Research, United Kingdom

This paper explores students' learning and learning experiences in environmental education (EE). Recent reviews in the field of environmental education research have made clear that insufficient attention has been paid to question of learning. In particular, there have been very few empirical investigations into the process (as opposed to the outcomes) of students' learning experiences. There has also been a failure by environmental education researchers to engage with learning theory. In the light of this situation, this paper will report findings from two studies that focused specifically on learners' experiences of and responses to environmental curricula. The purpose of the paper will be to highlight the complexity of the learning experience within EE and to draw attention to the need for improved research-based understandings of learning processes. The studies that inform this paper were undertaken independently but drew on similar theoretical perspectives and methodological approaches. The first focused on students' responses to environmental geography lessons within three English secondary schools. The other looked at Swedish university students' learning about environmental issues as part of undergraduate programmes. Drawing on data, the paper will:
- Present detailed empirical illustrations of learning challenges experienced by school and university students during environmental education courses
- Reflect upon the possibilities and limitations of what we call an intentional approach for researching students' learning in environmental education
Against the backdrop of wider research on students' learning in other subjects and

contexts, the paper will consider the influence of the values-rich and contested nature of environmental subject matter.

We see this paper as a contribution to the development of environmental education as a research-informed practice, and the strengthening of research and theory relating to students' learning in these contexts.

The environmental dimension in pre-service teacher training: Three case studies from Europe
Chrysanthi Kadji Beltran, University of Zurich, Switzerland
Petra Lindemann-Matthies, University of Zurich, Switzerland

Because of the multiplier effect, awareness of environmental issues among teacher trainers is of particular importance. Every teacher trainer will educate a large number of students, who themselves again will educate a much larger number of pupils. It is thus essential to ensure the quality of training offered to the teacher students, because it will contribute to the formation of future citizens. The present study is part of a large research project on Biodiversity as a value and concept in education: Initial training and professional readiness of primary teacher students'. The project is financed by the Research Promotion Foundation in Cyprus and carried out from 2004-2006 in three teacher training institutions in Cyprus, Switzerland and England. We are investigating with the help of document review and analysis, interviews with the teacher trainers, and a triangulation of the information obtained, to which degree and depth environmental and, in particular, biodiversity issues are integrated into pre-service teacher training in the three countries. Moreover, we are looking at the overlap between the content of the training programmes and the environmental education philosophy and principles of the teacher trainers. Finally, we will highlight examples of good practice in the area of environmental education with special reference to biodiversity issues. First results show that all teacher training institutions offer at least one specialized environmental education related module. However, these modules strongly differ in their context. Cyprus and England have a rather science-oriented approach whose emphasis is on information about environmental issues, whereas Switzerland has a more holistic, social-critical approach to environmental education. In all three countries biodiversity issues are integrated at least into the science-oriented modules.

C 1   24 August 2005   08:30 - 10:30   Room E002

Symposium
Teacher Professional Development

TEACHER LEARNING IN COMMUNITIES

Chair: Harm Tillema, Leiden univ, Netherlands
              Shoshana Keiny, ben Gurion Univ of the Negev, Israel
Organiser: Shoshana Keiny, Ben Gurion Univ of teh Negev, Israel
              Harm Tillema, Leiden Univ, Netherlands
Discussant: Malka Gorodetsky, Ben Gurion Univ of the Negev, Israel

Collaborative inquiry of teachers into their work and professional lives has been advocated as re-valuing the teachers' position in educational practice and eveloping their professional identity. The co-construction of knowledge can be looked upon as a prime route to building and sharing a knowledge base produced by teachers themselves, as well as a means towards self directed professional development. In particular, it features of partnership and joint collegiality are regarded as a stronghold, not only to help teachers to recognize, interpret and respond to the challenges of their practice, but also to transform their work in the context of educational reform. This teacher research, therefore, offers new ways of seeing, being and acting in the professional world of teachers; emancipating them from the mere application of externally generated knowledge . Our aim in this symposium is to study and identify areas for sharing key knowledge on issues that deal with participation in a community of inquiry which can be said to support professional learning. With this focus in mind, we will address issues of learning, of knowledge and knowing, and of practicing the profession as surfaced by the various collaborative inquiry studies conducted by the contributors of this symposium. The contributions cover the following themes as questions to be raised and debated in the symposium:
1. What characterizes the collaborative inquiry framework, and how to enhance its development?
2. How can learning and teachers' professional development be shown and validated in acollaborative community of inquiry?
3. What are the dynamics, the intra- and interactive processes within the collaborative inquiry community that contribute to the construction of knowledge?
  We invited several contributions from authors active in this domain of research to provide an input for our discussion that circle around four key words: Personal

Autonomy; Authenticity; Identity and Uncertainty

Authenticity in collaborative learning of professionals
Harm Tillema, Leiden Univ, Netherlands

To promote knowledge productive learning in collaboratively working teams a self organized group of teachers worked together engaged in self-study and collaborative inquiry to redesign their own work environment Knowledge productive learning of professionals can be framed by taking the perspective of authenticity as a starting point, thereby integrating the elements of exchange and dialogue, self directedness and freedom, as well as collaboration in teams to create and renew a personal knowledge base. The goal of our study is to explore the parameters for possible interventions which may enhance knowledge productive learning among professionals. Evaluations of the collaborative learning processes were collected on three criteria: problem understanding, conceptual or perspective shift and commitment to implement ideas in practice. The findings revealed insights about the potential power of learning as a discovery oriented construction of knowledge. A main finding is the improvement in abilities to shift perspectives and to represent a problem under study. The collaborative inquiry method used by these teachers is evaluated as a tool for situational understanding and progressive discourse.

Collaborative learning: A mutual process of knowledge construction and of Personal autonomy development
Shoshana Keiny, Ben Gurion University of Negev, Israel

"Organizations are made of conversations" (Perkins 2003, p. 17). By that we mean that their unique nature, as compared to other forms of discussion, is that the topic of the conversation cannot be predetermined, but arises in the process of conversing. Rather than leading the conversation, the participants are being led by it, opening themselves to others and at the same time open the possibility of affecting our understanding of the world (Gadamer 1990). Communities of Learners', are mediums that enhance open conversation, where participants can voice their unique individuality. As such, they can serve as optimal sites for participants, to define themselves and create their own identities in relationship with others (Arendt, 1958). As opposed to the common notion of collaborative frameworks as ìbrain-washing sites, that enhance uniformity and conformity, I argue that they form optimal mediums for developing personal autonomy and freedom. My aim in this paper is to show how collaborative inquiry frameworks, which develop to communities of learners',

enhance two coupled processes: the emergence of new joint professional knowledge, as well as the participants' personal autonomy and freedom

Teacher knowledge as identity rationality
Jukka Husu, University of Helsinki, Finland

This study aims to show how pedagogical practices can be rendered into pedagogical knowledge with the aid of concept and means of teachers' identity rationality. When teachers undertake teaching they analyze i) their situation - what is possible; ii) their students - what their students need and what they can do; and iii) themselves as teachers - what kinds of teachers they are themselves. When teachers act and interact in a given context, they recognize themselves (and others recognize them) as acting and interacting as certain kind of persons' or even as different kinds' at once. These multiple identities are connected not only to teachers' internal states but also to their performances in schools and classrooms. Within this stance, teachers' pedagogical knowledge resides in relations as they encounter with others and situations. Negotiation processes characterize these relations and reflect the situational nature of teachers' knowledge construction though inquiry. Also, these negotiations take place in the context of larger political, historical and structural contexts of a pedagogical situation. The goal of this study is to highlight the importance of taking care the multiple contexts within which teachers and students are practically engaged. Also, it underlines the evidence how pedagogical knowledge develops through practical activities and communicative interchange. Consequently, the research task is to understand and explicate more deeply the complexity of pedagogical relations, and to use these results in the work of teacher education and teacher development

A survey and follow-up study of Norwegian teachers' professional uncertainty / certainty and collaboration
Munthe Elaine, Stavanger University College, Norway

Teacher collaboration has been advocated as an important means to enhance teacher learning for several decades. Uncertainty has been described as being endemic to teaching, and collaboration has been regarded as a means to enhance teachers' professional knowledge and competence, creating a space to address the many uncertainties of teaching. A vast amount of research has also demonstrated both the potential of collaboration as well as the pitfalls. And yet, despite the fact that teachers in Norway have a number of hours per week stipulated for collaboration, we still

know fairly little about uncertainty among teachers and how teachers in Norway collaborate, what they collaborate about, and how they perceive this collaboration. Two research projects were conducted during the years 1998-2004 to shed more light on teachers' perceptions of professional uncertainty/ certainty and their participation in collaboration. A quantitative study from 1998 will address issues of covariance and variance among groups (elementary and secondary school teachers and groups differentiated by age), and a follow-up study of student teachers (2001-2004) as they venture into teaching includes qualitative analyses of how schools may enhance uncertainty as well as how novice teachers describe the collaboration they take part in at school. The two research projects represent both quantitative and qualitative approaches to the questions, and the questions will be discussed in light of possibilities for further professional learning through collaborative inquiry

C 2   24 August 2005   08:30 - 10:30   Room A110

Symposium
Instructional Strategies

RECENT WORKED EXAMPLES RESEARCH: INNOVATIVE WAYS TO INCREASE GERMANE COGNITIVE LOAD AND FOSTER LEARNING AND UNDERSTANDING

Chair: Fred Paas, Open University of the Netherlands, Netherlands
Organiser: Fred Paas, Open University of the Netherlands, Netherlands
               Tamara Van gog, Open University of the Netherlands, Netherlands
Discussant: Roxana Moreno, University of New Mexico, United States

Worked examples are an effective means to decrease extraneous cognitive load and free up working memory resources that are necessary for meaningful learning of complex cognitive tasks. However, freeing cognitive capacity by reducing extraneous load is not a sufficient condition for instructional formats to be effective. Hence, cognitive load research has started to shift its focus towards finding instructional techniques that stimulate the allocation of resources to activities that are relevant to learning and understanding (i.e., increase germane cognitive load). This symposium provides a state of the art overview of research on innovative ways of designing and delivering worked examples in order to increase germane load. With regard to design, the techniques presented are: the inclusion of errors in the worked-out solution (Grosse & Renkl), the inclusion of an expert's rationale behind the selected solution

steps (i.e., ìthe how and why; Van Gog, Paas, & Van Merrinboer), requiring learners to self-explain the rationale behind the steps and providing feedback on that explanation (Scheiter, Gerjets, & Catrambone), and varying how actively learners process condition-action information for procedures (Catrambone). Another study explores how a learners' prior knowledge interacts with the several ways of transitioning from worked examples to conventional problems (Reisslein, Atkinson, & Reisslein). Furthermore, two studies (Grosse & Renkl, and Van Gog et al.) do not only consider learning outcomes, but also try to advance our understanding of the actual cognitive processes and effects that different designs induce through the use of think-aloud protocols.

Exploring the relative impact of learners' prior knowledge and type of example-based instruction in an environment teaching circuit analysis techniques
Jana Reisslein, Arizona State University, United States
Robert Atkinson, Arizona State University, United States
Martin Reisslein, Arizona State University, United States

This study examined the effectiveness of a computer-based learning environment employing several different example-based instructional sequences to teach series and parallel electrical circuit analysis. In light of recent research suggesting that the effectiveness of these sequences may depend upon on learners' level of knowledge (i.e., the ìexpertise reversal effect), a sample of engineering college freshmen was first grouped according to their level of prior knowledge -low or high- of electrical circuit analysis. These students were then randomly assigned to one of three instructional sequences: (a) example-problem pairs, the traditional format where worked examples preceded practice problems; (b) problem-example pairs, where practice problems preceded examples; or (c) backward fading, where a steady transition from modeling (complete example) to scaffolded problem solving (incomplete example) to independent problem solving was implemented. We found that low-prior knowledge participants provided with the example-problem pair instructional sequence outperformed their high-prior knowledge counterparts on near transfer whereas the high-prior knowledge participants presented with the problem-example pair sequence outperformed their low-prior knowledge peers. Similarly, the high-prior knowledge participants assigned to the backward fading instruction sequence outperformed their low-prior knowledge counterparts on near transfer items. In sum, low-prior knowledge learners benefited from the traditional example-problem pair instructional sequence whereas high-prior knowledge learners benefited from the more non-traditional instructional sequences including problem-example pairs

and backward fading. Overall, this study suggests that it is important to consider learners' level of prior knowledge when designing learning environments that rely on example-based instruction. This study also indicates that the results from studies involving the design of computer-based learning environments in other knowledge domains may not directly carry over to the electrical engineering domain and that there is a need for further research on the specific characteristics of the electrical engineering domain that give rise to this phenomenon.

Can learning from molar and modular worked examples be further enhanced by prompting self-explanations and providing feedback?
Katharina Scheiter, University of Tuebingen, Germany
Peter Gerjets, Knowledge Media Research Center, Germany
Richard Catrambone, Georgia Institute of Technology, United States

Traditional molar examples are characterized by teaching problem categories and solution procedures in a rather holistic way, and therefore require that learners keep in working memory a large amount of information with a high relational complexity. In modular examples the solution procedure is broken down into as small as possible meaningful solution elements that can be conveyed separately, which resulted in less time required for learning, reduced cognitive load during learning, and improved problem-solving performance on near as well as for far transfer problems. In this experiment we investigated whether including self-explanation prompts and feedback can enhance learning from both types of worked examples even further. To address this question we implemented both modular and molar examples as either fully worked-out or incomplete examples. In the fully worked-out conditions, elaborated explanations for each solution step were contained in each example. In the incomplete conditions, problem categories were explained by first presenting a fully worked-out example, followed by a second example in which only the solution steps were given and learners had to specify the reasons for why a particular solution had to be applied to the problem themselves. Learners were prompted to give these explanations through questions (e.g., why is the numerator 1 in this case?). Because learners' self-explanations may be incomplete or false, learners' answers were displayed together with corrective feedback. Subsequent to the learning phase learners were asked to solve 9 test problems, which were either isomorphic to the examples or novel. We hypothesized that the helpfulness of prompting self-explanations and giving feedback would be moderated by learners' prior knowledge as well as by the example format (molar vs. modular). These assumptions were tested in an experiment with 120 students. The data collection is finished and the results

will be presented at the conference.

Finding and fixing errors in worked examples: can this foster learning outcomes?
Cornelia Grosse, University of Freiburg, Germany
Alexander Renkl, University of Freiburg, Germany

Learning from worked examples is a very effective instructional method in well-structured domains. This is, however, only true when relevant design features of an example-based learning environment are considered. In two experiments, a new feature aiming to optimize example-based learning was investigated: learning with incorrect examples. It was tested whether a combination of correct and incorrect worked examples enhances learning outcomes in comparison to correct examples only. The participants learned to understand and solve probability problems either learning with correct and incorrect examples or learning with correct examples only. The learning outcomes were assessed by a post-test. In Experiment 1, it was found that a combination of correct and incorrect worked examples fostered far transfer performance if the learners had favorable domain-specific learning pre-requisites. Experiment 2 replicated this effect. Thus, incorrect examples enhanced learning outcomes, but only for "good" learners. In addition, in Experiment 2 spontaneous self-explanations were assessed by thinking-aloud protocols. It was shown that confronting learners with incorrect solutions changed the quality of their self-explanations: On the one hand, new types of effective self-explanations could be observed, but on the other hand the amount of the very important principle-based self-explanations was substantially reduced independently of the amount of prior knowledge of the students. Thus, it can be concluded that it might be promising to foster principle-based self-explanations when learning with faulty worked examples.

Effects of process-oriented worked examples on transfer performance and understanding
Tamara van Gog, Open University of the Netherlands, Netherlands
Fred Paas, Open University of the Netherlands, Netherlands
Jeroen van Merrienboer, Open University of the Netherlands, Netherlands

This study aims to empirically test the claim by Van Gog, Paas, and Van Merri?nboer (2004) that process-oriented worked examples would be able to foster understanding and transfer performance further than product-oriented worked examples. Process-oriented worked examples show a learner not only the solution steps, but also

the strategic (heuristics, systematic approaches to problem-solving) and domain-principled information used in selecting the steps. A 2 x 2 factorial design is used, in which the following factors are varied: solution worked out (yes/no) and process information (yes/no). The resulting four conditions are: conventional problem solving, conventional problem solving with process information given, studying product-oriented worked examples, and studying process-oriented worked examples. After working on the electrical circuits troubleshooting training in one of those conditions, all participants complete a transfer test consisting of conventional problems. Participants are 56 first year electrotechnics students of 2 Dutch schools of senior secondary vocational education. They are randomly assigned to one of the four conditions. In each condition, 4 randomly selected participants are asked to think-aloud while working on some of the training tasks and all of the test tasks. To determine whether the process-information has the desired effects on understanding and transfer performance, students' mental effort during the training and the test, and students test performance is measured. To determine how the process information might influence students' understanding, the think aloud protocols are analyzed.

C 3   24 August 2005   08:30 - 10:30   Room A112

Symposium
Knowledge Acquisition

THE ROLE OF THE BOOK IN STORYBOOK READING AS A CONTEXT

Chair: Adriana Bus, Leiden University, Netherlands
Organiser: Adriana Bus, Leiden University, Netherlands
              Molly Collins, Boston University, United States
              Mary Ann Evans, University of Guelph, Canada
              Kathleen Roskos, John Carroll University, United States
              Dorit Aram, Tel Aviv University, Israel
              Maria de Jong, Leiden University, Netherlands
Discussant: Susan Neuman, University of Michigan, United States

Storybook reading is a highly acclaimed practice in providing children with early literacy experiences, although its efficacy for developing early literacy skills that support later reading achievement remains in question. Research over the past decade has examined different sources of variability within storybook reading. How-

ever, less attention has been paid to the book per se as a mediator for influencing interactive processes between adult and child. Recent research suggests that book qualities may be more decisive elements in the language and literacy learning outcomes of storybook reading than previously thought. This symposium includes 5 research studies that examine different book qualities, such as video fragments in televised books, on Children's language and literacy development. The scientific quality of the studies will be critiqued and implications of the findings for early literacy practice will be highlighted.

Attention to print and pictures during shared book reading
Mary Ann Evans, University of Guelph, Canada

Reading to children is often cited as a basis for children learning to read, in that children are exposed to printed text at close hand in a quiet, intimate context. It is thought to develop an understanding of print conventions, the appearance of words, and the shapes of the characters in written script. For this to be the case, children would have to look at the print while being read to. A few studies have examined parents' and Children's comments during shared reading as a window to the objects of their attention. We will report on three studies where we attempted to more directly assess this.

Storybook reading and vocabulary acquisition in preschoolers
Molly Collins, Boston University, United States

To examine the effects of rich explanation on ESL's L2 vocabulary acquisition from storybook reading, 70 Portuguese-speaking ESL preschoolers were pre-tested in L1 receptive vocabulary, L2 receptive vocabulary, and L2 expressive vocabulary. Matched according to L2 receptive vocabulary scores, subjects were assigned to control or experimental groups. Subjects in the experimental group heard stories read with explanations of target vocabulary. Subjects in the control group heard stories read without explanations. ANOVA showed significant, robust effects of treatment (i.e., explanation). Regression analysis showed that treatment accounted for 32% of the variance in target vocabulary scores. The presentation focuses on the selection of sophisticated vocabulary, strategies for teaching vocabulary during reading, and examples of vocabulary instruction.

Rare word vocabulary growth in at-risk preschool english language learners
Kathleen Roskos, John Carroll University, United States

This study describes the rare word vocabulary growth of 398 children enrolled in Southwest border community Head Starts. All children are native Spanish speakers who are participating in an Early Reading First Project designed to improve Children's early reading skills. The early literacy curriculum (Doors to Discovery, Wright Group/McGraw-Hill) provides daily instruction in oral language, alphabet knowledge, phonological awareness and print concepts. The curriculum offers extensive opportunities for learning new words as an integral part of storybook reading, with a special emphasis on learning content vocabulary that builds domain knowledge, referred to in the program as wonderful words (275 words). Children are afforded ample practice to hear and use new words in large group, small group and play activities. Research has shown that the Doors program is effective in promoting the oral language and print knowledge of both English-and Spanish-speaking Head Start students.

Do we need the written text in illustrated children's books?
Dorit Aram, Tel Aviv University, Israel

Participants were 30 middle income SES dyads of mothers and their children aged 4 - 6. We videotaped the mother twice in their home while ìtelling two books to her child (with text/ without text). The order of reading the two books was random. We used two books that were new to the children. The books were illustrated by the same illustrator and we presented randomly, once with and once without text. After the mother finished telling the story, the child was asked to retell the story, and he/she was asked questions regarding the story content and novel words from the story. Children's language level was assessed via PPVT and the Definition test. Beyond book's genre, mothers have their own style of telling a book to their child related to the child's retelling and understanding of the story. Books without text yielded richer, more creative mother-child interactions, suggesting the language potential of this genre.

Televised books: a scaffold to preschoolers' story understanding and language development?
Adriana Bus, Leiden University, Netherlands

With an experimental design we tested the potential role of new media in develop-

ing narrative comprehension and language skills in preschool children with a low level of language proficiency. In the first condition children heard the same story six times supported by static pictures; the second group heard the same story six times, but three times through televised presentations. The third group was read to six times but they heard two different stories both supported by static pictures. The fourth group did also hear two stories, each three times, every story once through televised presentation. A fifth group was only pre- and post tested. With the help of a physiological measure (skin conductance responsivity) we assessed Children's level of arousal while hearing the story. The results show an advantage for televised stories: children are more aroused. It also appeared that in a young group at-risk the availability of another symbolic system created by presenting a story with rich images and sounds promotes story understanding and language skills. Furthermore, positive effects of multimedia accumulate over sessions.

C 4   24 August 2005   08:30 - 10:30   Room A111

Symposium
Emotion

ACADEMIC EMOTIONS IN STUDENTS' SELF-REGULATED LEARNING AND ACHIEVEMENT

Chair: Peter Op 't Eynde, University of Leuven, Belgium
Organiser: Peter Op 't Eynde, University of Leuven, Belgium
             Reinhard Pekrun, University of Munich, Germany
Discussant: Monique Boekaerts, Leiden University, Netherlands

In the past ten years, there has been a call for empirical studies that focus on the emotional life of students. In contrast to ìcold cognition, the role of emotions has been neglected by educational research, with a few notable exceptions - research on test anxiety, and Weiner's program of attribution research (see Pekrun & Frese, 1992; Weiner, 1985). As a consequence, we lack knowledge about the interrelations of students' emotions with their goals, motivation, use of self-regulatory strategies, and academic achievement. Recently, a number of American, European, and Australian research groups have begun to conduct in-depth investigations into these interlinkages. Many of these studies build on the traditions of test anxiety and attributional research, but their scope goes well beyond that. This symposium brings together emotion researchers and programs of research from around the world as well

as a discussant that is a world-renowned European scholar in the field of students' affect and motivation. The five presentations all share a common focus on students' emotions. Based on the results of empirical studies, all five presentations will discuss emotions and their relationship to aspects of students' goal strivings, self-regulated learning, and academic achievement. The structure of the presentations implies that the symposium (1) discusses a number of facets of students' emotional life, including anxiety, but also negative and positive academic emotions other than anxiety, as well as students' regulation of their emotions; (2) presents findings from different populations of students; (3) addresses emotions both from a trait perspective and from a process-oriented, situated perspective; (4) examines functions as well as antecedents of emotions, and their reciprocal linkages; (5) presents empirical findings gained by different, complementary methodologies. The format of the symposium will be a traditional one with five presentations followed by remarks from the discussant, Monique Boekaerts.

Investigating the role of academic emotions in negotiating multiple goal-strivings
Jeannine E. Turner, Florida State University, United States
Cathryn E. Simmons, Florida State University, United States

As college students progress towards the completion of their degrees, many life goals; i.e., social goals and/or future career goals occupy their current concerns. Although the pursuit of their academic goals may be quite salient, students' motivation for academic achievements fit within their broader goal-striving context. Choosing and striving for goals entail complex processes that involve cognitive, motivational, and emotional systems. Sustained learning is a complex phenomenon involving a myriad of complex, adaptive processes, such as those involved in perceptual-cognitive appraisals, affective responses, fulfilling motivational goals, striving for future goals, and self-regulation as well as complex skills such as reading, problem-solving, and learning strategies. Understanding students' processes for negotiating and regulating their emotions, cognitions, and behaviors was the focus of this study. Approximately 30 undergraduate students, from various majors, volunteered to participate in this research. Throughout the semester, we both collected quantitative data (e.g., motivational goals, effort regulation, study strategies, emotions, and grades) and qualitative data (interviews). The data suggest that, following test feedback, students experience a variety of blended emotions (e.g., feeling disappointed and worried, disappointed but content, angry, ashamed, pleased and proud). Students' subsequent motivations, self-regulation strategies, and academic achievements are influenced by their initial emotional reactions; their attributions concerning test feedback; their appraisals of their multiple workloads and resources; and the clarity

and importance of their future academic and occupational goals. Throughout the semester, students appraised the importance of their multiple goals, their emotional experiences, and their academic feedback and made strategic decisions and negotiations regarding their goals, effort, and strategies for each task within each class. The results of the initial analysis are congruent with current theories of goal striving, but highlight the strategic processes in which students engage to manage the many tasks that are associated with their many life goals.

Girls and mathematics : A hopeless issue? An analysis of girls' and boys' emotional experiences in mathematics
Anne Zirngibl, University of Munich, Germany
Reinhard Pekrun, University of Munich, Germany
Rudolf vom Hofe, University of Regensburg, Germany
Werner Blum, University of Kassel, Germany
Raymond Perry, University of Manitoba, Canada

This study focuses on gender differences in mathematics emotions. Based on Pekrun's (2000) control-value theory of academic emotions, competence beliefs and values are assumed to be important cognitive antecedents of academic emotions mediating gender differences in students' emotional feelings. Furthermore, we hypothesized that gender-linked emotions contribute to gender differences in mathematics performance. N = 1,036 male and 1,017 female 5th grade students participated in the study, representing a broad range of student abilities and socio-economic backgrounds. Students' emotions, competence beliefs, and value beliefs were assessed through self-report measures. A standardized mathematics test and students' academic grades were used to assess mathematics performance. Girls reported significantly less enjoyment, pride, and boredom than boys, but more anxiety, hopelessness, and shame. No significant gender differences were found for anger. The assumption that gender differences in emotions were mediated by control and value beliefs was confirmed. Regression analysis showed that the female maladaptive affective pattern was due to girls' low competence beliefs and low subjective value of mathematics, combined with high subjective values of achievement in math which were comparable to boys' achievement values. Concerning performance, grades of girls and boys did not differ significantly, but considerable gender differences were found in the standardized mathematics test. Structural equation modelling confirmed the postulated relationships between gender, competence and value beliefs, emotions, and performance in mathematics. Furthermore, a multi-group comparison procedure revealed that these functional relations were similar

in boys and girls. Gender-linked differences in emotions and achievement were due to differences in mean scores of competence and value beliefs, rather than to differences in relations between variables. In conclusion, the need for interventions to improve girls' cognitive-affective attitudes towards mathematics will be discussed.

Affect during small group instruction: Implications for students' engagement and learning
Elisabeth A. Linnenbrink, University of Toledo, United States
Kristin L. Kelly, University of Toledo, United States
Toni M. Kempler, University of Michigan, Ann Arbor, United States

Both psychologists and educators have become increasingly interested in considering affect in academic contexts (Schutz & Lanehart, 2002). Two studies (Study 1: n = 138; Study 2: n = 192) were conducted to investigate upper-elementary students' affect during small group instruction. In both studies, a multi-dimensional model of affect consisting of both valence (pleasant, unpleasant) and activation (high, low) was used to consider how affect relates to behavioral and cognitive engagement during group work and perceptions of the quality of the group's interaction. Results indicate that it is useful to use a multi-dimensional model, as the findings varied both in terms of valence and activation. Across both studies, high positive affect (excitement) was associated with higher levels of individual self-regulation. In contrast, both high (tense) and low (tired) negatively valenced affect was associated with a tendency to loaf, or allow other group members to do the activity. Students' perceptions of the quality of the group's interactions also varied based on affect. In study 1, low activation was associated with group interaction with reports of feeling calm associated with reporting higher quality group interactions and reports of feeling tired associated with lower quality group interactions. In study 2, feeling more happy than sad or more excited than tired was linked to higher quality social interaction suggesting that a positive valence is also important. Interestingly, students' learning during the group activities was unrelated to the affect they experienced, suggesting that affect may be more important in shaping engagement than in predicting learning.

The effect of achievement goals on academic emotions and task performance at a mathematical task
Jacques Gregoire, Catholic University of Louvain, Belgium
Sophie Govaerts, Catholic University of Louvain, Belgium
Benoit Galand, Catholic University of Louvain, Belgium

We studied the influence of achievement goals on academic emotions and performance at a mathematical reasoning task, and the way achievement goals are related to task performance through academic emotions. A 246 students sample (grade 11) answered a questionnaire assessing their value of mathematics and their general self-efficacy in mathematics. Their specific task self-efficacy was also measured. The students were then assigned to three groups. Each group received different instructions designed to manipulate their goal orientation (learning goal, performance-competition goal, performance-approval goal) during a logical reasoning task. Six academic emotions (enjoyment, hope, pride, anxiety, boredom-anger, and shame) were measured with the Academic Emotions Scale (Govaerts & Gregoire, in press). Fifteen logical reasoning items were presented in three blocks of five items of equivalent difficulty. As expected, MANOVA showed that goal orientation induction had an effect on three academic emotions reported during the logical reasoning task. Students in the learning goal condition presented more hope, and less anxiety and shame than those in the performance-competition and performance-approval goal conditions. Repeated measures ANOVA showed an interaction effect between goal orientation and performance blocks. The students in the learning goal condition remained more stable across task performance than those in performance-competition and performance-approval conditions whose performance decreased. As expected, academic emotions were found to mediate the interaction effect between task performance and goal orientation. In the learning goal condition, students' performance remained more stable across the blocks because they felt more hope than those in the two others goal conditions. These results supported a model linking motivational and emotional components in learning context. They showed the benefit on achievement of learning goal versus performance goal. They also emphasized the role of positive academic emotions in learning and achievement.

Students' self regulation of emotions in mathematics learning: How do they cope?
Peter Op 't Eynde, University of Leuven, Belgium
Erik De Corte, University of Leuven, Belgium
Inge Mercken, University of Leuven, Belgium

Over the years the concept of self-regulated learning has broadened to include motivational, volitional, and emotional components next to (meta)cognitive ones. The exact nature and role of these different components is, however, not always clearly understood. More specifically, very few data are available on the regulation of emotions in school contexts. We lack a proper understanding of students' knowledge and use of strategies to regulate their emotions in school contexts. Therefore, in this paper we will discuss the results of a survey study aimed at identifying the different categories of emotional regulation strategies students use in different contexts related to mathematics learning in school. To identify the kind of regulation strategies students employ when managing their emotions we developed a questionnaire and administered it to 393 students. Students participating in the study were in their second or fifth year of secondary education following either a classical, humanities, or vocational track. They were asked to indicate the emotional regulation strategies they draw on to manage their emotions in three different stressful situations related to mathematics learning. An exploratory factor analysis was performed to identify the different categories of emotional regulation strategies used by students. Next, variance analyses clarified the relations between the strategies used and the different situations, students' familiarity with the stressful nature of these situations, students' track level, age, and gender. Results show that students know and make use of 6 different categories of emotional regulation strategies in stressful school situations related to mathematics learning, including active and problem focused strategies as well as more emotion focused strategies. There are, however, clear differences in the kind of strategies used by students depending on the situation confronted with, their familiarity with the stressful nature of this situation, the track level they are in, their age and gender.

Symposium
Teaching and Instructional Design

THE ROLE OF PEDAGOGICAL AGENTS: WHEN DO THEY WORK?

Chair: Jan Elen, K.U.Leuven, Belgium
Organiser: Geraldine Clarebout, K.U.Leuven, Belgium
                Jan Elen, K.U.Leuven, Belgium
Discussant: Peter Goodyear, University of Sidney, Australia

Pedagogical agents are animated characters designed to operate in an educational setting for supporting and facilitating learning (Shaw, Johnson & Ganeshan, 1999). They may adapt their support to learning paths followed by students and provide students with non-verbal feedback through means of facial expressions and gestures (Gr?goire, Zettlemoyer, & Lester, 1999; Johnson, Rickel & Lester, 2000). Pedagogical agents can adopt different roles and deliver support on different dimensions (see Clareobut, Elen, Johnson & Shaw, 2002). Most research on pedagogical agents has focussed on more format issues of pedagogical agents, while this symposium puts the pedagogical scaffold at the core. Empirical studies are presented where the agent provides support on different levels and adopts different roles. In a first study by Domagk et al. the differentiating effect of motivation is studied in relation to the influence of pedagogical agents on leanrning outcomes. The study of Choi and Clark focusses on the cognitive and affective effect of pedagogical agents, while the study of Clarebout and Elen investigates whether an agent providing metacognitive support is benefical for students' learning. The last contribution by Atkinson, Dunsworth, and Reisslein discusses whether learners' English language proficiency influence the utility of pedagogical agents.
The discussion integrates the different research findings to identify functionalities these pedagogical agnet can take and issues that still need ot be studied.

The effect of pedagogical agents on student's motivation and the learning outcomes

Steffi Domagk, University of Erfurt, Germany
Helmut Niegemann, university of Erfurt, Germany

Pedagogical agents are defined as animated lifelike characters in multimedia learning environments that facilitate the learning process (Johnson et al., 1998). Although this definition already implies a learning supportive role of pedagogical agents, the kind of support that they should provide and their role in the learning environment remains vaguely. In most cases an unspecific and unjustified motivational effect of these agents is assumed (Bendel, 2003). The differentiated examination of this motivational effect is the goal of this study.

The research on pedagogical agents is still at its beginning. The different roles that pedagogical agents can take over in multimedia learning environments and the different variables that they could have an effect on (such as motivation, emotion, learning outcomes) make this research field a very large one. The focus of this study is the effect of pedagogical agents on the learning outcomes mediated through the learner's current motivation. Therefore the current motivation of the learners was measured three times during the learning process to detect effects over time. After the learning period, the learners passed a learning test to investigate the effect of the pedagogical agent on retention, near and far transfer tasks. The pedagogical agent in this study has the role to guide the learner through a multimedia learning environment. It gives short introductions before the start of a new topic. The subject of the learning environment used was the visual perception of human beings. The data analysis is based on the calculation of structural equation models that take both into account, the motivational effects over time and the expected mediating role of the learner's current motivation on the learning outcomes.

Cognitive and affective benefits of animated pedagogical agent in learning english as a second language

Sunhee Choi, University of Southern California, United States
Richard Clark, University of Southern California, United States

An animated pedagogical agent is a lifelike computerized character that inhabits a computer-based learning environment to direct learning attention and provide learners with pedagogical assistance such as information and contextualized feedback. The present paper discusses the results of an experimental study that explores

the cognitive and affective impact of an animated pedagogical agent as well as an alternative delivery system (i.e., an electronic arrow with audio) when they are used to teach English relative clauses. Of particular interest is to investigate relative effects of an animated pedagogical agent and an electronic arrow in directing learner attention which is necessary for learning second language grammar. The study also examines the cognitive efficiency of these two media systems used to deliver am instructional methods - metalinguistic rule presentation. 60 college level ESL students are randomly assigned to two treatment groups (Agent Group and Arrow Group), and work with respective versions of computer-assisted ESL learning software. The total of seven dependent variables are measured, which include mental effort measures, time measures, noticing measures, learner interest measures, cognitive efficiency measures, and performance measures.

Does a learner's english language proficiency influence the utility of an animated agent and labels during multimedia learning?
Robert Atkinson, Arizona State University, United States
Qi Dunsworth, Arizona State University, United States
Jana Reisslein, Arizona State University, United States

Animated pedagogical agents are capable of delivering instruction using life-like behaviors such as gaze, gesture, and locomotion. They are designed to broaden the communicative relationship between learners and computers, which may in turn foster active engagement with the learning environment and increase the probability of future interactions with the instructional program. The research findings on whether an animated agent can facilitate learning are mixed, however. In an effort to clarify the conditions under which the deployment of an animated agent in a multimedia learning environment might be productive, we conducted a study with 111 middle-school students learning about the human circulatory system. We explored how learner performance was impacted by: (a) the presence of agent's image in a learning environment involving the human cardiovascular system; (b) the use textual labels as signals to guide the process of instructional information; and (c) the interaction between learners' English language proficiency and the presence of an agent and labels. The agent was animated to move around the screen in coordination with narration, using gaze and gestures to direct learners' attention. The labels emphasized key words from the narration and were explicitly linked to the visual material that the narration was referencing. We found that learners with limited English proficiency benefited most from the presence of labels coupled with narration but did not profit from the presence of labels in combination with an agent. On

the other hand, learners classified as English proficient performed best when presented with both an agent and labels. Overall, our results revealed that learners' language proficiency interacted with the presence and absence of an agent and labels in a number of important ways. This suggests that the existing instructional design recommendations for authoring multimedia learning environments may need to be adapted in order to accommodate learners' language proficiency.

Influence of pedagogical agent on complex problem solving in open learning environments
Geraldine Clarebout, K.U.Leuven, Belgium
Jan Elen, K.U.Leuven, Belgium

Research show that pedagogical agents can acts as tools to direct students' learning processes. However, research performed with pedagogical aagents is mainly done in so-called closed learning environments. Only limited studies have been done with more open learning environmetns that aim at the student acquisition of complex problem solving skills. In this contribution research is reported that investigates the effect of a pedagogical agent on solving complex problems. Two groups are compared, one with and one without agent. An ANOVA revealed no difference between the agent and no-agent condition for the post-test score. A difference was found however, for the transfer test where the no-agent group outperformed the agent group. Apparantly, a mathematentic effect of agents was found.

C 6   24 August 2005   08:30 - 10:30   Room A009

Symposium
Teacher Education

MOTIVATIONS FOR TEACHING: PERSPECTIVES FROM ISRAEL, GERMANY, AUSTRALIA, USA

Chair: Juergen Baumert, MPI fuer Bildungsforschung, Germany
Organiser: Jens Moeller, University of Kiel, Germany
              Helen Watt, University of Michigan, United States
Discussant: Juergen Baumert, MPI fuer Bildungsforschung, Germany

Our symposium aims to bring together researchers around the world investigating individuals' motivations for teaching and the choice of teaching as a career. Re-

search approaches are informed by lenses from the motivation literature, and findings have important implications for teacher recruitment and teacher motivation. This is a timely symposium, in the current climate of severe teacher shortages.

Goal orientations for teaching: A novel framework for conceptualizing and studying teacher motivation
Ruth Butler, Hebrew University, Israel

Policy papers and recommendations in many European countries in recent years emphasize the importance of attracting and retaining teachers who are not only well qualified but also well motivated. Surprisingly, however, we know little about teacher motivation, at least in part because of the dearth of compelling theoretical frameworks. After discussing how research can be informed by application of general theories of motivation, this presentation will extrapolate from achievement goal theory to develop a novel conceptual framework that is based in the assumption that the classroom is an achievement arena not only for students, whose role is to learn, but also for teachers who presumably strive to feel successful in their work, but may differ in the ways they define success, and thus in their personal goals for teaching. Specifically, there are grounds for predicting that it will be possible to identify four distinct classes of achievement goals for teaching (mastery, ability-approach, ability-avoidance, work-avoidance) that correspond to previously identified goals for learning. Supporting data will be presented from two studies conducted with Israeli teachers. In Study 1, 30 teachers were interviewed about their reasons for feeling that they had had a successful day at work. Data from this study also served to create the new "Orientations for Teaching" measure that was administered in Study 2 to 100 teachers. Discussion will focus on the implications of this perspective for studying and understanding a) personal and organizational influences on teachers' goal orientations and b) influences of teachers' goal orientations on other features of teacher thinking and behaviour, on student motivation and learning, and thus on the creation of effective learning environments.

Different types of teacher students' motivation
Britta Pohlmann, University of Kiel, Germany
Jens Moeller, University of Kiel, Germany

The purpose of the present study was to examine profiles of motivation for choosing teacher education. For that reason we developed a questionnaire which is guided by the Expectancy-Value (Wigfield & Eccles, 2000) model and the research by Watt

and Richardson (2004). The expectancy-value model provides the most elaborated approach for explaining academic choices. Besides the motivations for the choice we asked teacher students for the certainty of their decisions and for their doubts about it. Exploratory factor analyses for first-year students elicited two motivational factors (an intrinsic and an extrinsic factor) and one doubt factor. By using Mixed-Rasch models we identified 3 different types of teacher students. The three types which are characterised by the extent in intrinsic and extrinsic motivation differ in the certainty and the doubts about their decision. Additional factor analyses for senior students revealed that the motivation structure as well as the doubts differ over time. The intrinsic factor splits in four components: -educational motivationì, -subject-specific interestì, -teaching self-conceptì, and -low demands, whereas the extrinsic factor remains stable. Regarding the doubts senior students differentiate further than first year students in -bad imageì, -stressì, and -low challengeì. In further studies the development of the different types of first-year students will be followed to obtain more information about the impact of motivation profiles on success and satisfaction in the teaching profession.

A new theoretical model for studying motivations for teaching: Theorisation and empirical evidence
Helen Watt, University of Michigan, United States

Objectives of the present study were to apply current influential models from the motivational literature to issues and findings relating to teacher recruitment. Specifically, our goals were to develop a comprehensive scale (the Factors Influencing Teaching Choice [FIT-Choice] scale) measuring factors influencing the choice of teaching as a career, validate the scale on two large cohorts of preservice teachers in Sydney Australia, and determine the factors most important in choosing teaching for these cohorts. Our study makes important theoretical contributions through establishing a comprehensive framework to guide future investigations, as well as important applied contributions through providing an integrative measure to assess motivations for the choice of a teaching career. Values and ability beliefs emerged as strong influences on the choice of teaching as a career, as the motivational literature would suggest. Understanding preservice teachers' motivations for choosing teaching suggests implications for teacher recruitment, having clear social and political relevance in the current climate of severe teacher shortages.

Career change into teaching: Different motivations for career switchers?
Paul Richardson, Monash University, Australia

Governments around the globe are finding it difficult to deal with the supply, recruitment and retention of the teaching workforce, and in response are increasingly focusing recruitment campaigns on suitably qualified graduates seeking a career change. Using the recently validated FIT-Choice [Factors Influencing Teaching Choice] Scale (Watt & Richardson, 2003, in review) we compare the motivations and beliefs of graduate and undergraduate participants entering pre-service teacher education from three universities across two States in Australia, a sample size of 1645 participants. Our scale identifies seventeen constructs related to self-perceptions of teaching ability, perceptions about the demands and rewards of teaching, as well as intrinsic, subjective attainment and social utility values about teaching as a profession. The study is distinguished from previous smaller scale, opportunistic research designs, through its sample size and scope. The profile of motivations and beliefs of graduate entrants from these three universities, making the career change into teaching, shows they are aware that teaching is a demanding and skilled career which does not offer compensations of high salary and high social status and yet, they want to become teachers so as to make a social contribution. For these graduates, the desire to make a social contribution was a major motivation for choosing teaching as a career - more so than undergraduates. However, in identifying and clarifying the motivations and beliefs underpinning the career change decisions of graduate entrants coming into teaching, we find that they are not very different from undergraduates. This suggests that recruitment campaigns could best attract graduate entrants through an emphasis on teachers' social contribution. Other major motivations for both groups were intrinsic value, job security and perceived teaching ability.

Seniority in teaching and perceptions of motivations for entering the teaching profession: A comparison between beginning and experienced teachers
Yael Katzir, Levinsky College of Education, Israel
Tal Yaakobi, Levinsky College of Education, Israel

We examine motivations for entering the teaching profession among teachers of varying seniority in Israel. Studies suggest motivations for the choice of a professional career are influenced by interactions between family, environmental and genetic factors, relationships among economic, social and cultural factors, and the sex, age and developmental stage of the individual. Most studies categorize moti-

vational factors into three major categories: intrinsic, extrinsic and altruistic. While the majority of such studies were carried out with populations of student teachers, our study addresses the effects of experience in teaching on motivations for the choice of a teaching career. The population under study included 414 teachers, all women, aged 23 to 66 years. Seniority in teaching was categorized into three groups by years of experience: "beginning teachers", "mature teachers" and "senior teachers". The research tool was a structured questionnaire. Findings show a predominance of intrinsic and altruistic motivations. Factor analysis elicited 6 factors (2 intrinsic, 2 altruistic, 2 extrinsic) in the choice of teaching. Correlations were found among all four intrinsic and altruistic factors, but not between the intrinsic or altruistic factors, and the extrinsic ones. Significant differences were found between beginning teachers, and the mature and senior teachers concerning two motivational factors: "contribution to the educational system" and "convenience". In both cases the beginning teachers perceived their motivations significantly lower than the other groups. While the actual motivations for the choice of a career in teaching may be a function of personality, age, sex, social, cultural and economic factors, the individuals' perceptions of their motivations may change over time as a function of experience in teaching and professional position. Our findings demonstrate the importance of including teachers having varying degrees of experience in research concerning perceptions of motivations for the choice of a teaching career.

Symposium
Web-based learning

KNOWLEDGE BUILDING IN WEB-BASED LEARNING ENVIRON-MENTS

Chair:	Begona Gros, University of Barcelona, Spain
Organiser:	Jeroen Van Merrienboer, Open University of Netherlands, Netherlands
	Isabel Alvarez, University of Barcelona, Spain
	Therese Laferriere, University of Laval, Canada
	Mary Lemon, OISE, Canada
Discussant:	Jan Elen, University of Leuven, Belgium
	Steffano Cacciamani, University of Valle d'Aosta, Italy

Much of the conventional development of web-based learning environments is based on the creation of electronic material based on existing print-based format. In this case, the web-based learning environments have tended to display limited evidence of the learning and affordances of the new technologies. The main goal of this Symposium is to analysis different perspectives and researchers about the design of web-based learning environments to facilitate the process of building knowledge. The contributions will be address to different aspects of the process of knowledge building: scaffolds, mentoring, web-based support, affordances, etc.

Five design principles for web-based learning: Their psychological basis and effects on transfer of learning
Jeroen Van Merrienboer, Open University of Netherlands, Netherlands

Van Merrienboer's four-component instructional design model aims at meaningful learning. The first component of the model pertains to learning tasks, which are whole-task experiences that are based on real-life tasks. It may be case studies that must be studied, tasks or projects that must be performed, or problems that must be solved by the learners - all aiming at knowledge construction through inductive learning. The educational medium must allow learners to work on those tasks and in web-based learning it takes the form of a computer-simulated task environment. This presentation focuses on the role of learning tasks in web-based learning. In

particular, it presents empirical studies that investigate five principles of multimedia learning, which are directly relevant for the organization and presentation of learning tasks. The sequencing principle indicates that it is better to sequence learning tasks from simple to complex, than to present them in their full complexity at once. The fidelity principle indicates that for novice learners it is better to work in a low-fidelity environment (not trying to mimic the real task environment) than in a high fidelity task environment, which contains irrelevant details that may deteriorate learning. The variability principle indicates that learning tasks must be sufficiently different from each other to allow for the construction of general, abstract schemata that make transfer of learning possible. The individualization principle indicates that adaptive web-based systems, which dynamically select learning tasks based on the characteristics of the individual learner, yield higher transfer than non-adaptive training systems. And the scaffolding principle indicates that learners should receive a high level of support and guidance for the first tasks at a particular level of difficulty, but that support and guidance should diminish as they acquire more expertise. This presentation discusses empirical studies that provide support for the five design principles.

New challenges for teachers professional development: creating knowledge building communities
Isabel Alvarez, University of Barcelona, Spain

This paper is about the introduction of Knowledge Forum for bringing Teacher Professional Development into a more meaningful and participatory idea. Finally, the paper finishes by discussing some final considerations to help create knowledge building communities in our Spanish Teacher Professional Development context. There are certain elements that need some further thought before we even introduce knowledge forum software into classrooms: 1) Serious awareness of the teachers, 2) Stressing the idea of community, 2) Collaborative work, and, 4) Understanding knowledge Forum as a tool to enhance knowledge building communities.

Pre-service teachers' use of web-based environments to support field experiences
Therese Laferriere, University of Laval, Canada

This presentation will focus on pre-service teachers' use of Web-based environments to support field experiences, reflective practice, and knowledge building. Using both quantitative and qualitative methods, data was gathered over a three-year period, with pre-service teachers going to the same innovative school for learning

to teach in their last year of their four-year B. Ed. in Secondary Education. The university-school partnership applies the professional development school model (PDS), and the school has a student-owned laptop program and the Web is accessed daily by school learners. Student teachers' patterns of use will be identified, and the role of accompanying school-based and university-based teacher educators will be described. At a finer level of analysis, student teachers' online discourse was analyzed in relation to the professional beliefs and skills that they manifested at the beginning of the term. Progress was assessed both in terms of reflective practice and knowledge building, and advances as regards student teachers' understanding of teaching in a web-enhanced classroom are identified.

Fostering reading comprehension with information and communications technology: The teacher's role in online discourse
Mary Lemon, OISE, University of Toronto, Canada

This paper reports an investigation of how students' text comprehension improved through on-line discourse. Two English literature classes in an inner city multicultural secondary school participated. The teacher taught both classes-an experimental and a control class. The experimental group was a class of Grade 9 students with access to the discourse space, Knowledge ForumÆ, for writing narrative and expository texts, critiquing others' texts, and exploring ideas. The control class did not have access to Knowledge Forum. Writing autobiographies, students teaching other students how to use html, creating texts (narrative and expository) that were evaluated and revised according to teacher and student commentary, and online discourse led to a database view focusing on idea improvement that moved the curricula from a focus on tasks to a focus on real ideas and authentic problems. Reading comprehension measures showed no difference on a pretest but the experimental class excelled on question-oriented items compared to the control class on the posttest. Additionally, experimental students' intellectual activity in the database was assessed using the Analytic Toolkit (ATK), a suite of tools underlying Knowledge Forum. ATK results were positively correlated with students' final grades. Randomly selected students in the experimental class were interviewed about their online experiences. The teacher and his students reported that interactions in the database led to a more harmonious classroom culture both on and off-line. Overall, discourse in the database resulted in improved reading comprehension, a positive correlation between database activity and final grades, and to improved class relationships. Teacher interviews and his online scaffolding of students' work are of specific interest for this paper.

SIG Invited Symposium
Higher Education

EDUCATIONAL INNOVATIONS IN HIGHER EDUCATION: CONDITIONS TO MAKE IT WORK

Chair: Mien Segers, University Leiden, Netherlands
Organiser: Mien Segers, University Leiden, Netherlands
                Sari Lindblom-Ylanne, University of Helsinki, Finland
Discussant: Vermunt Jan, University Utrecht, Netherlands

Many teachers and program leaders in Higher Education invest in optimising the learning and teaching environment in order to facilitate student learning. However, educational innovations are complex processes, not always leading to the expected positive results. In this Invited Symposium of the SIG HE, four studies are presented offering empirical evidence for the role of different factors in educational innovations. By exploring the impact of innovations on student learning from different perspectives and on a variety of dimensions, we aim to contribute to the current insights in educational innovations and the conditions to make it work.The Trigwell and Lindblom-Ylanne paper focuses on the role of the teacher in innovations. A range of dimensions in university teaching are studied: approaches to teaching, self-efficacy, regulation, interest in student learning and interest in the subject matter being taught. The results are discussed in the light of their possible impact on innovations. The Hounsell, Hounsell, Litjens and McCune paper as well as Struyven, Dochy and Janssens paper address the main theme of this symposium from the learner perspective. The former investigates the impact of changes on the course-level in various disciplines, designed to bring about a greater congruence in the provision of extrinsic feedback and guidance and so to facilitate student learning. The latter compares the effects of being assessed by more traditional and new modes of assessment on student performance and discusses the reasons for the observed effects. As with both previous papers, the Segers, Nijhuis and Gijselaers paper explores innovation from the learner's perspective, considering assessment as well as instructional practices. It present the results of an evaluation of the effectiveness of an educational innovation in terms of the meaningfulness of students' learning (Kember et al, 1997), taking into account students' perceptions of the learning and assessment environment.

Enhancing guidance and feedback to students: Findings on the impact of four evidence-informed initiatives
Hounsell Dai, University of Edinburgh, United Kingdom
Jenny Hounsell, University of Edinburgh, United Kingdom
Judith Litjens, University of Edinburgh, United Kingdom
Velda   McCune, University of Edinburgh, United Kingdom

At the 2003 EARLI Conference in Padova, we presented a symposium paper which discussed the findings of a study of three final-year courses in Biology . While the first part of those findings examined the development by the students of characteristic ways of thinking and practising in biology as a discipline, the second part of the findings highlighted features of the teaching-learning environments represented by the three course units -- and notably, variations in the provision of feedback to the students --- which appeared to facilitate or inhibit the quality of their learning. The present paper reports follow-up work in the same three university departments, focusing on two of those three final-year course units together with two first-year course units, in each of which varying steps had been taken to introduce changes designed to address students' concerns about the provision of feedback. As in the preceding empirical studies, data had been gathered from students via two questionnaires which had been designed specifically for use in the large-scale research project of which the present study forms part, and by means of semi-structured interviews with groups of students. These follow-up enquiries consequently drew upon data from 968 questionnaires and 18 interviews with 45 students. The analysis reveals a mixed set of outcomes, with marked variations across the four course settings in the extent and scope of the impact of the guidance and feedback initiatives. The paper explores possible reasons for these variations in impact, while also highlighting fundamental differences between first- and final-year undergraduate courses which may affect the ease with which changes can be implemented.

How dimensions of university teaching are related to educational innovations
Keith Trigwell, University of Oxford, United Kingdom
Sari Lindblom-Ylanne, University of Helsinki, Finland

This study aims to explore qualitatively and quantitatively a range of dimensions of university teaching and how those dimensions might be a part of successful educational innovation. Using interviews and a multi-dimensional university teaching questionnaire, we investigated areas of teaching such as self-efficacy, interest in subject matter, approach to teaching, and how they are related. We observed

zero correlations between Conceptual change (CCSF) approaches to teaching and Self-efficacy and small positive correlations between Information transfer (ITTF) approaches to teaching and Self-efficacy. Importance of student learning correlated positively with both approaches, whereas interest in the subject being taught correlates positively with a CCSF approach and negatively with an ITTF approach. Self-regulation correlates positively and external regulation negatively with a CCSF approach to teaching. From these and similar results we have assessed the likely effects of these variables on innovation, and reached five conclusions. First, that CCSF approaches are more likely to be associated with effective innovation than ITTF approaches. Second, that in attempts to introduce innovation, both Approach to Teaching and Self-efficacy need to be considered, along with degrees of self-regulation as feelings of lack of control may result in a maintenance of departmental norms and act as a barrier to educational innovation. Third, the confidence teachers have in their ITTF approach to teaching may work against the adoption by these teachers of educationally innovative ideas. Fourth, how teachers view the importance of student learning is not related to their approach to teaching, and therefore may not be a factor in educational innovation. However, teachers who are more interested in their subject matter are more likely to adopt innovative approaches. Finally, we see benefits in educational development and training sessions that include aspects of awareness raising in the key areas described above.

The effects of the method of assessment on student performance
Katrien Struyven, University Leuven, Belgium
Filip Dochy, University Leuven, Belgium
Steven Janssens, University Leuven, Belgium

The quest for the effects from being assessed by a particular assessment mode on student performance is central to the reported research. For this study, a distinction has been made between a lecture based and a student activating learning environment. Five experimental conditions go together with one of four assessment modes, namely: portfolio, case-based, peer assessment, and multiple choice evaluation. The investigation took place in a first year course on Child Development in the elementary teacher education program of eight different institutions. Data collection was obtained by a pre-test/ post-test-design with the help of standardised tests (N=816). To find out whether the different assessment modes had differentiating effects on student performance, a first unexpected test (= pretest) was administered to the students during their last class session, so before having prepared for the examination, and the second test was administered after students had completed their

final examination (= posttest). The results show a statistically significant effect of the multiple choice test on student performance, whose students outperform their colleagues in other conditions. However, if students' preparation level is taken into account, the other assessments in the pre-test equal or exceed their scores. Though the closed book format of the tests might have been to the advantage of the multiple choice students, this evaluation method tends to remain strong competition for other assessments.

The impact of an educational innovation on students' study strategies and the role of students' perceptions of the learning environment.
Jan Nijhuis, University Maastricht, Netherlands
Mien Segers, University Leiden, Netherlands
Wim Gijselaers, University Maastricht, Netherlands

Many educational innovations in higher education aim to enhance student learning in terms of their study strategies. However, although much time and energy is invested and the design of the innovations seems to be sound, the results in terms of student learning do not always meet the expectations. The present paper explores the conditions for innovations to work, looking from the students' perspective. A so called Assignment-Based Learning (ABL) course was redesigned into a Problem-Based Learning (PBL) course, taking into account the results of studies on the effects of PBL and implementing instructional principles derived from constructivist propositions. The instructional as well as the assessment practices in the course were optimised. In both conditions (ABL and PBL) the students' study strategies (as expected by the students at the start of the course and as adopted during the course) as well as their perceptions of the learning environment were measured. The Biggs Study Processes Questionnaire and the Ramsden Course Experiences Questionnaire, extended with the Scouller Perceptions of the Assessment Demands Questionnaire were used as instruments to measure these variables. The results indicate that students in the PBL condition (n=312) do not adopt more deep study strategies than the students in the ABL condition (n=406). Comparing the expected study strategies and those adopted, the results show a significant decrease in deep study strategies for both conditions. In the PBL course surface study strategies are significantly more adopted than students expected to do. The results of the logistic regression analysis indicate the importance of students' perceptions of various learning environment factors for their study strategies. It can be concluded that it seems that students' perceptions of the learning environment, including assessment, act as a filter between the learning environment as designed and student study strategies.

Symposium
Collaborative Learning

MEASUREMENT CHALLENGES IN COLLABORATIVE LEARNING RE-SEARCH

Chair: Jan-Willem Strijbos, Leiden University, Netherlands
                Frank Fischer, Knowledge Media Research Center, Germany
Organiser: Jan-Willem Strijbos, Leiden University, Netherlands
                Frank Fischer, Knowledge Media Research Center, Germany
Discussant: Martin Valcke, Ghent University, Belgium
                Gerry Stahl, Drexel University, United States

Collaborative learning is increasingly used at various educational levels and the use of computer-supported collaborative learning is growing. Given the current focus on so-called student-centred and self-regulated learning it is likely to increase in forthcoming years. In addition, the research has shifted from being solely outcome focused to the study of the process of collaboration: in other words the analyses of the communication - whether this is face-to-face or text-based. Yet, the study of collaborative learning has evolved into a multidisciplinary field (i.e., sociology, computer science, social psychology, communication studies) and provides a wealth of analysis approaches (quantitative content analysis, conversation analysis, multilevel modelling, cross case matrices, et cetera), however it is difficult to determine which approach could be used. Moreover, several studies reveal that the analysis is far from straightforward; including the development of an analysis procedure. Furthermore, analysis methodologies cannot be applied to any type of data at any level of collaboration (i.e., small group, community of learners or community of practice) and since we want students to influence each others behaviour and perception some established analysis methodologies are not readily applicable anymore (e.g., the assumption of independence - a requirement for ANOVA and regression analyses - is violated). Each type of collaboration requires specific considerations for the methodological approach to be used. In this symposium we aim to make the methodological considerations (which are often summarily dealt with in journal articles) more explicit. Especially the rationale for choosing and applying a specific approach to a specific data collection (each methodology will be illustrated with some of the research outcomes). Collaborative learning has been studied from

many different perspectives and it is time to combine them and extend the interdisciplinary character to research methodology.

Problem solving through chat: Beyond dyadic interaction.

Jan-willem strijbos, leiden university, netherlands
Gerry Stahl, Drexel University, United States

Computer-supported collaborative learning (CSCL) deploys several different communication technologies to support collaboration: chat is one of them. Thus far it has been primarily used during dyadic interaction. In the Virtual Math Teams' (VMT) project small groups of three to five students collaborate through chat in a one hour session to solve a mathematical problem. As part of a multi-method analysis approach a coding scheme was devised to conduct content analysis to reveal differences between well and poor groups in mathematical problem solving. A first conceptualisation of the coding scheme consisted of four dimensions. Each chat-line could be assigned one code from multiple dimensions: communication, social interaction, problem solving and mathematical reasoning. During the calibration several methodological problems emerged that thus far have not been reported in CSCL and collaborative learning research. Firstly, the diversity of processes proved problematic. Initially the dimensions were assumed to be independent, but analyses revealed that ties between the dimensions could not be avoided. Secondly, the analysis required that the interaction structure (i.e., who responds to whom) was reconstructed. Obviously reconstruction needs to be conducted reliably. Also, not all chat-lines are eligible to receive a code in every dimension - further complicating analysis. Reconstructing the conversational thread proved to be crucial for the whole coding process. The mathematical dimension proved to be most difficult, because of the many subtle nuances involved. So far we are able to detect mathematical content, yet a specific typology requires additional work and conversation analysis might be more applicable to uncover this process. Yet the coding reveals a collaborative process evolving on multiple concurrent strands. The reliabilities for most dimensions proved to be satisfactory. The implications of the observed methodological issues for analysis of chat communication will be discussed.

What's in the mix? Combining coding and conversation analysis to investigate chat-based problem solving
Alan Zemel, Drexel University, United States
Fatos Xhafa, Open University of Catalonia, Spain

The coding of interactional data for statistical analysis presents theoretical and practical challenges. Coding schemes that rely on categories that are decided by their relevance to the analytical problem under investigation carry with them the presumption that the analyst's perspective and concerns are privileged over the demonstrable and publicly displayed perspectives and concerns of the participants in the interaction. We suggest that 1) the endogenous and publicly displayed concerns of participants in interaction provide for the actual performance of the observed actions of participants and for the observable organization of that participation, and 2) these publicly observable features of the ongoing interaction properly constitute the appropriate data for analysis. Typically, such data has been examined using the methods of Conversation Analysis (CA). While CA can provide detailed descriptions of the methods actors use to organize their interaction in ways that are meaningful to the actors themselves, there has been very little statistical analysis of interactional data for the distributions of these methods or their consequences for ongoing interaction. In this paper, we explore a respecification of coding procedures for doing statistical analysis of interactional data in a manner consistent with a conversation analytic approach (Heritage & Roth, 1995). We will analytically identify coding categories that are consistent with and are constitutive of the production of the local order of interaction. By treating observed phenomena in terms of what they are designed to achieve at the point in the sequential unfolding of interaction where they occur, we will be able to capture the sequentiality of interaction. With this approach, we believe that the statistical analysis would be more parsimonious and produce a more precise description of group process and interaction.

Measuring knowledge convergence: Achievement similarity and shared knowledge in computer-supported collaborative learning
Armin Weinberger, Knowledge Media Research Center, Germany
Karsten Stegmann, Knowledge Media Research Center, Germany
Frank Fischer, Knowledge Media Research Center, Germany

Learning in small groups may result in convergent knowledge outcomes or foster possible prior differences between learners. Few studies, however, measure convergence or divergence of knowledge as an outcome of small group learning. This

contribution analyzes knowledge convergence/divergence as an outcome of learning in small groups with the concepts of achievement similarity and shared knowledge rooted in two different theoretical frameworks. Achievement similarity means that learners acquired similar amounts of knowledge regardless if they share similar knowledge. Shared knowledge means that learners acquired similar knowledge. In order to test application-oriented knowledge, learners had to individually apply concepts of a psychological theory in analyzing a problem case. Trained coders identified correct relations between theoretical concepts and case information. These data were used to compute both, achievement similarity and shared knowledge. A 2x2 factorial design was used (number of triads = 32, N = 96) to examine the following questions: (1) can theoretical concepts of achievement similarity and shared knowledge be measured independently and (2) to what extend are these measures of convergence sensitive enough to indicate effects of specific instructional interventions? We examined effects of two instructional interventions on achievement similarity and shared knowledge. Achievement similarity was conceptualized as difference between the amount of known theoretical concepts of an individual learner and the average of his or her group. As a measure for achievement similarity, standard deviations of learners within one group were used to indicate dissimilarity and multiplied by -1 to indicate similarity. Shared knowledge was measured as number of pairs within one group, which applied the same theoretical concept in the individual analysis of the problem case. Results show that the different instructional interventions significantly and independently affect both convergence measures. Validity and interpretability will be discussed against the background of theoretical approaches to learning in small groups.

The analysis of negotiation of common ground in CSCL
Pieter Jelle Beers, Open University of the Netherlands, Netherlands
Henny P. A. Boshuizen, Open University of the Netherlands, Netherlands
Paul A. Kirschner, Open University of the Netherlands, Netherlands

The recent growth in CSCL research has given rise to a plethora of analysis methods, all with specific analysis goals, specific units of analysis, and made for specific types of data (chat, threaded discussions, etc.). This paper describes the development of such an analysis method, with the ultimate aim of drawing general conclusions about CSCL-analysis. Special attention is paid to choices made and changes in those choices through the course of development of the analysis scheme, and its underlying assumptions. The analysis scheme reported on was developed as part of a research project about ìKnowledge sharing and knowledge building in expert

teams with ICT. This project involves the development of support for negotiation of common ground. A new coding scheme needed to be developed because no existing scheme addressed negotiation. The first step concerned operationalising negotiation with negotiation theory as starting point. This resulted in a set of codes that characterised the negotiation process in task communication. The second step involved development of a reliable measurement strategy, primarily aimed at assisting the assignment of codes to segments in ambiguous situations. This resulted, in the case of face-to-face communication, in a necessary lowering of the number of different codes so as to code reliably. Reliability was not a problem in electronic communication. The results show that the main challenge in analysing negotiation involved achieving reliability without compromising the original operationalisation of the research question. In general, it can be concluded that CSCL-analysis needs to take into account both validity of the coding scheme and the associated measurement strategy. Aiming for reliability can render a coding scheme invalid if one applies a measurement strategy without proper care.

Comparing analysis schemes and applying multilevel modelling: Two methodological issues in the study of the impact of role assignment in asynchronous discussion groups
Bram De Wever, Ghent University, Belgium
Hilde Van Keer, Ghent University, Belgium
Tammy Schellens, Ghent University, Belgium
Martin Valcke, Ghent University, Belgium

CSCL is often presented as a promising learning environment. To gain deeper understanding of its mechanisms, adequate research methodologies are however needed. This presentation focuses on two important methodological issues in this research area: (1) the use of adequate, reliable, and valid ways to analyse the discussion corpora, and (2) the importance of taking into account the hierarchically structured setting. The context for discussing both issues is a study conducted in the field of educational sciences with first year university students (n = 273). Asynchronous discussion groups were introduced to enhance collaborative learning. In order to explore students' sharing information, elaborating, negotiating, and consensus building, 10 discussion groups of approximately 10 students were randomly selected (n = 98). The presentation focuses first on content analysis as a way to uncover the information locked in the transcripts of asynchronous discussion groups. In the study, two content analysis instruments were employed: the model of Gunawardena and colleagues (1997), and the coding scheme of Veldhuis-Diermanse (2002). Both

instruments were selected on the basis of their social-constructivist background. The motive to apply two analysis instruments was to explore potential relations between both approaches and to validate the schemes empirically. Whole messages were chosen as the unit of analysis and inter-rater reliability was checked. Secondly, to take into account that individual students are clustered into collaborative groups, we opted for a multilevel approach. Because data of students within a group cannot be considered as completely independent and thus the assumption of independency for using traditional analysis techniques is violated, we need to use this multilevel technique, since it takes the interdependency in groups explicitly into account. Moreover, it allows us to uncover the specific influence of, and cross-level interactions between student, group, and task variables.

Learning together: Combining individual and group-level perspectives for studying collaborative learning

Maarit Arvaja, University of Jyvaskyla, Finland
Hanna Salovaara, University of Oulu, Finland
Paivi Hakkinen, University of Jyvaskyla, Finland
Sanna Jarvela, University of Oulu, Finland

Collaborative learning has been critizised for neglecting the broader classroom context in which the collaboration is embedded. A specific challenge is to find ways to combine individual and group level perspectives for evaluating collaborative knowledge construction activity in groups, as well as building models for analysing the interactions that occur between individual and group level learning processes. The aim of this paper is to identify conceptualizations and methods for studying collaboration in context and for understanding in detail how individuals, groups and contexts interact. In order to effectively study the impact of context on the collaboration at the individual and group level, process-oriented data will be used such as videotapes of students' activity, interviews and questionnaires. Furthermore, studying the knowledge construction at the group level should focus on analysis of the negotiation processes of the students. Linell's (1998) notion of contextual resources will be used as an analytical tool in studying how students negotiate meanings in their activity and what resources mediate that activity. Interviews and questionnaires will give insight into students' short-term impressions after meaningful activities or events and personal meanings students' attach to different activities. Results obtained form several groups during a teacher education course on educational psychology (N = 150), under face-to-face or computer-mediated conditions, will be used to illustrate the applicability of the methods that were selected to reveal

the mediating influence of context on collaborative activity. The specific focus of this paper is to illustrate the methods used to identify the influence of context on students' collaborative activities and their applicability to reveal the interaction between individual and group level perspectives, ultimately generating information of individual students' interpretations of their collaboration to identify aspects that support or hinder successful collaboration.

C 10   24 August 2005   08:30 - 10:30   Room E004

Symposium
Qualitative and Quantitative Approaches to Learning and Instruction

DEVELOPMENT OF ARGUMENTATION COMPETENCIES IN THE MATHEMATICS CLASSROOM

Chair: Kristina Reiss, University of Augsburg, Germany
                Fou-Lai Lin, National Taiwan Normal University, Taiwan
Organiser: Kristina Reiss, University of Augsburg, Germany
                Fou-Lai Lin, National Taiwan Normal University, Taiwan
Discussant: Bracha Kramarski, Bar-Illan University, Israel

Reasoning correctly and arguing coherently may be regarded important goals of mathematics education (NCTM, 2000), although it is a well-known fact that many students are facing difficulties when they learn mathematical reasoning, argumentation, and proof. Within the last decade several international studies on mathematics achievement like TIMSS or PISA and a number of specific studies on students' proof competencies have shown that arguing mathematically and proving are difficult mathematical activities for students to perform. However, some of these investigations give reason to assume that there is a particular influence of the specific mathematics classroom. Moreover, these findings suggest that it might be possible to create learning environments for students in order to foster their proving abilities. The participants of the symposium will discuss this topic in some detail. Relying on the results of empirical studies with secondary school students on argumentation and mathematical proof in the different countries (Germany, Taiwan, United Kingdom) conducted by the participants, the discussion will focus on the development of argumentation skills in the mathematics classroom and on possible interventions that might help students learn a coherent mathematical argumentation. This discussion will be supported by the presentation of results from quantitative and qualita-

tive research studies. We will argue from a perspective where learning is regarded a constructive process that can be initiated and supported by the teacher. The symposium aims at describing aspects of the development of argumentation skills and at identifying adequate learning environments with respect to cultural specifics of the mathematics classroom.

One more step toward acceptable proof in geometry
Ying-Hao Cheng, Chung Kuo Institute of Technology, Taiwan
Fou-Lai Lin, National Taiwan Normal University, Taiwan

The results of a national survey in December 2002 show that there are one quarter of our 9th grade of students, they had just learnt formal proof in geometry lessons, can construct an acceptable proof in a 2-step unfamiliar question. More than one third of them do not response to this question. And about one third of them may recognize some crucial elements and prove this question but lack the process of concluding or miss one step in proving, we call this type of proof as incomplete. These students seem to have a gap to construct an acceptable proof. There are two different modes of incomplete proof. One is lacking the process of concluding. It is only ritually incomplete because all the key elements of proof are included and correct. The other is missing one step in proving. This mode of performance means that the students cannot recognize all the necessary information from the premise. It may be due to the invisible of literal information because students always find the cue of proof on figures. It may also be due to the lack of finding useful information from the premise. An interview was conducted with 12 grade 9 students whose proofs were incomplete in order to overcome their obstacles and help them to construct an acceptable proof. There were two main strategies used in our interview based on the idea of visualizing the implicit information. One is picking out the key terms and drawing on figures, the other is setting goal by one step backward reasoning. The results show that the strategies were effective

Students' development in geometrical reasoning: Insights from a large-scale longitudinal survey
Celia Hoyles, University of London, United Kingdom
Dietmar Kuechemann, University of London, United Kingdom

We report some results from a longitudinal study of mathematical reasoning among a nationwide large sample (n=1512) of high-attaining students in England, from age 131/2 years to age 151/2 years. Using a mixture of quantitative and qualita-

tive methods, we report clear progress in reasoning in response to standard items in algebra and geometry; however, on less standard items, and ones requiring an explanation, a sizeable minority of students persist in basing their explanations on perception in geometry or on numerical evidence in algebra, with at best modest progress in the construction of mathematical explanations along with some regression. Finally robust gender differences were identified along with subtle influences of curriculum and school organisation.

Reasoning and proof in geometry: Effects of a learning environment based on heuristic worked-out examples
Kristina Reiss, University of Augsburg, Germany
Aiso Heinze, University of Augsburg, Germany
Christian Gross, University of Augsburg, Germany

In this presentation, we argue that heuristic worked-out examples are an adequate learning environment for mathematical argumentation and proof. It enhances the traditional worked-out examples that turned out to be efficient for the learning of algorithmic problem solving. The basic idea of heuristic worked-out examples is providing students with opportunities to explore, recognize, and use explicitly different phases in the process of performing a proof. The results of an intervention study with 243 students from grade 8 suggest that this learning environment might be more efficient than regular mathematics instruction on proof. The ability to give correct mathematical argumentation and to generate a proof for a specific hypothesis is based on several aspects like knowing mathematical concepts, knowing heuristic strategies and being able to use them, having metacognitive control strategies available, and understanding the nature of mathematical proof. Empirical studies indicate that students lack one or more of these facets of proof. In this study we investigated to what extent learning to prove can be fostered by heuristic worked-out examples. We addressed the question, whether this learning environment is of special use for low-achieving or high-achieving students. Comparing the mean posttest scores of the experimental and the control group we found a significant difference: the experimental group performed much better in the posttest than the control Summarizing the analysis of the posttest results the experimental group performed significantly better than the control group. Moreover, students from the experimental group performed significantly better on complex proofs. We found a positive effect on the achieve-ment of students learning with heuristic worked-out examples (in comparison to a control group receiving traditional mathe-matics instruction).

A model of reading comprehension on geometry proof
Kai-Lin Yang, Chung Yuan Christian University, Taiwan
Fou-Lai Lin, National Taiwan Normal University, Taiwan

Research on the learning and teaching of mathematical proofs mainly focused on constructing mathematical proofs. However, we approached to the learning of mathematics proof with the perspective of reading comprehension. One purpose, to explore the characteristics of students' reading comprehension on geometry proof, was proposed in this study. Herein, reading comprehension means what was grasped and inferred while reading a text. From theoretical analysis, a framework of the levels of reading comprehension on geometry proof was formulated. From empirical exploration, the assessment instrument was developed to identify the level of each student's reading comprehension on geometry proof, and students' cognitive and thinking characteristics in each level were explored through interviews. In sum, a model was constructed to describe what the levels of reading comprehension on geometry proof were and to explain why it is difficult to advance students' ìreading comprehension level in this research.

C 11   24 August 2005   08:30 - 10:30   Room A010

Symposium
Teacher Professional Development

THE SCHOLARSHIP OF RESEARCH AND SCHOLARSHIP OF TEACHING IN SCIENCE AND ENGINEERING

Chair: Brandon Reed, University of Cape Town, South Africa
Organiser: Ake Ingerman, Chalmers University of Technology, Sweden
Discussant: Keith Trigwell, University of Oxford, United Kingdom

Lee Shulman, in his capacity as president of the Carnegie Foundation for the Advancement of Teaching, recently wrote the following in the conclusion to an article entitled: Opening Lines: Approaches to the scholarship of teaching:
ìIn modern times, we regularly distinguish between two kinds of method: the methods we use in our research, on the one hand, and our methods of teaching on the other. In the older traditions of the university, however, these two aspects of method converged (or were never separated). The methods of scholarship and the methods of teaching were identical; ones ìmethods were those strategies used to

marshal evidence in a scholarly and persuasive manner for instructing one's students. Both pedagogical and scholarly arguments involved warrant (evidence) and explanation, in a persuasive rhetorical form. It is ironic that the two have not only drifted apart; they are seen as competitive.In this spirit this symposium explores the nature of the research and teaching context experienced in science and engineering. Ake Ingerman & Shirley Booth describe how physicists relate to the trustworthiness of their own research and that of their peers. This furthers the understanding of the ground for the collaboration, peer review and communication in the research community. Liselott Dominicus, Rebecca Lippman Kung, Cedric Linder & Delia Marshall describe the nature of the relationship between how physics lecturers craft their practice and the kinds of perceptions their students have developed about what constitutes quality teaching in physics. Lotta Antman & Thomas Olsson have investigated peer evaluation of scholarly approaches to teaching and use this to discuss the relationship of scholarship of teaching to perceived teaching expertise, providing rich exemplars of how a scholarly approach to teaching in practice is and could be, supported.

Trusting research: An exploration of physicists' conceptions of the trustworthiness of their own and others' research
Ake Ingerman, Chalmers University of Technology, Sweden
Shirley Booth, Lund University, Sweden

Research is, also in science and engineering, done in collaboration with, in relation to and reviewed and collated by peers. To act and work in that world, the researcher have continually to make judgements of the quality, appeal, usefulness and how good their own as well as their peer's research outcome is. This presentation focuses on how researchers in condensed matter physics make judgments, or conceptualize the making of judgments, of the trustworthiness of their and others' research results. Through an analysis informed by phenomenography, four different aspects of the complex phenomenon trustworthiness are brought out, in which dimensions of variation are identified and explored. The four different aspects are: the object of trust, the anchor for trust, the context for trust, and the relation between the object and the anchor. The relations between the ways in which the different aspects are handled are explored and the establishment of trustworthiness is related to participating in a community of practice. Judging trustworthiness as related to both content and social aspects is considered in relation to the peer review process and to the development of PhD students from newcomers to full-fledged researchers.
Crafting of teaching practice and physics students' perceptions of quality teaching

Liselott Dominicus, Uppsala University, Sweden
Cedric Linder, Uppsala University, Sweden
Rebecca Lippmann Kung, Uppsala University, Sweden
Delia Marshall, University of the Western Cape, South Africa

This study explores the relationship between university physics lecturers crafting of their teaching practice and their students perceptions about what constitutes quality teaching. The work described is limited to introductory and intermediate undergraduate teaching and learning in three university physics departments, two in Sweden and one in South Africa. Physics lecturers and their students, who were involved in different physics courses, were selected for the study on the basis of being able to distinctly identify qualitatively different characterizations of crafting-of-practice for the participating lecturers. This selection was based upon the results of interviews with lecturers in the three participating physics departments. Then, a selection of students taking these courses were given questionnaires and a further selection interviewed about their perceptions of quality physics teaching. Drawing on a phenomenographic perspective categories were developed from the interview transcripts in order to capture the variation in perception. The interviews were then collated by course lecturer and sorted in terms of the categories we had developed. The results were captured in terms of sets of data clustering across the perception categories. These clusters were then examined in terms of the lecturers' crafting-of-practice characterizations. The outcomes provide an illustration of how the nature of the crafting-of-practice can significantly influence how students come to think about quality teaching and in turn potentially influence their own development as learners.

Peer review of scholarly approaches to teaching: The case of the pedagogical academy
Lotta Antman, Lund University, Sweden
Thomas Olsson, Lund Institute of Technology, Sweden

The Pedagogical Academy is a model for rewarding excellent teaching, developed at Lund Institute of Technology. A phenomenographic approach was used to study the procedure of reviewing and assessing scholarly approaches to teaching, in the case of the Pedagogical Academy, integrating the analyses of documents, video-recorded observations and interviews. The assessment process was peer-reviewed in the sense that previously awarded and rewarded teachers acted as reviewers. The results indicated that the group of reviewers worked with three tacit levels of

knowledge, a notion which was problematised and expanded in a matrix model, opening up two complementary knowledge dimensions. The variation in focus was analysed in terms of thematised validity claims with respect to their effect on the assessment procedure as a whole and on the results. In the peer-reviewed process-an ostensibly scholarly approach to assessing levels of Scholarship of Teaching and Learning among applicants-issues of power, social status and tradition were nevertheless seen to set the stage.

C 12   24 August 2005   08:30 - 10:30   Room E102

Symposium
Mathematics Education

CONCEPTUAL UNDERSTANDING AND PROCEDURAL SKILL IN MATHEMATICS LEARNING

Chair: Camilla Gilmore, University of Oxford, United Kingdom
                Michael Schneider, Max Planck Institute for Human Development,
                Germany
Organiser: Michael Schneider, Max Planck Institute for Human Development,
                Germany
                Camilla Gilmore, University of Oxford, United Kingdom
Discussant: Lieven Verschaffel, Catholic University of Leuven, Belgium

Several theories of learning and cognition pose that our behaviour is shaped by at least two different kinds of knowledge: one providing abstract understanding of the principles and relations between pieces of knowledge in a domain, and another one enabling us to quickly and efficiently solve problems. In recent empirical research on mathematics learning the former is frequently named conceptual knowledge or understanding, while the latter is labelled procedural knowledge or skill.
Models about these different kinds of knowledge and their interrelations may be helpful for designing the contexts in which knowledge is to be conveyed. They could be used for a theory-guided construction of learning environments and curricula. There seem to be, however, more questions than answers concerning conceptual and procedural knowledge. Their specific characteristics, their interrelations, and their relations to other psychological constructs are controversial.
Despite these controversies and despite the importance of the field, comparatively few empirical studies have addressed the relationships between conceptual under-

standing and procedural skill. This symposium, therefore, is to give an overview over different empirical works in the field. While some of the participants use theory-derived measures for the kinds of knowledge, others evaluate the knowledge demands of different types of tasks by factor analyses or expert-ratings. Some focus on processes that spread over years, e.g. by comparing different age groups, others on processes that may take only hours and can be observed in training studies. Some study task specific knowledge, others concentrate on broader and more stable constructs like mathematical knowledge or quantitative reasoning skills.

The discussion of the studies will not only focus on empirical results, but also on researchers' experiences with their different designs and methodologies, and will try to work out promising directions for future research.

Children's Understanding of Addition and Subtraction
Katherine Canobi, University of Melbourne, Australia

The research addressed Children's understanding of addition and subtraction by identifying different patterns of performance on various conceptual indices. Investigating patterns of conceptual understanding provides a strong basis for examining the role of (a) different principles, (b) physical referents, (c) types of activities, (d) age-related changes, and (e) conceptual-procedural interactions in Children's addition and subtraction development. In Study 1, 72 6- to 9-year olds judged a puppet's activities involving 3 conceptual relations: (a) $a + b = c$, $b + a = c$; (b) $a - b = c$, a $c = b$; and (c) $a + b = c$, $c - b = a$ and explained their judgements. In Study 2, 60 5- to 8-year olds completed a Guessing task and a Problem-solving Task comprising 3-term inverse problems (i.e., $a + b - b = ?$) and pairs of complementary addition and subtraction problems (i.e., $a + b = c$, $c - a = ?$) along with control problems. In the Guessing task, children were encouraged to make ìgood guesses about the answers to problems. In the Problem-solving task, children attempted to solve the inverse and control problems. Distinct conceptual profiles were identified in both studies and were related to Children's problem-solving skills (speed, accuracy and self-reported procedures on unrelated problems). The results suggest that many children find the inversion principle relatively difficult although performance differs among children and across tasks. The results also suggest that the usefulness of physical referents for illustrating concepts varies across individuals, concepts and tasks. The findings highlight the importance of exploring variation among individuals and across tasks for developing effective learning environments. They underscore the complexity and functional significance of understanding the structure of addition and subtraction in Children's mathematical development and suggest that there are

different pathways to conceptual knowledge.

The results of a new mathematical reasoning task given to a large number of 8-year old children
Peter Bryant, Oxford Brookes University, United Kingdom
Terezinha Nunes, Oxford Brookes University, United Kingdom

A new Mathematical Reasoning task, which assesses reasoning and poses very little demands on Children's computational skills, was administered to over 2,000 8-year-old children as part of a large-scale longitudinal, epidemiological study that is being carried out in the West of England. The task is designed to measure Children's ability to reason additively and multiplicatively. The scores in this task were related to the same Children's IQ scores, to their performance in a standardised arithmetic task and in working memory tasks, and also to their school achievement scores (SATS). Our preliminary analyses show that:
1. the Mathematical Reasoning task had a higher correlation than any of the other measures with school achievement in mathematics (SATS).
2. general intelligence, computation skill, and mathematical reasoning make specific contributions to explaining variance in SATS-Maths, and together explain 46% of the variance;
3. working memory is not a strong predictor of SATS-Maths after general intelligence has been entered in the equation: the correlation between working memory and SATS-Maths is low.
We conclude that:
- General intelligence does not account for Children's mathematics achievement by itself. Learned abilities, such as computation skills and mathematical reasoning, play a significant part in explaining variance in mathematical competence.
- Working memory has a negligible role in explaining variance in mathematics achievement in the population as a whole.
- To improve mathematics achievement, it is necessary to invest in developing Children's mathematical reasoning just as it is necessary to invest in teaching computation skills.

Who can judge reasoning and knowledge demands of mathematics problems?
Martin Brunner, Max Planck Institute for Human Development, Berlin, Germany
Mareike Kunter, Max Planck Institute for Human Development, Berlin, Germany
Stefan Krauss, Max Planck Institute for Human Development, Berlin, Germany

Subscores on student achievement tests in mathematics are often interpreted as reflecting (static) mathematical knowledge or some kind of (procedural) quantitative reasoning ability. In many cases, this interpretation is based on expert analyses of task characteristics. In psychometric research on cognitive abilities, the reasoning and knowledge demands of test items are represented by factor loadings on corresponding latent variables. The aim of this study is to compare expert judgments of cognitive task demands with factor loadings indicative of those demands. Three groups of experts (mathematics educationalists, psychometric researchers on intelligence, experts on German mathematics curricula) rated 117 mathematics tasks with regard to characteristics that are theoretically related to reasoning and knowledge demands. By means of confirmatory item factor analyses and using additional reasoning items, a model with a reasoning and a mathematical knowledge factor was specified and corresponding factor loadings were estimated. Performance data were collected from 29,386 ninth-graders attending all academic tracks in Germany. The main result was that correlations between expert ratings and factor loadings were almost negligible, indicating that expert ratings may relate to constructs other than psychometrically defined abilities or knowledge. With regard to educational practice, it might thus be helpful to bear in mind that tasks recommended by experts to focus on reasoning abilities or mathematical knowledge do not measure those demands in a psychometric sense. The implications of these findings for test construction are discussed.

The relationship between children's understanding of inversion and arithmetic skill
Camilla Gilmore, University of Oxford, United Kingdom

Children must understand the concepts underlying arithmetic as well as learning how to perform the operations. One key principle children must learn is the inverse relationship between addition and subtraction. A direct test of Children's understanding of this concept compares their performance on a set of standard arithmetic problems (a+b-c=) and a set of problems which can be solved directly by making use of the inverse principle (a+b-b=). Children's flexibility in using inversion was examined by varying the format of the inverse problems and the position of the

missing number (e.g. b-b+a= ;?+b-b=a). Children were more accurate on the inverse than standard problems, showing they were able to apply the inverse principle, but this was affected by the order of elements in the problem and the position of the missing number. The relationship between Children's understanding of inversion and their calculation skills was examined using cluster analysis. Three distinct profiles of performance were observed: one group of children with good conceptual understanding and calculation skills; one group with poor conceptual understanding and calculation skills; and a final group with good conceptual understanding but poor calculation skills. This suggests that these aspects of arithmetic may be somewhat independent and so it is important to consider different components of mathematics ability in both research and educational settings.

The measurement of children's conceptual and procedural knowledge about a mathematics problem: Findings from confirmatory factor analyses
Michael Schneider, Max Planck Institute for Human Development, Berlin, Germany

Different causal relationships are proposed between conceptual and procedural knowledge. Some theories suggest uni-directional links, others bi-directional ones. Because of their implications for learning theory and classroom instruction, e.g. task sequencing, these positions should be compared empirically. However, empirical research on these questions is hampered by the lack of knowledge on how the two kinds of knowledge can be measured with a sufficient degree of validity and independent of each other. The present study was designed to examine this point by means of confirmatory factor analyses (CFA). Conceptual and procedural knowledge about decimal fractions of 231 fifth- and sixth-graders was assessed by eight different measures before and after an intervention. The measures were adopted from studies in other mathematical domains, where four of them (evaluation of procedures, translations into diagrams, size comparisons, written explanations) had been used to access conceptual knowledge, while the other four (problem solving correctness, problem solving duration, asymmetry of access, dual-task interference) served to access procedural knowledge. CFA for the pre-test data revealed that two-factor models, i.e. one factor reflecting conceptual knowledge and another one reflecting procedural knowledge, were not significantly superior to a one-factor model in terms of model fit. This indicates a low divergent validity of the eight measures. The convergent validity, estimated by Cronbach's Alpha coefficients, was acceptable for the measures of conceptual knowledge (a = .71), but not for the measures of procedural knowledge (a = -.08). Similar results were found for the

post-test data. These findings highlight the difficulty of measuring conceptual and, especially, procedural knowledge and suggest that results from previous studies should be interpreted with caution. The generalizability of the present findings and their methodological and theoretical implications are discussed.

C 13   24 August 2005   08:30 - 10:30   Room E112

Symposium
Learning and Instructional Technology

SUPPORTING EFFECTIVE LEARNING IN VIRTUAL ENVIRONMENTS

Chair: Karen Littleton, The Open University, United Kingdom
Organiser: Linda Price, The Open University, United Kingdom
Discussant: Eleni A. Kyza, University of Cyprus, Cyprus

Educational programmes are making increasing use of Information and Communication Technologies (ICT) and there is an assumption that the technology itself is the agent of change. However some educational programmes do not take account of how to constructively align the technology with the pedagogical aims, objectives and assessment strategy of the course and this can render less valuable uses of technology and inferior student experiences. Further the design on virtual environments often second guess the student experience and in what way the use of ICT may assist their learning. In this symposium we shall consider how students can be supported by using the technology in both a transformative way and a facilitative way. Transformative, in terms of why and how technology could and should be used in order to enhance the student learning experience students; where the technology and pedagogy are constructively aligned. Facilitative, in the sense that students are provided with an opportunity that they would not otherwise have had. Within this framework we will examine how we can effectively support the student learning in their particular virtual environment and circumstances. The research illustrates that understanding the student experience from the student's perspective is fundamental to providing an effective virtual environment whether this be from a transformative or facilitative perspective.

Independent learners' conceptions and perceptions of tutorial support in on-line and person to person contexts
Linda Price, The Open University, United Kingdom

On-line tutoring is a means of providing flexible learning support. However there is a concern that in some circumstances students may perceive on-line tutoring as less valuable than face-to-face and telephone tutoring. In a previous study Richardson & Price (2003) investigated students' perceptions of quality in a distance education course that had two tutoring modes: face-to-face tutoring and on-line tutoring. The two modes were comparable on all scales of the Course Experience Questionnaire (measuring perceived quality of the course), except Good Tutoring. The students receiving on-line tutoring gave lower ratings to the quality of tutoring than did the students receiving face-to-face support.

To investigate the reasons for these findings we undertook a further study. Semi-structured interviews were used to elicit students' beliefs. These were conducted using the virtual research method of epistolary interviews being developed at the Open University. Student's conceptions and perceptions of tutoring were compared and contrasted in order to understand why on-line tutoring is perceived as poorer and what role on-line tutoring might play in supporting student learning.

The groups did not differ in their conceptions of learning but they did differ in their perceptions of the tutorial support that they had received. Students in the on-line group had expectations that were not met on-line. However, on-line tutoring did provide some students with an option to study that otherwise would not have been available. Hence in this situation the role of ICT was not transformative but facilitative, providing an educational opportunity that would otherwise not have existed.

Pedagogic integration and learners' use of electronic resources
Adrian Kirkwood, The Open University, United Kingdom

Electronic (on-line) resources are progressively being introduced within HE courses and/or provided by university libraries. The Internet enables students to access a range of information sources - including bibliographic databases, on-line journals and other archives and collections - from wherever they are located. Access to these resources is particularly valuable for dispersed independent learners, many of whom are unable to study in an academic or specialist library. However, research evidence from studies of on-campus and distance education students indicates that there are often disappointing levels of use by students of recommended on-line resources and of the information infrastructure developed to support teaching and learning

in UK higher education. This presentation reports a study that aimed to investigate how and why independent learners use on-line resources while undertaking their normal undergraduate coursework. The investigation was concerned not only with the academic context of the course(s) being studied, but also any personal, domestic and employment-related experiences and circumstances that were pertinent. The study built upon quantitative data collected from large-scale surveys. The methods and outcomes of the research will be summarised and evidence presented to support the need for closer integration of on-line resources within course pedagogy. Students are not averse to using the WWW to find information that they feel will be of benefit to them, particularly in relation to assessed work. They will make use of on-line resources that can be seen to contribute to the achievement of core course and/or personal outcomes to a greater extent than those that appear to be peripheral or optional. However, students often lack appropriate information literacy skills to make effective use if what is available via the Internet.

Repurposing wisdom - applying 'grounded guidelines' for effective e-tutoring in post-compulsory education
Erica McAteer, University of Strathclyde, United Kingdom

This presentation draws on research funded by the UK Joint Information Systems Committee (JISC) in 1998, involving a substantive review of research and practice literature, followed by fieldwork undertaken across a range of subject disciplines, where learners and teachers were engaged in what were then thought of as cutting edge uses of communication and information technologies for learning. The research itself is summarised, and evidence is provided to support the rationale for conversion of its dissemination strategy to provide accessible practice guidelines which retain their grounding in the illuminative data from fieldwork and practice literature. The resource itself will be illustrated. The evaluation of its application to practice, conducted with the support of practice networks across the UK, is in a sense another reality check of what are, now, emergent issues of concern for learners and teachers in e-learning environments using CMC as the medium for communication.

Using on-line resources to support students learning physics in Irish secondary schools
Jen Harvey, Dublin Institute of Technology, Eire

As the number of online resources available to support student learning has in-

creased so to have the mechanisms enabling faster access to these materials. However, while individual teachers might make use of subject portals or gateways, there is still a tendency to create individual collections of resources, even if this remains a time consuming activity to undertake. This presentation explores changes in practice observed as part of an ongoing project where a group of teachers have worked together to create a portal of resources tailored to support the needs of the Irish secondary school Physics curriculum. Potentially, the effective use of such resources can both encourage and enable students to engage more with the topic and, in turn, develop a deeper conceptual understanding of the subject area. For the teachers, the speed of access to an appropriate resource for use with students is a priority. Therefore the development of a robust and effective way of evaluating potential resources and materials has been a key element to the project portal development process. The group reports a sense of ownership over the process and a strong feeling of community has developed. As the resource portal has evolved so has the way in which the resources are being used and reviewed. Teachers use and promote the site because the content has been developed and reviewed by a select group of their peers. They also remain actively involved with the community as a means of exchanging ideas and changing practices. The network links to many of the schools have greatly improved and within this current year all schools are expected to have broadband access. This influences the way in which the resources are evaluated, stored and then used. A case study approach is used to explore some of these emergent and potential changes.

Case study approach to evaluating student support in on-line environments
Anne Jelfs, The Open University, United Kingdom

This paper and presentation is based on the premise of supporting students using technology in a transformative and facilitative way. This paper focuses on the facilitating of students in their academic careers with the Open University in the UK (OU) through the provision of a series of on-line materials. Understanding how effective and useful on-line student support materials are to distance/flexible students requires a strategic evaluation of the provision. This paper refers to a case study of the educational evaluation of on-line resources where the aim is to improve the quality and effectiveness of teaching and learning. Particularly where the resources are mediated through and supported by information and communication technologies (ICTs) for on-line study support. A range of approaches and tools can be drawn on, and I see the role as that of an expert informing and illuminating decision making. The qualitative aspects of the evaluation reported in this paper found that the

main influence on use of the website was the labelling and navigation. A number of the labels were too similar to allow students to differentiate and anticipate which topics were included in specific areas. There needed to be a strategic philosophy on how the pages were to be presented, so that students did not have to learn to navigate each area separately. On the positive side, students thought the content was very valuable and would use it in their studies as it did facilitate their approaches to studying. The case study evaluated the use of on-line resources to support and scaffold students working at a distance. The aim of the paper is to encourage further discussion of provision that can make on-line support materials more facilitative and engaging.

C 14   24 August 2005   08:30 - 10:30   Room E005

Symposium
Assessment and Evaluation

DEVELOPMENT OF CROSS-CURRICULAR COMPETENCIES IN DIFFERENT EDUCATIONAL CONTEXTS

Chair: Beno Csapo, University of Szeged, Hungary
Organiser: Beno Csapo, University of Szeged, Hungary
Discussant: Philip Adey, Kings College, London, United Kingdom

The main goal of this symposium is to bring together a collection of papers that examine the development of cognitive competencies and the role they play in education from a variety of perspectives. Improving students' general, broadly applicable, transferable cognitive competencies has been one of the major goals of education systems for several decades, but since life long learning became a reality, the related issues should receive even greater attention. The development of cognitive skills determines students' school career in a number of different ways, from the success in learning of the particular subjects to the selection processes taking places during the transition between grades. The papers present research related to several cognitive skills, including Piagetian operations, propositional logic, scientific reasoning, critical reasoning, inductive reasoning, deductive reasoning, and argumentation skills. The age of the students examined in the studies presented in this symposium ranges from the primary grades to the higher education. A variety of methods of research will be presented, compared and discussed including ethnographic techniques, interviews, discourse analysis, large-scale cross-sectional

and longitudinal assessment, and computer simulation. The first paper (Wegerif at al.) reports on a study of dialogues in several short online courses. The second one (Vidakovich) investigates the relationships between the development of logical operations and deductive patterns. The third paper (Seppala) compares the development of scientific thinking at two types of higher education institutions. Finally, a computer simulation will be presented (Csapo), where a database was simulated by using data of large-scale assessment project in order to study the selection processes of a school-system. Comparing and contrasting these for different approaches may stimulate an active discourse on the status of competencies in educational research and practice.

Investigating the social dimension of induction into argumentation
Rupert Wegerif, University of Southampton, United Kingdom
Simon McAlister, London Metropolitan University, United Kingdom
Andrew Ravenscroft, London Metropolitan University, United Kingdom

This paper reports on a study of synchronous dialogues on several short online courses teaching the core skill of critical reasoning in a range of educational contexts. The focus of this paper is the way in which we combined several methods into a coherent and principled methodology for researching the induction into argumentation online. We used a flexible dialogue support tool as an experimental device, or lens, through which to investigate the interplay of social and cognitive dimensions of online educational dialogue. The tool provides templates (e.g sentence openers), frames and advice shaping online interactions and so enables researchers to explore the impact of different interaction rules. A combination of qualitative interpretation and the use of concordance software was used to facilitate the discourse analysis. Finally ethnographic techniques of participant observation and open-ended interviews were adopted to explore the experience of participants online. Through the use of these methods it emerged the supports offered by dialogue tools, sentence openers for example, did not work independently of social relationships but through the way in which they entered into and mediated those relationships. This paper reports on the development and testing of a new methodology combining and adapting the best of what has been learnt from the analysis of face-to-face discussions with some recent techniques from applied linguistics to understand the experience of learning in a virtual environment. Through this we explore the distinctive affordances that online environments have for the induction of learners into argumentation.

Differences in the development of logical operations and deductive patterns of 10-16-year-olds
Tibor Vidakovich, University of Szeged, Hungary

The aims of the study were: to construct tests for the evaluation of seven basic operations of propositional logic, and deductive patterns with these operations as premises; to diagnose the status of these operations and deductive patterns in four age groups between 10 and 16 years; to reveal significant differences and characteristic tendencies of the development between the age groups; and to examine whether the development of operations influences significantly the development of deductive patterns. On the basis of the selected logical operations a task system was constructed. All operations were evaluated in two ways. First as operations in complex statements, then in deductive patterns, where one of the premises was a complex statement containing the operation. All tasks were formulated with familiar contents, evoking everyday situations. The tests were administered to a sample of more than 8500 students; 4th, 6th, 8th and 10th graders, the sample was representative for Hungary by settlement and school types (academic, technical and vocational). In the operational tasks, improvements were significant between the age groups, but standard deviations showed a growing tendency. In the primary school the disjunctions, in the secondary school the conditionals showed faster improvement. In the tasks of deductive patterns, differences between the age groups proved to be significant for most tasks, but there were no unambigous correlations between the results of logical operations and deductive patterns. According to our results, significant development of logical operations takes place mostly before adolescence, and development slows down later. The development of deductive patterns did not show similar characteristic tendency. The hypothesis that the development of basic operations influences performances in deductive patterns can not be proved on the basis of our results. The effects of school, especially schooling streams are significant. These results demonstrate the selection mechanism of the Hungarian school system.

Students' scientific reasoning skills in polytechnics and universities in the field of business education
Hannele Seppala, University of Helsinki, Finland

The aim of the research was to investigate students' scientific reasoning skills in the initial, intermediate and final phases of the university and polytechnic studies in business education. Scientific reasoning was defined in the research as hypotheti-

cal-deductive reasoning, which includes the ability to identify causality between variables (possible in the level of formal operations). The level of formal operations includes also the abilities to reflect or to operate on the concrete operations of classification and relation. (Inhelder & Piaget, 1958) In addition - as another part of scientific reasoning - students' metacognitive awareness of the formal operational schema was investigated in the research. Two measures of formal reasoning were used to find out students' scientific reasoning skills: the Pendulum and the Chemical tasks (Science Reasoning Tasks: Shayer, Wylam, Kuchemann & Adey, 1978). 338 business major students from five polytechnics and four universities participated in the study. In the research the university students showed significantly higher formal reasoning abilities than polytechnic students. The results of the Chemical task indicated that there were also significant differences between the higher education sector and the phase of studies. In the initial and intermediate phases of studies in the polytechnics and in the universities the development of formal reasoning corresponded each other, but in the final phase of studies the results of the two sectors differed from each other: the polytechnic students in the final phase of studies showed lower reasoning abilities than the students in the initial and intermediate phases. The research will continue with investigating the connections between the students' formal reasoning abilities and the scientific and vocational orientations in polytechnic and university studies.

Stability and change in the development of general cognitive skills: An analysis of data of large-scale cross-sectional and longitudinal studies
Beno Csapo, University of Szeged, Hungary

This paper presents a model to overcome the difficulties of long-term longitudinal assessments by combining data form different sources and it aims to give reliable answers to questions raised in educational practice. The data used for the analyses were obtained from three different sources: (1) inter-age correlation data form long-term longitudinal studies cited in the literature; (2) data of large-scale cross-sectional assessments of Hungarian school-aged population; and (3) data of short-term longitudinal studies concerning the same population. Sample sizes of the two latter data collection were $N > 1500$ per cohort. The age difference between the cross sectional samples was two years (students of 3rd, 5th, 7th, 9th, and 11th grades); similarly, there was two years difference between the two measurement points in the longitudinal assessment. (A younger sample was assessed when students were in grade 6 and 8, and an older sample when they were in grade 10 and 12). Means and standard deviations were computed from the large-scale assessments, while

inter-age correlations were obtained from the literature and short-term longitudinal studies. These data were used to generate a simulated database that reflects all attributes of the development known from empirical studies. In this paper, the case of inductive reasoning - one of the most important general skills determining school success - will be shown in an analysis that estimated how accurate school selection may be if it takes place at the end of grades 4, 6, 8, and 10. Results show that if 10% of the most advanced students are selected for an academic track in these grades, only 3.9%, 5.2%, 7.1%, and 8.9% will be found in the same upper achievement range at the end of 12th grade. The paper concludes that because of the flexibility of cognitive development no reliable basis may be established for early selection.

C 15   24 August 2005   08:30 - 10:30   Room A108

Symposium
Reading

EARLY READING DEVELOPMENT: LOCAL MODELS AND CROSS-LINGUISTIC COMPARISONS

Chair: Timothy Papadopoulos, University of Cyprus, Cyprus
Organiser: Timothy Papadopoulos, University of Cyprus, Cyprus
Discussant: Irianna Diakidou, University of Cyprus, Cyprus

For many years, the development of theories about the way children learn to read was relied extensively on studies of English-speaking populations. However, as reading research accumulates evidence from other languages as well, we learn more about how children learn to read in other scripts, noticeably different from English. Greek, for instance, is unusual in having a unique mapping between letters and phonemes making it distinctly more transparent than English for both reading and spelling. This, in turn, makes both processes more accurate, even for the least capable readers and/or spellers. This symposium aims to examine and provide some preliminary answers about the similarities and differences existing between English and Greek in early reading and spelling. With data deriving from three different cohorts, two English-speaking Canadian (Alberta and Ontario cohorts) and a Greek-speaking in Cyprus, we focus on children reading both words and non-words as well as comprehending text. At the same time, the developmental associations between phonological and cognitive correlates with reading and spelling are examined. The Ontario team discusses evidence from children who experi-

ence considerable difficulties with reading and/or spelling, examining the so-called double-deficit hypothesis', substantiating any relevant arguments about the role of phonological and naming speed skills as strong predictors of reading development in English. Overall, it emerges that such an endeavor provides findings that explicitly speak out for substantial differences existing between the two languages: Greek children learn to read rapidly and accurately even only seven months after the start of formal reading instruction. On the other hand, phonological and orthographic processing measures appear to account for more variance in the English- than in the Greek-speaking sample. Finally, although the double-deficit hypothesis is well searched with English-speaking populations, even with the home background being taken into account, it remains an open issue with the Greek-speaking population.

Predictors of word fluency in english and greek: A cross-linguistic comparison
George K. Georgiou, University of Alberta, Canada
Rauno K. Parrila, University of Alberta, Canada
Timothy Papadopoulos, University of Cyprus, Cyprus

This study examines the relative importance of different components (phonological sensitivity, phonological memory, and rapid naming speed) of phonological processing for learning to read an orthographically regular language (Greek) and an orthographically irregular language (English). Sixty English-speaking Canadian children and 70 Greek-speaking Cypriot children participated in this study. Children were followed from grade 1 until grade 2. Independent and dependent measures were similar in both languages. Initial analyses of the data indicate that the accuracy of word decoding was close to ceiling for the Cypriot children already at the end of grade 1, whereas the same was not true for the grade 2 performance of the Canadian children. Regression analyses with word reading fluency as the dependent measure showed that generally phonological and orthographic processing measures accounted for more word reading fluency variance in the Canadian sample than what was true for the Cypriot sample. Fischer's r to z transformations, however, showed that the only significant differences between the two orthographies were found when orthographic processing tasks were used to predict word reading fluency. Our findings suggest that the cognitive processes that are crucial for the development of reading ability in English may play a more limited role in languages such as Greek in which children easily learn to decode any word irrespective of its length and complexity.

Phonological awareness, naming speed, and working memory as predictors of reading comprehension in greek

Timothy Papadopoulos, University of Cyprus, Cyprus
George K. Georgiou, University of Alberta, Canada
Rauno K. Parrila, University of Alberta, Canada
Eleni Anastasiou, Ludwig-Maximilians-Universitat Monchen, Germany

The aims of the present study were two-fold: (a) to identify a combination of predictive measures from grades 1 and 2 that correlate with reading comprehension in grade 2, and (b) to examine the predictive accuracy of these measures, in a Greek-speaking population. Seventy children participated in this study. Measures representing color, object, letter and digit naming, phonological segmentation and blending, phonological memory, word identification, word attack, orthographic choice, and word chains were used as the independent measures, administered in both grades 1 and 2. Reading comprehension was measured at the end of Grade 2, using an adapted version of the task from Woodcock-Johnson Psychoeducational Battery-Revised. Four predictive models representing different combinations of the predictive constructs were run. Analysis showed that although the phonological variables were highly correlated with passage comprehension, the ability to decode or read isolated words was even higher correlated with the dependent measure. In grade 2, passage comprehension was highly correlated with all grade 2 independent measures, yielding the highest correlations with phonological segmentation and blending, followed by word chains and orthographic choice. The subsequent multiple regression analyses showed that the grade 1 model combining blending of sounds, word chains, and decoding of words was identified as the best predictor of passage comprehension in grade 2. Similarly, the grade 2 model joining blending of sounds and segmentation of words, words chains, and reading of isolated real words was yielded as the best predictive model. These findings are important for two reasons: (a) they indicate that phonological more than the rapid automatized naming measures have higher predictive power on reading comprehension, a striking finding countered to what predicts word reading in Greek, and (b) they strongly support the notion of word recognition modularity in a salient orthography as far as the prediction of reading comprehension is concerned.

Language development and reading: The roles of naming speed and phonological awareness
John R. Kirby, Queen's University, Canada
Jennifer E. J. Dawson, Queen's University, Canada
Jennifer Currie, University of Alberta, Canada

The Double-Deficit hypothesis (Wolf & Bowers, 1999) indicates that deficits in phonological awareness and naming speed are associated with reading disabilities. These two oral language constructs can also be seen as predictors of reading development (Kirby, Parrila & Pfeiffer, 2003). This paper reports results from a four year longitudinal, prospective study of children selected to fit the four double-deficit categories. Our goals in the present paper are to (a) examine the home backgrounds of the children in the four groups, (b) track the development of the children in the four kindergarten-identified groups, and (c) investigate the relationships between the phonological awareness and naming speed dimensions and reading, taking into account other factors, such as home background and home literacy activities. We screened 547 kindergarten children (aged 5 years) on measures of phonological awareness (Word Blending) and naming speed (Object Naming), and selected 214 children who fit in one of the 4 groups (no deficit, phonological deficit, naming speed deficit, or double deficit). During kindergarten, we assessed these Children's letter knowledge and early reading skills (including letter-sound knowledge and word reading), and we also asked their parents to complete a questionnaire about home literacy activities. During Grades 1, 2, and 3, we are assessing further early reading and spelling skills (regular, irregular and pseudoword reading, orthographic processing, and regular and irregular word spelling). Results indicated that home background was associated with oral language deficits in kindergarten. There was also considerable movement between groups, indicating that kindergarten diagnoses were not entirely stable. Reading results supported the expected pattern: children with no observed deficits performed better than those with single deficits, who in turn out-performed those with the double deficit. Phonological awareness and naming speed continued to predict reading development after taking home background into account.

C 16   24 August 2005   08:30 - 10:30   Room E009

Symposium
Education for Peace

PEACE EDUCATION IN REGIONS OF CONFLICT AND TENSION: DOES IT MAKE A DIFFERENCE?

Chair: Gavriel Salomon, Haifa University, Haifa 31905, Israel
Organiser: Gavriel Salomon, Haifa University, Haifa 31905, Israel

Peace education, co-existence education, education for mutual understanding and their likes are carried out all over the world, particularly in regions of severe conflict and tension. However, despite this richness of activity, there is very little research into these activities (with the exception of research on inter-personal conflict resolution in the schools). In light of this shortage of scholarly activity, research in such countries as Cyprus, Kenya or Israel/Palestine is of particular interest. Much of this interest stems from the examination and analysis of existing programs (Cyprus: Hadjipavlou; Kenya: Owinyo; Israel: Gordon) as well as from analyses of the challenges that face peace education in regions of severe conflicts (Salomon). The latter leads to serious yet researchable questions about the ways that institutional education can contribute to peace education and about the possible limitations of what peace education can achieve. Owinyo and Wildemeersch describe the problems faced by anti-violence programs in Kenya, with particular emphasis on the incongruity between the local culture and the one embedded in programs designed in the industrial West. Hadjipavlou describes the effects of the opening of the line between the two parts of Cyprus on members of the community and asks how could this be incorporated into school-based activities. Gordon describes a qualitative study of a school-based program designed to promote Jewish-Arab co-existence and the difference between the way teachers and students approached it. He focuses in particular on the blindness that extreme enthusiasm can afflict. Salomon lists hurdles facing peace education, research results that are incongruous with these, suggests a theory to account for the discrepancy and offers specific testable hypotheses. In all, the proposed symposium describes peace education in three conflict countries and raises serious questions about its nature and implementation as a planned educational intervention.

Does peace education in the context of intractable conflicts affect the really impor-
tant beliefs about self and adversary? Theory and researchable questions
Gavriel Salomon, Haifa University, Haifa 31905, Israel

A discrepancy is pointed out between formidable and thus discouraging hurdles facing peace education in the context of intractable conflicts and actual, encouraging research findings of such programs. It is suggested that the hurdles pertain to the most deep-seated, and thus unchangeable convictions constituting the backbone of a group's collective narrative. On the other hand, the change-objects affected by peace education programs pertain to more peripheral attitudes and beliefs which are more easily changeable, more weakly associated with behaviors and thus less consequential. This hypothetical possibility is briefly examined from both a theoretical and practical perspective, leading to three clusters of research questions: (a) Is the proposed distinction between central and peripheral attitudes and beliefs applicable to peace education programs? (b) How stable are changes of peripheral attitudes in the absence of changes of the more central ones? And (c) to what extent can only long-term, socialization-like programs affect core beliefs and attitudes?

The Blindness of Ideological Commitment: The Educational Tragedy of Arab/Jewish Co-existence
David Gordon, Ben-Gurion University of the Negev, Israel

I will illustrate educational problems that can arise as a result of laudable ideological commitment. The illustrations derive from the evaluation of the Children Learning Together (CLT) Project developed to promote Arab-Jewish coexistence. CLT is a program which emphasizes commonalities and similarities between the two nationalities. A basic assumption is Allport's Contact Hypothesis i.e. under certain conditions, inter-group contact reduces hostility and prejudice. An implicit assumption is that the development of bonds with someone of another culture is part of one's own personal growth as a human being. I engaged in a qualitative evaluation of 3 pairs of Arab and Jewish schools. A consistent motif revealed is the different reaction and perspectives of teachers as opposed to students. Teachers were active, enthusiastic and happy to meet each other whereas students were passive, less enthusiastic and tended to remain within the boundaries of their ethnic group. Much of the teachers' enthusiasm was the outgrowth of teachers' workshops which aimed to produce true believers' of the ideology and ideas that CLT represents. As a result, however, teachers often tended to misread the student's reactions to activities and failed to interpret correctly students' dissatisfaction, which for an outsider seemed

obvious. Extreme commitment may create a blindness' which leads to moral insensitivity, uncritical transfer from teacher to student activity and to teachers' loss of touch with reality. Such conduct may become harmful especially, when ideological commitment overcomes pedagogical considerations. In addition CLT's implicit assumption re personal growth may be problematic because its existentialist-like orientation may be at odds with the pragmatic nature of school life.

A search for peace in secondary education systems in Kenya
Salome Owinyo, Kenya, Kenya
Danny Wildemeersch, Catholic University or Leuven, Belgium

The goal of this study is to explore the nature and effect of peace education in a Kenyan education context. Following an empirical research carried out in Kenya to understand the despicable culture of violence that has permeated the schools, we observed that the traditional conceptions and practices of peace education do not seem to be very helpful. Violence in the secondary schools has developed into an alarming and worrying trend. Whereas before school unrest was characterised by simple walkouts its now evident that students premeditate and plan actions aimed at causing maximum harm (MOE, 2001). As a result many students have lost their lives in these skirmishes and the schools have lost millions of property which have been destroyed and burnt-up. In retrospect, very little research has been done to understand this phenomenon and as such efforts to intervene and control these incidences have been insufficient as we continue to witness more schools engaging in these culture. Our concern is to explore this helplessness' depicted by traditional conceptions of peace education that do not seem to function in this situation. As stated in part of UNESCO's constitution, ìSince war begins in the minds of men, it is in the minds of men that the defences for peace must be constructed. We believe that it's imperative to first give up the traditional ambitions of peace education and question the conceptions of peace educators by opening up for another understanding.

Multiple stories: the Crossing as part of people's Peace Education in Cyprus?
Maria Hadjipavlou, University of Cyprus, Cyprus

The paper discusses the dynamics of crossing to and from the Line in Cyprus giving examples of the new experiences and stories as these are constructed when meeting the Other. I will argue that these stories form part of the public reconciliation process and constitute part of informal peace education. I define peace education as the

capacity to reach to the Other, feel empathy for their suffering and engage in shared social activities thus challenging the bipolarity of ìus and them. The challenge remains of how to incorporate these ìnew realities and stories in formal peace education curricula. To do this would mean official engagement in a new dialogue about history making. The Line in Cyprus is about 112 miles long stretching across the island separating North and South. This Line, which according to one's positioning in politics, ideology and history is referred to as the green line, the ceasefire line, the dead zone, the demarcation line, the partitioning line, the Attila line, the no-man's land or the border, has been opened on April 23, 2003, in four areas -two in Nicosia, one in the Famagusta area and one in Larnaca. Thousands of people from all Cypriot communities have been crossing to and from since then and new relationships have been formed based on direct face-to-face experiences with the Other. Many of these stories reveal, at first, the presence of the past as was experienced by each other in formal schooling or through mediated information in the mass media. They do not, however, stay there because through the direct meeting with the Other, i.e. the Turkish Cypriot or the Greek Cypriot who has been living in the other's house and memories for over thirty years discover the human being who has also suffered and has been imagining a different life.

C 17   24August 2005   08:30 - 10:30   Room A109

Symposium
Research Methodology

WRITING RESEARCH IN THE LAB AND IN THE FIELD: RECENT METHODS

Chair: Asa Wengelin, Lund University, Sweden
Organiser: Daniel Perrin, University of Applied Sciences, Switzerland
Discussant: Deborah McCutchen, University of Washington, United States
                David Galbraith, Staffordshire University, United Kingdom

During the last 20 years writing research has evolved from the study of stand alone texts to include cognitive and social perspectives. Some reasons for this could be the increased availability of computers, and the possibilities of interactive writing provided by the internet and other interactive tools. . This has lead to a need also for teaching practices to incorporate the concept of process and social dimensions into the teaching of writing as well as into the writing for learning practices.

Therefore, in order for researchers and educationalist to be of use for each other, it would be useful if methodological development within the writing research area, was concerned not only with research methods which can yield research outcomes, but also research with methods which can be used by educationalists as part of their intervention, which in turn could be researched etc. For this purpose we need multi-method approaches that involve both qualitative and quantitative analysis, allowing the possibility of both interpretive and positivist stances in order to cover as well social as cognitive perspectives on writing. Thus the papers in this symposium all put forward recent multi-approach methods that could be used both in research and in the classroom. Williams and Edwards focus on collaborative writing and explore dimensions of group interaction and suggest how email may be a vehicle for realising and recognising those dimensions. Perrin put discusses the relation between interviews and participatory observations before the writing session, keystroke logging of the actual session and verbal protocols after the writing session in progress analysis. Bakker and de Glopper test the combination of the four methods thinking aloud protocols, writing questionnaires, keystroke logging and text analysis. Finally Wengelin, Johansson, Lindgren and Stevenson reviews different usages of keystroke loggings and combinations of keystroke logging with other methods.

Collaborative writing: The role for effective research and effective learning.
Noel Williams, Sheffield Hallam University, United Kingdom
Kirstie Edwards, Sheffield Hallam University, United Kingdom

Evaluation of student collaborative writing, whether we are looking at product or process, requires better knowledge of the social constructs operating during a project, and the way they may relate to product outcomes than we currently have. For research, obtaining that knowledge is a commitment to explore socio-cognitivist models of writing, in order to map the interactions and hidden intentions of collaborating students onto the observed features of their products. Examining student emails is one method for providing both quantitative and qualitative data, which allows both positivist models of writing (e.g. data seen as evidence of group goal-oriented problem-solving) and, simultaneously, more interpretativist models (e.g. using students' own categorisation of group interactions in addressing the writing task). This is because email data is both ifixed, as permanent record with countable features, and discursive, implying or entailing a number of different discourse constructs to be fully understood (such as, for example, inter-group politeness strategies designed to maintain group cohesion). Research which aims to link the social process of writing to accounts of its collaborative product should have pedagogic

value in enabling teachers to identify points of connection between formative assessment, which is often process-based, and summative assessment, being generally product-based. We explore dimensions of group interaction which may have value in terms of the contribution to the writing project, suggest how email may be a vehicle for realising and recognising those dimensions, and how their connections and correlations might be examined. If such observations, even measures, can be identified in email exchanges, then they may also be detectable in other media used by collaborating student writers, offering tools for educators which are simultaneously helpful as classroom instruments and research tools. This in turn raises issues about the nature of the relationship between pedagogy and research in the context of writing.

Progression Analysis: A mult-method approach for investigating writing at the workplace
Daniel Perrin, University of Applied Sciences, Switzerland

What exactly do journalists do when they write - and what do they do with language? In 1997, the Swiss Federal Office for Communication (BAKOM) commissioned a qualitative and explorative investigation of journalistic writing in print, radio, TV, and on-line news offices. Before the study could begin, an ecologically valid method had to be developed to investigate writing processes at workplaces: the writing processes had to be accessible from a number of relevant perspectives but not be affected by the data collection. Progression Analysis (PA) was developed and applied for the first time within the framework of the BAKOM research project. Data on writing processes were obtained from 40 workplaces in media newsrooms and evaluated as case studies. Additional corpora on journalistic writing have since been collected. Findings include detailed information on journalistic language performance, language awareness, language use, and writing strategies. Current research projects are using PA to investigate writing in other domains as well, such as in academy and industry.
PA is an ethnographic, computer-based multi-method approach with which data can be obtained on three levels.
1. Before writing begins, PA determines, through interviews and participatory observations, what the writing situation is and what experience the writer draws on for it.
2. During writing, movements are measured with keystroke-recordings. It's crucial that the computer logging doesn't influence the performance of the editing system or the writer.

3. After writing, PA deduces the repertoire of an author's writing strategies. Based on cue-based retrospective verbal protocols, this third level of PA opens a window into the mind of the writer. The question is what can be recognized through this window. The presentation will focus on the relations between the thee levels of Progression Analysis.

Comparing writing process research instruments in an educational environment
Carien Bakker, University of Groningen, Netherlands
Kees de Glopper, University of Groningen, Netherlands

To gain better insight in the way writers write-to-learn and how writing can affect learning, we need careful observations of the processes that take place during writing-to-learn. In order to observe these processes, researchers have the disposal of several observation techniques and methods like thinking aloud, writing questionnaires, keystroke analysis and text analysis. Until now, researchers have used the different types of observation instruments, but have never compared systematically the merits and drawbacks of each instrument or the surplus value of the use of a combination of instruments. Such a comparison will contribute to well- founded methodological choices. In a study of conceptual learning in science and writing-to-learn processes of 15-16 year old students we developed and tested four instruments that capture writing processes: one synchronous - direct (thinking aloud), one asynchronous - direct (a task-dependent writing questionnaire), one synchronous - indirect (keystroke registration) and one asynchronous - indirect (text analysis). We have tested the combination of the four instruments with 5 students who carried out a knowledge transforming writing assignment while thinking aloud. During this writing act we recorded their key strokes. Afterwards, the students filled out the writing process questionnaire. All in all, we are able to analyze the writing processes that took place during the writing session with the help of thinking out loud protocols, key stroke analyses, responses to the writing process questionnaire and rhetorical and conceptual analysis of the texts produced. We currently analyse our data. We will outline a portrait of every student. We will make clear which contribution each instrument makes to the description of the writing process and we will determine the concrete surplus value of combinations of instruments.

A review of the different usages of keystroke logging - where are we heading next?
Asa Wengelin, Lund University, Sweden
Victoria Johansson, Lund University, Sweden
Marie Stevenson, University of Amterdam, Netherlands
Eva Lindgren, Umea University, Sweden

Keystroke logging has become an increasingly popular method for investigating the production processes during writing, both as a research tool (in experimental as well as naturalistic settings) and as a reflection tool for learners and teachers. The advantages of keystroke logging are that it can provide the researcher with data not only on the finally edited text but also on editings and temporal aspects of the production process, and that it is does not intrude on the normal production process of the writer. However, a disadvantage of the method is its lack of transparency. Keystroke logging provides us with information on frequencies, locations and durations of pauses as well as information on how much and what (on the surface level) is edited when and where in the production process, but it does not provide any information on which cognitive processes are going on during the pause, or the purpose of an editing. A possible solution to this is to combine keystroke logging with other data collection techniques, such as think-aloud protocols, stimulated recall, retrospective interviews, observations, writing questionnaires and text analysis. In this paper we will attempt to review the different usages of keystroke logging and keystroke logging in combination with other data collection techniques from both methodological and theoretical perspectives in order to outline where we are and where we should be heading next. Questions to be discussed are: What are the pros and cons of the different techniques? What are the theoretical assumptions underlying the different usages? What are the theoretical, methodological and pedagogical implications of the differens usages?

Symposium
Development of Expertise in Specific Domains

LANGUAGE COMPETENCE AND THE DEVELOPMENT OF SCIENTIF-IC AND MATHEMATICAL KNOWLEDGE

Chair: Eva Teubal, Hebrew University of Jerusalem and David Yellin Te,
               Israel
               Julie Dockrell, Institute of Education, United Kingdom
Organiser: Eva Teubal, Hebrew University of Jerusalem and David Yellin Te,
               Israel
               Julie Dockrell, Institute of Education, London University, United
               Kingdom
Discussant: Ma del Puy Perez Echeverria, Universidad Autonoma de Madrid,
               Spain

Nora Scheuer, University of Comahue - CONICET, Argentina, Argentina
This symposium considers the relationship between language and the development
of scientific knowledge and understanding. The four studies identify the language
processes that support scientific and mathematic discourse across preschool and
elementary school to adulthood. In their paper, Best and her colleagues use a natu-
rally occurring event - an eclipse- to evaluate young Children's lexical and concep-
tual understanding over a five-month period. They demonstrate how the exposure
to the eclipse was effective in helping children acquire lexical knowledge and wider
understanding about entities relating to eclipse. This demonstrates the importance
of multiple tasks to identify aspects of Children's learning that are central to under-
standing the development of scientific reasoning. The study by French and Peterson
develops this theme through the evaluation of a special preschool science interven-
tion. Both Children's lexical acquisition and their ability to use scientific discourse
were examined. This demonstrates how high quality talk, in the form of extended
conversations, and the use of multiple discourse forms supports Children's engage-
ment in and understanding of scientific principles. The paper by Garcia, Rojo &
Andersen considers how written language can support the process of scientific un-
derstanding. Their results demonstrate how note- taking and report writing in ele-
mentary school science can foster the development of scientific inferences. The im-
portance of embedding language within the scientific activity is further supported

by their analyses of science laboratory activities.

The by Teubal, Albert and Guberman discusses the effects of prototypicality and language on adults' conceptions of geometrical shapes. It shows that items belonging to the same categories may differ in prototypicality, and that although labeling may help in sorting geometrical shapes according to various definitions, it may also hinder the recognition of non prototypical items. These presentations emphasize the role of language as a representational system supporting scientific and mathematical discourse .

Children's Semantic Representations of a Science Term
Best Rachel, University of Memphis, United States

Assessments of lexical acquisition are often limited to pre-school children on forced choice comprehension measures. Our study assessed the understandings 30 school-age children (mean age = 6;7) acquired about the science term, eclipse following a naturalistic exposure to a solar eclipse. The knowledge children acquired about eclipses and a control term, comet was assessed at three points in time (baseline-test, two-week post-test and five-month post-test) using a range of assessment tasks (multiple-choice comprehension, picture-naming, drawing and solar system manipulation task). Children's knowledge was compared to 15 adult controls during the baseline-test and two-week post-test. The analysis focused on the range of knowledge children acquired about eclipses and entities related to an eclipse (sun, moon, earth and planets in general). We found that children acquired extensive knowledge about eclipses, but not comets. At the two-week post-test, the majority of children were able to produce the term eclipse and provided evidence of accurate comprehension and wider conceptual knowledge about solar eclipses, which was retained at the five-month post-test. Further, at the two-week post-test children had acquired knowledge about entities relating to eclipse, which was also retained at the five-month post-test.

Learning Language through Preschool Science
Lucia French, University of Rochester, United States
Shira Peterson, University of Rochester, United States

Many children living in poverty in the United States have limited exposure to school-based oral language practices by the time they enter preschool (e.g., Hart & Risley, 1995; Heath, 1983). Unfortunately, research suggests that many preschool environments do not provide the kind of language environment that supports Chil-

dren's development of school-based language and literacy skills (Dickinson & Tabors, 2001). This study focuses on the language development of children exposed to ScienceStart!, a preschool curriculum designed to enhance Children's receptive and expressive language skills. In the ScienceStart! curriculum, children participate in daily hands-on science activities within a rich language environment stemming from scaffolded participation in a four-part cycle of inquiry. Over 450 children have participated in this study since its inception, 75% of whom come from low income families. Quantitative and qualitative methods were used to assess Children's language growth. On the standardized PPVT and on an interview-style assessment of explanatory language, children showed significant improvement in their language skills over the course of a single 5-week unit, and over the course of the school year. Videotapes of classroom activities revealed that children participated in high quality talk with teachers, including having extended conversations, engaging in multiple discourse forms, using features of scientific language, and producing causal explanations for science phenomena. These results support our claim that a language rich environment in preschool can support Children's normal acquisition of school-based language and literacy skills. The science-based curriculum is particularly suited for this goal because the science content engages children, and the science cycle provides a predictable linguistic format which scaffolds Children's participation in classroom discourse.

The role of labels and prototypes in geometrical conceptualization
Eva Teubal, Hebrew University of Jerusalem and David Yellin Te, Israel
Jeanne Albert, David Yellin Teachers' College, Israel
Ainat Guberman, Hebrew University of Jerusalem and David Yellin Te, Israel

The aim of the present study was to assess the effect of conventional labeling on adults' ability to identify geometrical shapes in terms of formal definitions.
Since prototypes are part of a word's meaning, it was hypothesized that labeling would enhance correct identification of prototypical items. Sixty two subjects were presented with 34 numbered shapes, and were given 9 different definitions, in the form of ìparty invitations. Each invitation contained either a conventional or a nonsense name for the ìguests, and a list of defining characteristics: ìOnly the DUCS are invited. A DUC is a quadrilateral whose angles are all equal. All the subjects had to list the shapes that fitted each invitation. Subjects who received nonsense names were asked to provide the conventional names, if they could. The research questions were: 1) Do Ss perceive membership in a geometrical category as a homogenous or as a graded trait? 2) How do conventional labels affect the subjects'

ability to act according to the definitions? 3) What is the relation between success in the sorting task and the ability to relate the conventional name of the category? Findings: 5. Identification rate was higher for "polygons" that don't have more specific definitions, and for "quadrilaterals" that do (such as rectangles and trapezoids). 6.Labeling helps subjects' sorting in the case of parallelograms and trapezoids.   It had no effect in the case of "polygons", "quadrilaterals", "rectangles", "squares" and "rhomboids". Labeling contributed to the identification of prototypical rhombuses, and hindered the identification of non-prototypical rhombuses (squares). 7.Subjects could identify at least some of the relevant shapes without the ability to specify the shapes' names, but not vice versa. It was concluded that membership in geometrical categories is graded. Conventional labeling promotes the recognition of some prototypical items, but may hinder the recognition

Written language as a metacognitive tool in science knowledge construction
M. Garcia-Mila, Universitat de Barcelona, Spain
N. Rojo, Universitat de Barcelona, Spain
C. Andersen, Ohio State University, United States

The present study aims at analyzing the mediating role of writing in fostering metacognition during scientific inquiry. Sixth grade elementary students were asked to investigate the effect of three factors (type of fertilizer, type of light and type of seed) on the plants growth. 34 students worked over seven sessions (twice a week), which permitted a microgenetic analysis of the data. During the inquiry process, participants had the chance to design the experiments they wanted, interpret the evidence they gathered, and make the corresponding inferences based on such data. Each participant was provided with a lab notebook to use whenever needed. They were also asked to write a report in the mid and final sessions. Our results show the microgenetic development of scientifc inquiry strategies (data collection and inference making) embedded with note-taking, and related with the reflection fostered by report writing. We found a statistically significant relationship between the quality of note-taking (taking complete notes) and the use of factorial combination strategies in the experimental design. In terms of report writing, our results show that the demand of writing a report in the mid session induced the students to stop and review their work by looking at results obtained so far which may have fostered the reflection process. Our results also show that those students who wrote reports with a high level of metacognition, that is, reports that went beyond the data recording by including inferences showed a statistically significant improvement in their inference making. These results, taken as a whole, show that prescriptive outlines

should not be the closure activity in the science laboratory activities. Report writing should be embedded during the inquiry along with the need to take notes.

C 19   24 August 2005   08:30 - 10:30   Room E103

Symposium
Action Research

COMMUNITIES OF PRACTICE IN HE

Chair: Gina Wisker, Anglia Polytechnic University, United Kingdom
Organiser: Gina Wisker, Anglia Polytechnic University, United Kingdom
Discussant: Erik Meyer, University of Durham, United Kingdom

Building on theories of Communities of Practice, this symposium aims to collate examples of Communities of Practice operating successfully in Higher Education contexts in three countries, UK, Israel and Australia. Two Communities of Practice relate to the continuing professional development of practising HE lecturers and Learning and Teaching advisers. One CoP focuses on continuing professional development for university staff aiming at publication, and another looks at the successful strategies and Communities of Practice activities of school-based Learning and Teaching advisers. Two others consider CoPs developed in relation to a cohort based international PhD. Here, Wisker, Robinson and Shacham, explore how the development of cohorts, guardian supervisors and online supervisor support enhance postgraduate learning and supervisory practice in terms of the personal, institutional and learning development areas. Trafford and Leshem consider the specific role and significance of conceptual frameworks as critical features in research and ask how candidates gain understanding of conceptual frameworks that incorporate ideas into their theses in the context of a cohort based PhD community of practice. The two final papers focus on web based and e-learning examples, Zimitat explores the effective use of WebCaseStudy which aims to enable health based professional learners to avoid the reification of knowledge and become involved in a community of practice, exploring the use of clinical approaches to cases and developing higher order skills and soft knowledge in the process. Uwe Richter and Sharon Waller use a constructivist approach to investigate the use of online discussions to help cultivate a learning community, in relation to student expectations on two masters modules designed to equip learners with the skills and pedagogical understanding required to facilitate effective learning with ICT. Each paper is research based and

focuses on the development and effective utilisation of Communities of Practice in HE contexts.

Cultivating a professional learning & teaching community of practice at APU
Sharon Waller, Anglia Polytechnic University, United Kingdom

This paper considers how the predominantly individualistic culture of academics working in isolation from each other at a split campus university - Anglia Polytechnic University (APU) - could be influenced by the cultivation of connections between staff to facilitate the sharing of good learning and teaching practices across the university. It suggests that like most organisations APU can be regarded as a community of Communities of Practice (Brown and Duguid, 2001, p. 203) connected by networked computers. However whilst the networked infrastructure provides the material basis' (Castells, 1996, p. 369) which affords communication flows between staff across the university, knowledge sharing across communities is dependent upon the development of shared practices (Greeno, 1996; Brown and Duguid, 1989; Brown and Duguid, 2001). Using the university's School-based Learning and Teaching Advisors as a case study the paper explores the notion that by working with groups of people who are bound together by a shared interest whilst also having multi-membership of different communities the university is able to take advantage of their ability to act as knowledge brokers' and mediate across community boundaries. The paper suggests that, as part of their practice, advisors have become stewards of the learning, teaching, assessment and curriculum (LTAC) domain, a role legitimised by their influence on the development of institutional policies. Interviews with the advisors suggest that successful cultivation of a community of practice is a process of negotiation rather than direction dependent upon understanding how it functions, what is important to its members and how to elicit their commitment. Additional considerations for a distributed community include the need to equip members to use technology more effectively, in order to maximise their time and strengthen the connections between them. Lessons learned will be used to inform the cultivation of a new community of Learning Technologists.

Postgraduate research success: Communities of practice involving cohorts, guardian supervisors and online communities
Gina Wisker, Anglia Polytechnic University, United Kingdom
Gillian Robinson, Anglia Polytechnic University, United Kingdom
Miri Shacham, Orte Braude College of Engineering, Israel

Traditionally, supervisors work with students on an individual basis and postgraduate development programmes run onsite. Isolation can be a key feature for postgraduates, particularly international students or those studying at a distance, and for their supervisors. Entry into the international community of research, supervision, study and publication can be enabled, arguably, by the support of Communities of Practice from the outset of postgraduate student/supervisor interactions. In this context, considerable numbers of international postgraduates at APU (UK) and their supervisors are effectively supported in three key areas of engagement, need and development: The Personal (e.g. support from friends, colleagues and family, stress and coping), Learning (research seen as a form of learning, development of learning levels, research processes and skills) and Institutional (support provided by the institution- postgraduate development programmes, supervision, infrastructure). The support is enabled by building three innovative Communities of Practice:

(1) Guardian supervisors - work with all students on research development programmes, with accompanying meetings focused on strategies of meta-learning. They support students' work with emails, and other distance media. This builds a CoP among the Guardian supervisors, and all who take part in the PhD programme.

(2) Cohorts - PhD students are empowered to develop mutual, critically focused support for each others' work through the enhanced use of the cohort as a CoP in the compulsory research development workshops and through ongoing discussion lists, self help groups and symposia.

(3) Online supervisory interactions - Supervisors of international postgraduates are supported as a CoP thorough the provision of online supervisory discussion and development.

This paper is based on action research with current postgraduate students and those who have successfully completed PhDs, guardian supervisors and supervisors as collaborators to explore the rationale, problems, practices and the richness of experience of working with systems fostering Communities of Practice.

Using online discussions to help cultivate a learning community and manage student expectations: A social constructivist approach
Sharon Waller, Anglia Polytechnic University, United Kingdom
Uwe Richter, Anglia Polytechnic University, United Kingdom

This paper explores the processes of negotiation and mediation which take place between learners and teaching staff on two masters modules designed to equip FE/HE tutors and educational technologists with the skills and pedagogical understanding required to facilitate effective learning with information and communication technology (ICT). Both modules are delivered in a blended mode of classroom-based and online learning activities including facilitated online discussions. Both modules are enhanced by a website integrated within a virtual learning environment (VLE). The paper examines the rationale for the development and integration of a pedagogical framework which is underpinned by a guided-construction model of learning (Shuell, T., 1992). This is followed by a consideration of how the framework operates in practice as a dynamic mechanism reflecting student learning and social needs as well as supporting the management their expectations. Reflections on the significance of the role played by the modules' online elements in cultivating a learning community (Wenger, et al., 2002) in order to better support students who are predominantly busy professionals are endorsed by student feedback and analysis of their online contributions. Emerging patterns of communication and behaviour within a networked learning environment together with associated implications for the roles of both tutors and learners are discussed. Learning within a networked environment is new to students who have yet to become encultured (Blackler, 1995, p. 1024) in the practices of online learning communities. It is therefore suggested that learners need guidance in how to behave, customs to be observed, what to expect and expectations of them. The paper concludes that successful learning depends on the robustness of the underlying pedagogical framework and the development of a supportive learning community whilst acknowledging that the development of successful networked learning takes time and effort due to the changes required in cultural and professional practices.

Webcasestudy: Using technology to capture soft knowledge within a community of practice
Craig Zimitat, Griffith Institute for Higher Education, Australia

This paper explores the processes of negotiation and mediation which take place between learners and teaching staff on two masters modules designed to equip FE/

HE tutors and educational technologists with the skills and pedagogical understanding required to facilitate effective learning with information and communication technology (ICT). Both modules are delivered in a blended mode consisting of classroom-based and online learning activities including facilitated online discussions. Both modules are enhanced by a website integrated within a virtual learning environment (VLE). The paper examines the rationale for the development and integration of a pedagogical framework which is underpinned by a guided-construction model of learning (Shuell, T., 1992). This is followed by a consideration of how the framework operates in practice as a dynamic mechanism reflecting student learning and social needs as well as supporting the management their expectations. Reflections on the significance of the role played by the modules' online elements in cultivating a learning community (Wenger, et al., 2002) in order to better support students who are predominantly busy professionals are endorsed by student feedback and analysis of their online contributions. Emerging patterns of communication and behaviour within a networked learning environment together with associated implications for the roles of both tutors and learners are discussed. Learning within a networked environment is new to students who have yet to become encultured (Blackler, 1995, p.1024) in the practices of online learning communities. It is therefore suggested that learners need guidance in how to behave, customs to be observed, what to expect and what is expected from them. The paper concludes that successful learning depends on the robustness of the underlying pedagogical framework and the development of a supportive learning community whilst acknowledging that the development of successful networked learning takes time and effort due to the changes required in cultural and professional practices.

SIG Invited Symposium
Writing

METHODOLOGY IN WRITING RESEARCH: A CONDITION FOR THE-ORETICAL INSIGHT AND FOR EFFECTIVE LEARNING

Chair: Joachim Grabowski, PH Heidelberg, Germany
              Thierry Olive, CNRS & University of Poitiers, France
Organiser: Joachim Grabowski, PH Heidelberg, Germany
              Thierry Olive, CNRS & University of Poitiers, France
Discussant: Pietro Boscolo, University of Padova, Italy
              Linda Allal, University of Geneva, Switzerland

This is the Invited Symposium of SIG Writing. Within EARLI, there is a rather stable international writing research community across Europe and beyond Europe that encompasses a wide diversity of research interests, disciplines, methods, and approaches related to the phenomenon of writing as a human skill, its processes and products, its mastery and development, and the affiliated conditions and educational supports. However, theoretical insights, empirical results and practical experiences will only accumulate and lead to mutual progress if the community members, in spite of their different disciplinary backgrounds, continue to mutually explain the ways they reconstruct and theoretically as well as practically approach the questions at issue and the needs and problems they encounter in their respective fields. The symposium is also aimed at concisely informing the learning-and-instruction community about a relevant part of the state of the art on educational writing research. Thus, the presentations of the symposium will provide an overview of recent important methodological approaches in writing research, from theories of working memory (Olive, Piolat and Kellogg: Investigating the role of working memory in writing: Ways, uses, and conclusions) and their applications to writing instruction at school (Bourke & Adams: Applying working memory research to writing instruction within the Primary School classroom) to the study of graphic and ocular motor behavior in skilled writing and its development (Alamargot: What on-line analyses of the eye and the pen reveal about the writing process and the ways to foster it) and the ways in which classrooms, the main loci of writing instruction, are considered and theoretically reconstructed from different educational perspectives. Together, the symposium tries to show and delevop ways how to get -From writing processes

to writing instruction, and back againì, a question that, raised by Linda Allal in her opening presentation, guided the 2004 SIG Writing Conference.

Investigating the role of working memory in writing: Ways, uses, and conclusions
Thierry Olive, CNRS & Universitede Poitiers, France
Annie Piolat, Universite de Provence, France
Ronald T. Kellogg, Saint-Louis University, United States

Writing involves several resource-demanding cognitive components that have to be orchestrated when composing a text (McCutchen, 1994). Understanding how writers compose a text thus means explaining how activation of these writing processes is orchestrated in working memory whose main characteristic is its limited capacity in simultaneously maintaining and processing information. Working memory is the cognitive structure (or function) that temporarily stores and processes information during the realization of complex cognitive activities. In writing, the role of working memory in writing was investigated with two theoretical perspectives and with two kinds of methodological approaches. On one side, based on McCutchen's (1994, 1996) capacity theory of writing (the more efficient the writing processes, the less they require resources from working memory and the more resources are available for activating other processes and for coordinating goals), Berninger and Swanson (1994; Swanson & Berninger, 1996) studied individual differences in working memory on writing performance with a correlational approach. This approach led them to propose a theory of writing acquisition in which the emergence of the writing processes is determined by the constraints of working memory. On the other side, Kellogg (1996) analyzed, at the light of Baddeley's multi-component model of working memory, the relationships between the writing processes and the different components of working memory (the central executive, the phonological loop and the visuospatial sketchpad). Methodologically, Kellogg's proposals were tested with the dual-task technique. Within these two lines of research, this presentation will describe some typical experiments and studies conducted in each perspective in order to review the recent findings about the involvement of working memory during writing. In parallel, we will illustrate how the different techniques have been fruitfully used to explore the role of working memory during writing.

Applying working memory research to writing instruction within the Primary School classroom

Lorna Bourke, Liverpool Hope University College, United Kingdom
Anne-Marie Adams, Liverpool John Moores University, United Kingdom

To investigate the relationship between working memory abilities and the development of Children's narrative writing skills. The nature and extent of this relationship is examined in two contexts. The first relates to the process used to instruct the children on the composite skills required to generate written narratives (word, sentence and text level, NLS, DfES, 2001). The second context relates to the use of appropriate statutory assessment measures of writing skill (i.e. Baseline; Key Stage 1 [KS1]). The implications of the research in terms of educational practice will be considered. Children were assessed on the quality of their writing at word, sentence and text levels at two age points (4-5 years & 6-7 years). Tasks measuring the visuo-spatial (corsi blocks, visuo-spatial pattern span), phonological (digit span, nonword repetition, word span) and central executive (verbal fluency, sustained attention to response, dual-task co-ordination) and integrated phonological storage and processing components (complex listening span task) of working memory were adopted. The written texts were analysed in terms of diversity of vocabulary, mean length of sentences in morphemes, and overall coherence (age 6-7 years only). They were also assigned an attainment level according to educational assessment guidelines for both ages (i.e. Baseline assessment at 4-5 years and Key Stage 1 assessment at 6-7 years). Hierarchical regression analyses revealed that individual differences in central executive functioning predicted performance on baseline assessments (age 4-5 yrs) and vocabulary diversity, total number of sentences, text coherence and KS1 attainment level (6-7 years). Individual differences in working memory capacity is associated with poorer quality texts. These findings support the characterisation of the writing task both in educational literature and in investigations of the cognitive skills underpinning writing as a resource-demanding task which requires the writer to successfully manage a number of processes in order to achieve a well-written text.

What on-line analyses of the eye and the pen reveal about the writing process and the ways to foster it

Denis Alamargot, University of Poitiers - CNRS, France

Since Hayes and Flower's (1980) seminal work, writing research has aimed at solving two important issues: (i) to further describe the processes involved in writing,

and (ii) to understand the dynamics of these processes. Among the different ways of conducting real time analyses of writing processes, recording the variation of graphomotor activity is particularly interesting because it is objective, non-intrusive and offers a continuous measure of the temporal aspects of processing. Stemming from research on oral production, this method can nevertheless be insufficient to assess some specific processes of writing. Based on the combined measurements of ocular (the input) and graphomotor (the output) activities of the writer, the Eye and pen device (Chesnet & Alamargot, in press) provides a very fine-grained description of the temporal characteristics of written production and offers a new framework to understand the writing processes. Eye and Pen relies on two main devices: a digitizing graphic tablet (to record spatial coordinates and pressure of the pen on the tablet surface) and an eyetracker (to record eye movements). All these observations are stamped with a common base millisecond timing. From the text written by the participant, and digitalized by the tablet, one may rebuild forward and backward on the computer screen, the trace leaved by the pen and the eye position at the same time (synchronized events). It becomes possible to improve investigations on processes engaged during the course of a pause as well as during a period of transcription. At an experimental level, this device will allow advances in the study of the visual component engaged during writing and of the functioning and dynamic of writing processes. At a methodological level, it already allows the study of handwriting in a multimedia computer environment (like the upcoming screen-pad).

Writing research in the classroom: Strengths and restrictions of different theoretical orientations and pedagogical perspectives
Triantafillia Kostouli, Aristotle University of Thessaloniki, Greece

While writing has been traditionally associated with schooling, the shift of writing research into school classrooms has brought into the foreground a new set of issues with regard to the way classrooms, as a specific and rather complex kind of context, may actually affect the nature of Children's writing; of great importance in this regard is another, parallel-running research strand focusing on the pedagogical processes and practices through which students in specific classrooms learn how to create texts according to specific, school-valued ways and reflect upon the texts they or their classmates produce. Different research traditions may be noted in the literature on classroom writing, differentiated through the methodological frameworks adopted for describing the nature of classrooms as learning contexts and through the different kinds of data analyzed; reference can be made to cognitive and sociocognitive research that traces school Children's developing understand-

ings of writing, to discourse-analytic work on texts produced by school children in classrooms (usually seen as finished products), to ethnographic accounts of textual processes and practices, to sociocognitive and sociolinguistic work on writing contexts and to critical discourse analytic work on the nature of school genres and classrooms as specific types of learning communities. Rather than singling out the similarities and differences of these perspectives in detail, this overview sets out to delineate certain overarching dimensions through which these research traditions may be differentiated from one another. This is attained by attending to answers provided to two basic questions: How is the nature of classroom as a specific type of context conceptualized by pertinent research strands? What are the types of data (texts and activities) through which writing ability is defined and assessed in classroom contexts? The research traditions developed are outlined and their pedagogical influence is delineated.

C 21   24 August 2005   08:30 - 10:30   Room A019

SIG Invited Symposium
Motivation

HOW TO CONCEPTUALISE AND MEASURE THE SITUATED NATURE OF MOTIVATION IN CONTEXT-ORIENTED RESEARCH?

Chair: Simone Volet, Murdoch University, Australia
Organiser: Simone Volet, Murdoch University, Australia
                Marold Wosnitza, University of Koblenz-Landau, Germany
Discussant: Susan Nolen, University of Washington, United States

This symposium addresses the topic of conceptual and methodological challenges in contextually-oriented research on motivation. The emergence of the person-in-context perspective within social-cognitive psychology combined with the growing interest in sociocultural conceptualisations of learning have lead to significant shifts in motivation research in recent years. Many scholars around the world have taken the challenge of studying motivation in real-life contexts and are now grappling with the difficulty of conceptualising and measuring the situated dimensions of motivation. The alternative positions, represented by the social-cognitive and the sociocultural traditions, are associated with different research methodologies and units of analysis. While distinguishing the fundamental assumptions of each tradition is necessary for conceptual clarity and interpretation, it has been argued that

from a pragmatic perspective combining approaches may do better justice to the complexity and multi-dimensional nature of motivation in real-life contexts. The specific aim of this symposium is to unpack and openly discuss these challenges. The first paper by Turner & Patrick critically examines and clarifies the different theoretical conceptualisations and related methodologies, adopted by researchers who have invoked a contextually-oriented perspective in their research on motivation. Representative examples of recent research are analysed with a focus on their theoretical and methodological features. The second paper by Jarvela, Volet& Jarvenoja extends the discussion by examining the social processes of motivation in goal-oriented collaborative activities. The challenge of investigating motivation as a dynamic, dual psychological-social phenomenon is discussed and illustrated with the development of a dynamic instrument. The third paper by Minnaert outlines the conceptual and methodological threats faced by researchers conducting motivation research in ecologically valid contexts. A case for the the design of more longitudinal designs and multi-dimensional approaches but also more dynamic theories is made, with support from recent empirical studies. An open forum will follow the discussion by Nolen.

Mixed messages: The difficulty and challenge of defining and measuring situated classroom motivation
Julianne Turner, University of notre Dame, United States
Helen Patrick, Purdue University, United States

Recent attempts to apply contextually-oriented theories to understanding motivation have resulted in considerable changes to both concepts and methods used within motivational research. These changes are especially apparent in classroom research. Recent research has attempted to explain and measure motivation not simply as an individual difference, but also as situated within the classroom context. The growing acceptance of this position has required researchers to address several methodological concerns with respect to measuring situatedness - issues they did not previously have to attend to within a social-cognitive framework. Thus, researchers invoking a contextually-oriented perspective find themselves with fewer established paradigms and procedures than those from other perspectives. Researchers have responded to the challenge of understanding motivation situated in classrooms from a rangeósometimes a combinationóof perspectives and with a mix of ecologically sensitive methods. The time is right to step back and examine differences and commonalities in this research. We will analyze and synthesize representative examples of international empirical research on motivation in

classrooms. The focus will be on three features:

1. Explicit or implicit theoretical conceptions of motivation. Some researchers characterize their conception as ìperson in context, others as ìsociocultural or ìsituated. Yet others do not state a theoretical conception, but cite references, e.g.Vygotsky or Rogoff, implying a similar conception. Such conceptions can also be implied in choice of language.

2. Methods. Both the research design and the measures used to capture motivation in classrooms will be examine. The unit of analysis and which features of students and the context are studied and how will be noted.

3. Congruence and Discrepancies between theoretical conceptualization and methodological operationalization.

Following the description and analysis of different approaches to conceptualizing and measuring situated motivation, we will discuss the implications (theoretical, methodological, practical) of these approaches for the study of motivation in classroom contexts.

Motivation in collaborative learning: New concepts and methods for studying social processes of motivation

Sanna Jarvela, University of Oulu, Finland
Simone Volet, Murdoch University, Australia
Hanna Jarvenoja, University of Oulu, Finland

The aim of this paper is to discuss theoretical and methodological issues related to the study of contextual and social processes of motivation in goal-oriented collaborative learning activities. Three challenges towards a more social conceptualisation and investigation of motivation are identified. First, how to conceptualise motivation as a dual psychological-social phenomenon? Second, how to conceptualise the social nature and origin of motivation? These conceptual questions lead to the third challenge of how to study the social processes of motivation in dynamic, socially challenging collaborative learning activities. Studying the dynamics of motivation in socially challenging collaborative activities is needed since new pedagogical environments have stressed the importance of learners' active involvement in collaborative, social constructivist forms of learning. Such activities create new motivational challenges in the classroom and need to be better understood. A recent study that examined how university students collaborated on a study activity perceived as particularly motivationally and emotionally challenging will illustrate an attempt to collect questionnaire data on dynamic social processes of motivation. We will introduce the idea of a ìdynamic questionnaire, which assesses each group

member's engagement in self-, other- and negotiated regulation strategies that are aimed at addressing what they perceived as the most socially challenging aspects of the situation, and eventually achieving their personal goals.

Beyond research on motivation in social learning contexts: Threats and challenges
Alexander Minnaert, University of Groningen, Netherlands

Empirical studies in the area of motivation in social learning contexts are often criticized about various conceptual and methodological issues. Many threats of construct, internal, external, and statistical conclusion validity are likely, also - and sometimes especially - when the research in conducted within an ecologically valid learning context. The objective of this contribution is to advance our understanding and awareness of the threats and challenges in the area of research on motivation in ecologically valid, social learning contexts. Three longitudinal, panel design studies, conducted in secondary vocational education and higher education within the Netherlands, are used to illustrate these conceptual and methodological issues. On a meta-level, the findings of these studies compel for more fine-grained, multi-dimensional, and multi-level approaches to disentangle the recursivity among various motivational, social, affective, and cognitive variables in social learning contexts. In reaction to the plentiful static designs and models, we need more ìcontextualized, dynamic longitudinal designs (e.g., cross-sectional, trend, intervention, time series, or panel studies) enriched by moderator/mediator variables and multiple outcome variables. Besides, the study dealing with theoretically incongruent or dissonant patterns of learning among first-year university students urges not only the need for more longitudinal designs and multi-dimensional approaches, but also the need for more dynamic theories able to model motivational orientations, learning conceptions, and learning and regulation strategies in a comprehensive way. Once the theory has been revised in this way, the phenomenon of dissonance, or at least some otherwise disturbing aspects of it, become part of the theory rather than something outside it. The threats and challenges in research on motivation in social learning contexts will be discussed.

EARLI Invited Symposium
Mathematics Education

**TEACHING FOR A HIGH QUALITY OF MOTIVATION AND DEEP UN-
DERSTANDING: OUTCOMES OF A BI-NATIONAL PROJECT**

Chair: Kurt Reusser, Institute of Education, University of Zurich,
                Switzerland
Organiser: Kurt Reusser, Institute of Education, University of Zurich,
                Switzerland
Discussants: Paul Andrews, University of Cambridge, United Kingdom
                Kurt Reusser, Institute of Education, University of Zurich,
                Switzerland

Which learning environments for mathematics education are optimally support-
ive, motivationally satisfactory, and effective? In a bi-national video study "Teach-
ing quality and mathematical understanding in different cultures of instruction (a
joint project guided by research groups located at the University of Zurich and the
German Institute of International Educational Research in Frankfurt; c.f. Klieme,
Reusser & Pauli, 2003), Swiss and German mathematics teaching has been inves-
tigated using both a longitudinal and a microgenetic design. The study is based on
a multi-level (classroom, individual), multi-perspective (students, teachers, outside
experts), multi-method (video data, questionnaires and tests), and multi-criteria
(maths achievement, maths interest and motivational profile) approach in order to
examine the impact of instructional quality on the development of mathematical
achievement and motivation of secondary school students. The study, which was
conducted over the course of one year, combines video data (5 lessons per teacher)
from two different mathematical topics with information gathered on a range of rel-
evant dimensions of teaching and learning quality, incorporating self-reports from
students, high-inference expert ratings of instructional patterns and content, and
standardised achievement tests. The topics were anchored both in the Swiss and the
German math curricula, and consisted of the first three lessons of the introduction
to Pythagorean theorem on the one hand and a lesson dealing with mathematical
word problems on the other. The sample of the study consisted of 20 Swiss and
20 German secondary school classes from the two higher school tracks. Based on
the videotaped lessons collected from the 40 teachers and the questionnaires and

tests of approximately 954 pupils of Years 8 and 9, the papers will use multi-level modelling to address differential relations (across different groups of students and different mathematical topics) between observational video data, student perception of learning environments, and student outcomes related to multidimensional measures and criteria.

Teaching patterns and learning quality in Swiss and German mathematics instruction

Isabelle Hugener, Institute of Education, University of Zurich, Switzerland
Christine Pauli, Institute of Education, University of Zurich, Switzerland
Kurt Reusser, Institute of Education, University of Zurich, Switzerland
Urs Grob, Institute of Education, University of Zurich, Switzerland

Teaching has an influence on the quality of the learning process and consequently on pupil achievement. The goal of this analysis is (1) to identify different teaching patterns, (2) to relate these to the self-reported, subjectively experienced learning quality of the pupils and (3) to compare this with a quality rating by trained observers with regard to cognitive activation in order to settle the question of whether a particular teaching pattern is especially conducive to learning qualities on the part of the pupils such as cognitive learning activity and understanding. From the research it is known that quality features such as "cognitive activation and "deep understanding are positively correlated with mathematics achievement. The problem-solving, discovery-based teaching pattern of Japan has therefore long counted as a model of cognitively activating teaching. As yet it has not been possible to empirically verify this link. Instead, previous research results point to the fact that a questioning-developing, direct instruction is particularly effective for pupil achievement. This question of the link between cognitive learning activity and different problem-oriented and questioning-developing teaching patterns is addressed in this contribution. This analysis emerges in the framework of the bi-national project. It is based on the 39 videotaped instructional units (117 lessons) on the introduction to Pythagorean theorem. In addition, pupil surveys ($N = 954$) on the experienced instruction and the quality rating of the videotaped lessons will be included. In the presentation both the methodological procedure and the results of the analysis will be presented.

Instructional quality, instructional content, and conceptual understanding: A micro-genetic study of geometry learning

Eckhard Klieme, German Institute for Int. Educational Research, Germany
Barbara Vetter, Institute of Education, University of Zurich, Switzerland
Frank Lipowsky, German Institute for Int. Educational Research, Germany

How should instruction be shaped to allow students to gain a deep understanding of domain-specific concepts and develop adequate, non-schematic epistemological beliefs? This paper reports on a study which tries to investigate content-specific teaching and learning from a micro-genetic point of view. 40 Teachers were video-taped in three lessons dealing with the introduction to the Pythagorean theorem, and they were asked to implement a mathematical proof at least once within that unit. Thus, higher levels of "cognitive activation could be expected. Different kinds of cognitive outcomes (procedural and factual knowledge, geometrical problem solving, understanding of the Pythagorean theorem, and understanding of proof) were measured (a) at the beginning and the end of the school year (global math scores, long-term design) as well as (b) immediately before and after a three-lesson unit on the Pythagorean theorem (content-focused math, short-term design). Thus, conceptual development could be described both from a long-term (global) and a short-term (thematically focused) perspective. General aspects of instructional quality, especially with regard to cognitive activation, were captured in student question-naires as well as in high-inference ratings by trained video observers. Detailed content coding assessed which of a set of mathematical aspects related to the theorem had been covered within the lesson. Hierarchical linear models showed that the overall level of cognitive activation has a strong effect on learning gains, especially with regard to the understanding of proof. Analyses of the contingencies between content covered in the lesson and student's understanding of the Pythagorean theorem proved that content coverage has an effect on the kind of understanding which students generate. Four cases with specific profiles of learning gains were studied in detail by interpretative analysis of videotapes. The presentation will also address the issue of differential effects of instruction.

Learning environment and learning motivation in mathematics instruction - differential relations depending on the topic?

Katrin Rakoczy, German Institute for Int. Educational Research, Germany
Christine Pauli, Institute of Education, University of Zurich, Switzerland
Eckhard Klieme, German Institute for Int. Educational Research, Germany

According to self-determination theory (Deci & Ryan) and the person-object approach to interest (Krapp) the quality of learning motivation is a relational concept developing from the interaction between the individual and his or her social environment. As a result, the subject which is to be learned plays a crucial role for the students' quality of learning motivation. The present study takes a closer look at the motivational regulation in mathematics instruction by comparing different topics with regard to the question: Does the quality of students' learning motivation show topic-specific relations to the learning environment?

In order to answer this question data of the bi-national study "Quality of instruction and mathematical understanding in different cultures was analysed. The sample consisted of 20 Swiss and 20 German secondary school classes from the two higher school tracks.

The students' learning environment and their self-reported quality of learning motivation were assessed in the context of two different mathematical topics: the introduction to the theorem of Pythagoras on the one hand, and the dealing with word problems on the other hand. An objective perspective on the learning environment was realized by videotaping parts of these teaching units. The subjective experience of the learning environment was assessed by questionnaire.

In order to investigate the relationships between the different perspectives on the learning conditions and the students' learning motivation in both mathematical topics, hierarchical linear modelling was conducted. The results of the hierarchical linear modelling show that differential relationships between the perceived learning environment and the quality of students' learning motivation across the two different mathematical topics do exist. The discussion of results is going to focus on the question to what extent the observed learning environment confirms or explains these relationships.

The motivational importance of introductory lessons against the background of the expectancy-value model of achievement motivation
Alex Buff, Zurich University of Applied Sciences, Switzerland
Kurt Reusser, Institute of Education, University of Zurich, Switzerland
Christine Pauli, Institute of Education, University of Zurich, Switzerland

The first impression is (often) crucial!? As we have all experienced ourselves, our first encounter with an object often leaves a deep impression, which even in the face of later contradictory experiences proves to be fairly resistant. Introductory lessons can, in this sense, be seen as "first encounters, which means that from a motivation theoretical perspective they can be particularly important. To put it another way: If the introduction to a topic is "messed up in any way, this can have an unfavourable influence on further learning. In this contribution, the question of the motivational importance of introductory lessons (Pythagorean theorem), or specific instructional features of them, are discussed against the background of the expectancy-value model of achievement motivation by Eccles and Wigfield. Examined are (1) the importance of instructional features of the introduction for the affective experience of the pupils directly after the introductory lessons, (2) the importance of instruction and affective experience with regard to the expectancy and the task value components of the model prior to the test on Pythagorean theorem, (3) the effects of dispositional features (control beliefs and interest), which were measured at the beginning of the school year, and finally (4) the dimensions analysed in questions 1-3 are related to the test achievements, controlling among other things for the general ability in mathematics, which was also measured at the beginning of the school year. The analyses are based on the statements of 954 pupils from 40 classes, who participated in the bi-national study presented in this symposium over the course of one year. The special features of the study lie in the consistent longitudinal design in the recording of the relevant dimensions, incorporating different data sources as well as the measurement of the constructs on different hierarchical levels: dispositional vs. situational.

SIG Invited Symposium
Conceptual Change

SITUATED CONCEPTUAL STRUCTURES

Chair: Gunilla Petersson, Karolinska Institute, Sweden
Organiser: Gunilla Petersson, Karolinska Institute and Stockholm University,
                Sweden
                Kaarina Meerenluoto, University of Turku, Finland
Discussant: Erno Lehtinen, University of Turku, Finland
                Stella Vosniadou, University of Athens, Greece

Knowledge is always situated. According to sociocultural analysis and situated cognition it is situated in practical settings and realised as management of cultural tools. In established constructivist theories knowledge is embedded in conceptual nets which form conceptual structures. Although context is a fundamental part of both approaches, it stands for quite different things; in one it refers to communicative settings and in the other to conceptual systems. The debate between these two approaches has given rise to a number of questions. Can we, for example, explain students' interpretations of a study task in an educational setting by condensing one theory into the other? Is it fruitful to try to unify the two approaches? How should we account for the situated aspects of cognitive function and for individual variations in a situation from a sociocultural perspective? This symposium aims to highlight these issues and is thus focussing on context and its meaning in sociocultural as well as in constructivist theories.

Situating conceptual structures in physics: What are we looking at?
 Claudia von Aufschnaiter, University of Hannover, Germany

Within the last years, an increasing body of research in science education has addressed theoretical foundations of students' learning of science. Theoretical accounts often address either the social aspect of learning or individual cognition. The paper argues that the theoretical framework chosen very much depends on the frame of reference. In order to understand how students develop their knowledge about a specific subject while acting and thinking in a learning community we might not describe and theorize how experts act nor should we refer to outcomes

of pre-post-testing. Rather, we may consider how a learner experiences the social and material world around him or her and makes use of this world for both developing his/her own understanding and creating opportunities for other learners to gain new knowledge. The framework used to investigate empirical data on learners approaching the domain of physics is based on individual experiences and individual learning in relation to the social and material world. Furthermore, it addresses some more general ideas of neurobiology in order to distinguish cognitive structures from cognitive processes as well as to describe how the notion of ìsituated may refer to (mental) activity.

Studying the (con)textuality of explanations in the learning of science
Kristiina Kumpulainen, Unversity of Oulu, Finland
Marjatta Kangassalo, University of Tampere, Finland
Satu Vasama, niversity of Oulu, Finland

 In the traditional conceptual change research tradition, explanations are often investigated as monological acts of language and cognition, witnessing the nature of conceptual understanding the individual holds of a particular scientific phenomenon. Typical to this strand of research has been to de-contextualize explanations from the social and physical contexts in which they are created. Less attention has been paid to the sociocultural contexts of explanation activity. In following the sociocultural and discursive approach to conceptual thinking and learning, this presentation discusses the potential of intertextual analysis to illuminate the contextual nature of explanation construction in the learning of science. The presentation draws on an empirical study that examined the intertextual elements of Children's explanations in a technology-enriched early years science classroom (N=22). The overall goal of the study was to investigate how the inquiry-based science unit, including its tools and activities, created the children social spaces to engage in the activity of explaining. Micro-level analyses of video-taped and transcribed data covering a 5-month period reveal that inquiry-based science learning activities enriched by a multimedia science learning tool, PICCO, promoted learners' active explanation construction. The Children's explanations were found to draw on multiple contexts, namely on textual and material links, hands-on explorations as well as on recounting events. These intertextual linkages functioned as important tools for the children (a) to share and validate previous experiences as sources of knowledge, (b) to establish reciprocity with each other, (c) to define themselves as learners of science and as individuals with specific experiences and background, and (d) to construct, maintain and contest the cultural practices of what it means to do and learn science

in the classroom.

Communicating understanding in a primary mathematics classroom: Towards a community of practice
Raymond Brown, Griffith university, Australia
Peter Renshaw, Griffith university, Australia

This study investigates the emergence of a community of practice within a primary classroom. Through employing detailed analyses of video/audio-taped transcripts, teacher/student journal entries, and students' work samples, the study investigates a Year 7 classroom's ways of coming to know, do, and value mathematics over the course of one school year. One of the concerns of the study was to provide insights into whether students use cultural tools such as mathematical notation systems to communicate meaning and to promote understanding when they operate in a classroom culture that provides them with the support necessary to positively experience the ways in which mature communities of practice communicate. The communicative activities of mature communities of practice may be said to be characterised by the expectations that (a) the products of members' efforts will undergo critical comment, (b) individuals will communicate with each other as equals, and (c) correctness and plausibility are to be found through members engaging in the discourse practices of the group. The study found that students do use mathematical notation systems to communicate meaning and to promote understanding when they are engaged in classroom talk that encourages them to change the relationship between themselves and the tools that they use to communicate their mathematics. It was found that the culture of the classroom influenced students' moves toward more mature forms of numerate behaviour by enacting norms that encouraged them to present their ideas and opinions, to accept that their presentations may not always be adequate, and to give truthful feedback and reports. It was found also that student use of mathematical notation systems to communicate understanding required the teacher and students to co-construct skills (e.g., listening, critiquing, evaluating) over time and to challenge each other to extend the quality of teaching and learning that takes place in the classroom.

Reasoning, categorising, and conceptualisation in situated practices
Asa Makitalo, University of Gothenburg, Sweden
Roger Saljo, University of Gothenburg, Sweden

Categorising is fundamental to human activities. Our perception, our memory, our

conceptual knowledge, and all our cognitive activities are grounded in distinctions of a categorical nature. Categorising is obviously one of the most important mechanisms through which human experiences are shaped and communicated. But we also need to recognise that categorising is fundamental at the collective level. Institutional practices such as those taking place in research, in courts of law, bureaucracies, and in many other settings are coordinated by means of categories. We would argue that categorising, and the uses of conceptual knowledge, must be understood in terms of this tension between individual knowing and collective practices. In research on conceptual learning and conceptual knowledge, concepts are generally studied as ready-made entities that people are supposed to acquire and master. The concepts appear as finished and closed entities, and they preferably should be grounded in scientific discourse in order to be legitimate. The extent to which people master these normatively sanctioned concepts, then, serves as a measure of conceptual learning. In our perspective, conceptual knowing is a natural element of human practices. Such knowing emerges in situated activities precisely because it corresponds to local needs and because it has the coordinating and rhetorical functions that are productive. Furthermore, we argue that conceptual knowledge should not be understood primarily as abstract linguistic entities that somehow represent reality but rather be conceived, and studied, as parts of the concrete practices of various activities. In the present study, we show how conceptual tools simultaneously serve as elements of individual reasoning, of collective communicative practices, and of the computerized technology that has is used to coordinate activities.

C 24   24 August 2005   08:30 - 10:30   Room E111

Symposium
Metacognition

THE NATURE OF METACOGNITION

Chair: Marcel V. J. Veenman, Leiden University, Netherlands
Organiser: Marcel V. J. Veenman, Leiden University, Netherlands
Discussant: Anastasia Efklides, Aristotle University, Greece

Metacognition appears to be one of the most powerful predictors of learning (Wang, Haertel & Walberg, 1990). Since Flavell coined the term in the seventies of the last century, however, consensus about definitions, about constituents, and about measurement methods of metacognition has been far out of reach (Veenman, in press).

This symposium is intended to contribute to a more comprehensive view on meta-cognition and its relation to other learner characteristics, such as developmental processes, compliance to demands of the task, intelligence, and motivational processes. Moreover, the undertow of these issues is the intricate relation between cognitive and metacognitive processes. Metacognition regulates cognitive activity, but at the same time it needs cognitive activity as a vehicle. For instance, checking the outcome of a mathematical procedure requires the cognitive activity of recalculation. In the presentation of Panaoura and Demetriou metacognition, the relation between cognitive and metacognitive processes is studied from a developmental perspective with very young children. Broekkamp et al. present a review study on how metacognition regulates the adaptation of students to self-imposed and externally enforced task demands. Meijer et al. investigated the relation between intelligence and the mere quantity of various metacognitive activities. Finally, Bendorf tries to uncover the relation between metacognitive and motivational processes through an intervention study. In various ways, all presentations deal with the relation between metacognitive and cognitive processes.

The interplay of the development of processing efficiency, working memory and self-representation with the development of mathematical performance
Areti Panaoura, UCY, Cyprus
Andreas Demetriou, University of Cyprus, Cyprus

The human mind includes three fundamental levels of organization: the processing system, the environment oriented level and the self-oriented level which involves metacognitive abilities. Although recent research on mathematics education has focused on metacognition and its influence on problem-solving ability, we know little about the relationship between cognitive and metacognitive processes. The focus of the present study was the investigation of the interplay of the development of processing efficiency, working memory and self-representation with the development of mathematical performance. A series of three repeated waves of measurements were done at 126 pupils (3-5 grades). Dynamic modelling was used to specify the nature of change in the main aspects of the mind and the possible interrelations in the patterns of change in these aspects. After testing several models we found that growth in each of the abilities was affected by the state of the others, especially the state of processing efficiency. Specifically, the existence of significant correlations among different cognitive abilities, especially between processing efficiency with working memory and cognitive performance in mathematics suggest that growth in each of the abilities was affected by the state of the other variables, especially the

state of processing efficiency at a given point of time. From the analysis of dynamic models it was quite clear that the processing efficiency had a coordinator role on the cognitive and the metacognitive system. Additionally results of the dynamic models indicated the coherence of the metacognitive system. The lack of relations between self-image and cognitive abilities suggested that growth of self-image was not directly affected by the state of the processing efficiency or working memory at a given point in time. Actually the advancement on self-image depended on the advancement of mathematical performance.

Strategic flexibility: A special case of metacognition
Hein Broekkamp, University of Amsterdam, Netherlands
Bernadette H. A. M. van Hout-Wolters, University of Amsterdam, Netherlands
Marcel V.J. Veenman, Leiden University, Netherlands

Strategies are at the heart of metacognition. By choosing, constructing, executing, monitoring, evaluating and revising plans of action, students regulate and become aware of their task performance and learning. Engaging in these metacognitive processes, however, is not enough. It is also the quality of these processes that determines the effectiveness of task performance and learning. A crucial quality criterium is goal directedness. The degree to which metacognitive processes are directed towards task goals will determine the likelihood that these goals are actually met. A distinction can be made between goals that learners set for themselves (personal goals), and goals that are defined by others or the environment in which the task is performed (task demands). We present a review study about students' attunement of study strategies to the particular information and types of processing that they should emphasize while studying (i.e., content and processing demands). For instance, students may rehearse information or create mnemonics to meet verbatim reproduction demands, while they may self-generate questions or reorganize learning materials when integration or deep comprehension is required. Similarly, students may pay special attention to text parts that are relevant to the task. Such task attunement draws heavily on metacognition. Part of the metacognitive knowledge and skills is needed to execute the strategies properly. Other metacognitive knowledge and skills are needed to analyze task demands and choose or tailor strategies according to these demands. We refer to the latter type of metacognition as students' ìstrategic flexibility. So far, strategic flexibility has been examined in limited ways. It is clear, though, that effective task attunement is not only dependent on the student but also on the environment. Teachers can foster students' task attunement by being clear about task demands and by providing metacognitive instruction aimed

at the development of students' strategic flexibility.

Metacognitive activity, intelligence, and learning results
Joost Meijer, University of Amsterdam, Netherlands
Marcel Veenman, Leiden University, Netherlands
Bernadette Van Hout-Wolters, University of Amsterdam, Netherlands

In this study into the relation between metacognitive activity, intelligence and learning outcomes, metacognitive activity was operationalised by nominal descriptions of mental behaviour observed in thinking-aloud protocols rather than by quality judgments. A taxonomy of metacognitive activities that was developed earlier, was revised in order to achieve sufficient interrater agreement. The framework of the taxonomy is built around the superordinate categories orientation, planning, execution, monitoring, evaluation and elaboration. Thinking-aloud protocols from 43 thirteen-year olds reading texts about history and physics were analysed using the taxonomy. Before the thinking-aloud sessions, participants had been tested for their intelligence and prior knowledge about the subjects of the history text and the text about physics. After the thinking-aloud sessions, posttests about the history and physics subjects were administered. Analysis of the data revealed that for the history text and tests, intelligence, metacognitive activity and test performance were unrelated. Posttest performance was only determined by pretest performance. For the physics text and tests, it appeared that intelligence determined posttest performance indirectly, through the pretest. Apart from executive activities, metacognition did not show any effect, neither on the pretest, nor on the posttest.

Fostering metacognition and learning strategies in commercial education
Michael Bendorf, Georg-August-University, Germany

Self-regulated learning becomes more and more important and, meanwhile, is regarded as one of the most popular objectives in commercial education. The question is how the constitutive components of self-regulated learning - learning strategies, metacognition, and motivation - can be promoted in learning situations. We prefer a direct and domain-integrated approach, which simultaneously promotes motivation, metacognition and learning strategies. In our project ìPromoting self competence, domain competence and functional competence in the commercial subjects at the Fachgymnasium Wirtschaft we aim for enabling eleven graders to act adequately in complex economic situations. It is assumed that motivation and strategic learning behavior play an important part in the development of these required competencies.

This contribution gives an insight in our approach to promote learning strategies and metacogntion through learning diaries; thereby the influence of motivation is taken into consideration. We assume that motivation and strategy trainings are necessary to support intrinsic kinds of motivation and the use of metacognion and strategies in their contribution to promote competencies. To investigate the effects of motivation and strategy/metacognition training on learning performance we conduct our study in 15 classes at five schools; thereby, we vary both kinds of training as independent variables. In this context, two critical aspects have to be mentioned. First, the use of strategies does not automatically lead to better learning performance. Secondly, the relationship between the subjectively estimated learning behaviors in questionnaires and the actual context-specific strategy use is not yet sufficiently clarified; therefore, we conduct summative and formative assessments to highlight this relationship. This contribution has its focus on the development of strategies and metacognition - under particular consideration of the influence of motivation in learning. Our study started in August 2004. First results are reported.

D 1   24 August 2005   11:00 - 12:20   Computer Labs

CIT Sessions

EVALUATION OF THE IMPACT OF A TOOL FOR COMPOSING PERSONALISED STUDENT RATING QUESTIONNAIRES IN COMPARISON WITH A STANDARDISED QUESTIONNAIRE

Marjoleine Breda, University of Leuven, Belgium
Kim Waeytens, University of Leuven, Belgium
Mieke Clement, University of Leuven, Belgium

Validity and reliability are considered important aspects of student ratings when the results are used in summative evaluations, but less so when student ratings have no other goal than giving feedback to the faculty. In a formative context, the quality of student ratings can be expressed in terms of its power to provoke reflection, change in teacher thinking and teaching practice rather than psychometric qualities. Questionnaires gain power to change teaching according to the results of the rating when they are in line with teachers' conceptions of teaching (Johnson, 2000). Optikwest is an on line tool that helps faculty construct a questionnaire that is in line with their subjective theories and educational practice. The tool is designed to provoke reflection. The tool introduces frameworks that need to be used by the faculty

to describe their educational practice and subjective theories as a first stimulus for reflection. As a second stimulus for reflection, feedback on their subjective theories and educational practice is given. The student feedback is the third stimulus for reflection. Opti-kwest is evaluated by comparison to a standardised questionnaire (EVALEC; Janssen, 1993) on the criteria of power to foster change en provoke reflection. Structured interviews were conducted by phone with users of either one of the instruments. Both qualitative and quantitative information was gathered. Preliminary results show that the design of Opti-kwest effectively provokes reflection when the questionnaires are composed. There does not seem to be a large difference between Opti-kwest and EVALEC with regard to the power to provoke change. It is suggested that contextual factors might influence the perception of the users and the impact of the instruments and that embedding a questionnaire tool in a larger offer for faculty improvement might augment its impact.

ConceptOrganizer: a Multifunctional Tool for Structuring Content
Lassi Nirhamo, Univ. of Turku, Finland

Constructing structured models of concepts and their interrelationships requires usually a full platform or specialized software. These models can be used in learning to facilitate computer supported collaborative learning, to help in developing argumentation skills, and to support knowledge building. Using a full platform in common every-day learning situations especially in educational institutions can cause problems because its seamless integration to working practices is not easy to achieve. Specialized software works well as an individual tool but the collaborative use of individual tools has proven to be a real challenge. To address these problems Educational Technology Unit from University of Turku has developed ConceptOrganizer, a multifunctional tool for structuring content. ConceptOrganizer is a small Flash application which has a very simple but powerful user interface. It provides means to place ìcontainers to application's desktop and define their relationships. Types of relation lines and the number of relation types are fully user definable. ConceptOrganizer's input information about available containers and output information about container locations and relations are in XML format. By using XML as communication format the data to and from ConceptOrganizer application is easily processed or analyzed with other applications. ConceptOrganizer's Flash source code is freely available to everyone and additional language support is easily added by only tagging appropriate terms in external language text file. This flexibility makes it possible to use ConceptOrganizer in various settings. In the University of Turku ConceptOrganizer application is integrated in learning platform WorkMates.

To give users different view to content, ConceptOrganizer application is used in WorkMates as a graphical interface to materials. This makes it easy to teachers to give the students e.g. wanted view to course materials. There are some research projects planned to gather information about actual usage and to guide further development of ConceptOrganizer.

D 2   24 August 2005   11:00 - 12:20

Thematic Poster Session
Assessment and evaluation
Discussant: Constantinos Papanastasiou, University of Cyprus

D 1   The Diary as a methodological tool for accessing the learner perspective on a learning environment
Margaret Brady, UEA, United Kingdom

This paper looks at the diary as a means of gathering data on the learning environment from the perspective of the learner. The diary helps the inquirer to gain insight into motivational and emotional aspects of learning and to capture the immediacy of a learning experience. The added value of using a diary approach is the learning that may be gained by encouraging the learner to take a reflective stance towards their work. Time spent on looking forward in a reflective frame of mind may reduce anxiety and maximise the learning that may be gained from the experience ahead. The paper will discuss the experience of the author of using the diary as a research instrument in a pan European Research Project in order to gain the learners' perspective on an ICT learning environment which was implemented in a cross-section of schools through the action of the project. A comparison is made between the merits of two forms of diary used to collect evidence. The main themes that emerged of significance for learners were collaborative work with cross-national partners and issues in relation to the telematics environment. It is concluded by the paper that the diary is instrumental in gaining access to the perspective of the learner and in providing insight into emotional and affective aspects of learning. As a method of investigation it can filter evidence for more focused inquiry and may be triangulated with other methods of investigation in order to increase the credibility and dependability of findings. Besides providing information about the student perspective, it stimulates reflectiveness in individuals and among groups which helps future learning, opening the mind to new ways of looking at problems to be encountered.

D2   The role of time of assessment in collecting expectancies in process-oriented course evaluations

Katrin Kahmann, University of Regensburg, Germany
Regina Mulder, University of Regensburg, Germany

It is a characteristic of the -integrative evaluation to collect expectancy rates of participants in addition to evaluations (Henninger & Balk, 2001). Measuring expectancies has proven to be a helpful source of information. The question arises if there is a suitable moment to collect expectancy rates. In order to find an answer to this question two argumentation lines were taken. The first argumentation was found in the action-theoretical aspect of evaluation and in the process-oriented evaluation (Frese & Zapf, 1994; Henninger, Balk & Mandl, 1998). The basis for the second line of argumentation was if expectancy rates of participants may change over the time of a course. The first line of argumentation implied, that expectancies should be measured at the beginning of the course. The theoretical outcome of the second argumentation showed, that adaptive processes of expectancies can take place during the course, which can lead to changes in the expectancies. The empirical verification of this thesis gave no clear results. There was no significant difference of expectancy rates at three different moments of collecting expectancies. But the participants surveyed at the end of the course stated, that they could not remember exactly the expectancies they had at the beginning of the course. Comprising it was the result of the study, that expectancy rates should be collected as early as possible in a course. This inquiry is a starting point for further research in course evaluation. As a next step an ìadaptive online evaluation toll is due to be designed. We will elaborate on that during the presentation.

D3   MAPS - Measurement & Assessment of Problem Solving

Eveline Wuttke, Johannes Gutenberg-Universitaet Mainz, Germany
Karsten D. Wolf, Otto-Friedrich Universitaet Bamberg, Germany

While researchers and educators consider problem solving as basic skill needed by today's learners, very little is still done to help students to acquire those skills. This is partly due to the fact that - apart from not knowing how to teach them - teachers dont know how to assess complex problem solving skills. Our work within this field is based on a theoretical framework (Sembill 1992) comparable to the IDEAL framework (Bransford and Stein 1993). It is called Analytical Ideal Type (AIT) of planned action and provides in a first step design criteria for complex learning environments were students solve problems. In the second step it can be used as an

instrument to evaluate quantity and quality of students' solutions to problems. The instrument measures how they:

1. analyze the given situation,
2. specify goals,
3. develop adequate strategies and
4. (mentally) control, if the solutions are adequate and the problem is solved.

Unfortunately the AIT system is extremely time-consuming and therefore not really usable for teachers. Another critical point is that the results of the tests are highly dependent on the student's motivation to try hard in the problem solution and their ability to put down a solution in writing. Therefore we are currently developing the AIT further into an instrument called MAPS (Measuring and Assessing Problem Solving). In contrast to the AIT method the MAPS test supplies detailed questions along with the problem description. These questions are intended to help students with the problem solution and "trigger" answers evens from students who are not highly motivated to provide written solutions. Results concerning the quality of the instruments and first results about problem solving skills from various pilot studies will be reported at the conference.

D4   The utrecht early mathematical competence test in a spanish sample

Manuel Aguilar-Villagran, University of Cadiz, Spain
Jose Navarro Guzman, University of Cadiz, Spain
Concepcion Alcalde, University of Cadiz, Spain
Esperanza Marchena, University of Cadiz, Spain
Gonzalo Ruiz, University of Cadiz, Spain

A large number of reports linked with early mathematical competence in pre-school children were published in the nineties. Some studies considered skills and abilities of young children with numbers using longitudinal procedures. Results show huge mathematical competence differences for school beginners. They have important consequences in mathematic teaching: if we know differences, an accurate learning program would be feasible. Within the Spanish educational context, early mathematical competence tests are not common. In this presentation an Spanish adapted version of The Utrecht Early Mathematical Competence Test (EMTC) (van Luit, van de Rijt, & Pennings, 1994) is presented. A total of 128 children aged between 4 and 5 participated in this study. They attended kinder garden school, came from middle-class family backgrounds and were socially adapted. The Utrecht Early Mathematical Competence Test (Version A) was individually administered to each participant in one session, with the prior agreement of their parents. EMTC assess

eight aspects of mathematical competence: Concepts of Comparison of quantitative and qualitative characteristics of objects; Classification of objects in class o subclass; Correspondence one to one relation; Seriation of objects in class or subclass based on criteria; Using counting words, forward and backward; Structures counting, synchronous counting, shortened counting from the dice structure; Resultative counting, structured and unstructured quantities as well as counting hidden quantities; and General knowledge of numbers, being able to use knowledge of the number system in simple problem condition. Each subtest has five questions. After the administration, the given answers were judged on their correctness with the help of the EMTC scoring key. Then, the children test scores were transformed in a competence score. This hematical ability. Finally, in order to check the EMTC fiability, results were compared with the experimental version of the Basic Mathematical Competences Assessment Test (TEDI-MATH) designed for Spanish children.

D5   Diagnosis and treatment of developmental disorders with computer based targeted exercises
Gabriella Blenessy, ELTE TTK, Hungary

In Hungary some 7 to 17% of children in school age are affected by some kind of developmental disorder. If we compare this number with the low number of available trained therapists we understand the need for a new approach in this field. One solution would be to develop tools for therapy which could be used for independent work with only little assistance from the part of a trained staff. These tools should be accessible for schools, therapeutical institutions and other organizations which target children. If parents could help their children in using these toolsóbased on the advice of expertsóthat would greatly enhance the situation.

D6   Teacher education students' evaluations of their problem-based learning experiences

Rosalind Murray-Harvey, Flinders University, Australia
Helen Askell-Williams, Flinders University, Australia

This paper reports the application of a conceptual framework to teacher education students' evaluations of the effectiveness of problem-based learning (PBL) environments for teaching and learning. The framework permitted comparisons between students' evaluations and the aims of their teacher education program. Much PBL research has concentrated on medical and health-related fields, and on

student achievements in content knowledge measured by test scores. Many less easily measured qualities that PBL purports to foster, such as collaborative skills, critical thinking and problem-solving, self-directed learning (SDL), and developing professional identity, are generally not researched. They are, nevertheless, desirable outcomes of university study and are explicit aims of many programs, including teacher education. To evaluate the effectiveness of a PBL environment for developing these less easily measured qualities we developed a conceptual framework to analyze students' written evaluations of their PBL experience in their teacher education program at a South Australian university. The framework contains five categories that reflect key aims of both the B.Ed program and concepts in extant PBL literature: knowledge; critical thinking; theory-practice relationships; collaboration; and self-directed learning. Using the conceptual framework we examined students' manuscripts with NVivo to map the scope and complexity of their ideas about teaching and learning. The framework proved to be an informative tool for mapping and interpreting students' perspectives of structural (PBL tutorial format, group work) and functional (personal, interpersonal, professional skill development) contributions of the PBL environment for their learning. Key findings include that students (1) perceive the value of case studies for engaging with subject content, motivating learning and connecting theory with practice, (2) develop awareness of reflective practice and professional identity, (3) recognize links between PBL and SDL, and (4) build collaborative group learning skills. The paper elucidates ways in which desired outcomes of professional education programs may be realized through PBL.

D7   Teacher Credentialing Reform and Candidate Assessment: Challenges and Dilemmas
Anne Hafner, California State University Los Angeles, United States

Many states in the USA have passed teacher credentialing reform laws in response to a national accountability push. This paper reports on the impact of one state`s credential reform on candidate assessment. A mixed methods approach was used, with a web survey and site visits. The study found that the reform influenced major changes in assessment. Most programs embedded candidate assessment into their classes and gave a summative evaluation of teaching. Although respondents were positive about having candidate outcome data, some were negative about the prescriptive nature of the mandate. There was great concern about the resources needed to implement assessment. One lesson is that although programs view candidate assessment as valuable, sustaining high quality assessment requires considerable

resources of time, personnel and training.

D8   Peer group assessment of teaching competency
Erica McAteer, University of Strathclyde, United Kingdom
Tracy Maluleka, University of Glasgow, United Kingdom

Teaching competency can be defined, and assessed, in various ways in Higher Education institutions. The Dearing recommendations influenced UK policy throughout the mid 1990s and led to the development of the Institute for Learning and Teaching in Higher Education, now re-formulated as the Higher Education Teaching Academy, and the growth of accredited courses in Higher Education teaching. This paper reports on research into the application and use of generic criteria to peer-assess teaching competency in Higher Education, querying other research positions (Neumann: 2001, McLean: 2002) which argue against this practice. The New Lecturer Programme at the University of Glasgow provided a case for specific examination of the use of generic criteria to assess the teaching competencies of participants. The intra and interdisciplinary peer relations of the cohort during the period and the resultant social learning claimed by members of the group was an additional outcome of the study and indicated success of the programme in converging the various disciplines and facilitating a unified conception and achievement of teaching competency among the participants. A major focus of the study was the efficiency and effectiveness of peer assessment procedures across disciplines traditionally known to have diverse educational orientations. The use of generic assessment criteria in the NLP resulted in the generation of a common conception of teaching competency throughout the various disciplines that differ in their educational orientations and discouraged disciplinary disunity as far as teaching competency is conceived while simultaneously making provision for disciplinary relevance.

Culture and Education
Discussant: Helen Ftiaka, University of Cyprus

D9   Colour Coded? How well do learners of different race groups really mix in South African schools? Eight graders share their views. Telling it like it is
Saloshna Vandeyar, University of Pretoria, South Africa

This study sought to interrogate the quality of contact between learners in desegregated schools in South Africa and to examine ways in which these schools have

elected or omitted to adopt certain strategies with the opening of racially exclusive schools. These strategies were probed in light of the different discourses in the debate about race and desegregation. Semi-structured interviews with Grade 8 learners from three secondary schools as well as school observation and field notes provide the evidentiary base of this paper. There are three major research findings emanating from this study: first, the institutional culture of the school has remained relatively intact; daily operational principles of these schools are strongly embedded within the existing hegemonic culture. Second, learner identities are shifting and there is an emergence of new self-identities and third, the polarities of the status quo versus transformatory reform are currently being contested by learners in the schooling environment.

D10   Comparing Chinese and Western: the shifting cultural categorisation work of two parents in an interview
Juliet Choo, Griffith University, Australia
Peter David Renshaw, Griffith University, Australia
Helena Austin, Griffith University, Australia

This paper is based on a wider study on cross-cultural collaboration between professionals and parents in an Australian special education context. Rather than invoke and rely upon a notion of cultural dissonance between the Western trained professionals and parents of diverse cultural background as some sort of explanation for low parental participation, we employ sociocultural approaches and Membership Categorisation Analysis (MCA) to examine the dynamic ways in which parents and professionals deploy cultural categories in the interview-talk. Further, the analysis seeks to find out what work is accomplished in deploying cultural categories and what attributes are assigned to these cultural categories. In accord with the tenet of ethnomethodology to avoid pre-theorisation in analysis, only those cultural categories that participants made relevant in the talk were taken for analysis. This paper is drawn from the case example of the Chinese parents of a child with autism spectrum disorder (Timothy). Analysis of the interview shows the parents to report culture as irrelevant in their relationship with professionals. However they deployed the cultural categories Chinese and Western when talking around the theme of parenting and education. The parameters of what they talked about change and slide through the interview, revealing the layering of complexity in which they manage their situations and, also, the importance of context in their moment-to-moment categorisation work. For instance, when describing their non-disabled daughter, the parents deployed the cultural categories Chinese and Western to account for their parenting

practices as effective. This category pairing changes as their category work became more delicate and refined when they moved on to comparing Timothy and his sister. The analysis shows the complex and fluid ways in which the participants assigned traits to cultural categories, shifting among a general-trait account, a cautious and situated trait explanation, and an orientation to hybridity.

D11   Chats behind the Chig - How Bedouin teenagers perceive ICT and online Chats

Gadi Alexander, Ben Gurion University, Israel
Adnan Grebea, Ben Gurion University, Israel

The present study attempted to find out how and why the online chat is used in schools by Bedouin teenagers and how they perceive it in relation to the expectation of their traditional community. A questionnaire was administered to 203 young Bedouin high school students. Some of the topics covered were: common uses of the internet, criteria for selection of chat portals and communities, presentation or false presentations of ones identity, etc. In addition, they were questioned about their perception of the norms of their home culture, and about possible matches or mismatches between these norms and the chat activity. It was found that the chat is perceived by these teenagers as playing a significant role in their socialization process. They use chats to find virtual friends, seek opportunities to communicate with the other sex, etc. However, a repeated claim was that chats can provide a bypass allowing them to take part, at least virtually, in a kind of discourse that would not be acceptable in their own community. The chat is a potential arena in which norms and rules of the elders can be stretched or even violated without having to pay an immediate social price. In addition, it expands the social network of the teenager, and creates a space were various identities of the Bedouin youth can be virtually experienced. This study has many implications for educators who attempt to learn about the social life of their student and create a bridge between the culture of the web and the school culture. It sheds light on unintended uses of ICT in school which have to be reevaluated and screened on the basis of a changing reality in which technology is used as both an outlet and a trigger for many social and educational changes.

D12   Testing a Model of the Adaptation of Mainland Chinese Postgraduate Students to the Universities of Hong Kong
Min Zeng, University of Hong Kong, Hong Kong

Recently the People's Republic of China has become an increasing source of international students for universities all over the world. However, it is surprising that little research has been directed to the adjustment of such students. This lack is particularly true at the postgraduate level at which more and more of these students are studying. The same lack of research applies to Hong Kong whose universities have attracted large numbers of Mainland Postgraduate students in the last ten years. Their adjustment to studying in Hong Kong may be different to studying at Western or Mainland Chinese universities. Based on the previous theory that the academic integration and social integration are the major predictors of student persistence and satisfaction, this study proposed and tested a model on the adaptation of MPS in a sibling cultural setting--Hong Kong. Unlike the most previous research, which focused on either institutional factors or cultural factors, this research explored the influences of both factors on student adaptation. The instruments were modified according to MPS' situation. The participants were 222 current students from four universities in Hong Kong. Results indicated that both academic integration and social integration were strongly correlated with persistence while academic integration was more strongly correlated than social integration to student satisfaction. Among the background variables measured, motivation, Cantonese proficiency and self-evaluated English language skills showed significant correlations with students' academic integration, social integrations, satisfaction and persistence. The general support of the data on the model and hypotheses presents implications for the faculty and university administrators that, in this sibling cultural setting, Mainland Chinese students' adaptation may be similar to that of domestic undergraduate students in previous American studies. However, as research students, academic integration may play a more important role in student satisfaction. Other implications from the study were also discussed.

D13   Factors Influencing the Academic Achievement of Chinese High School Students
Guifang Fu, University of Jilin, China
Kurt Reusser, University of Zurich, Switzerland

This study aimed to investigate the effects of control expectation, task value, self-efficacy, achievement goals, learning strategies, effort and perseverance on achieve-

ment by means of covariance structure analysis in a sample of Chinese high school students. Our hypothesized structural model is a conceptual framework that stems from the literature on self-regulated learning, task value, self-efficacy, goal orientation, and learning strategies. A total of 1,968 students in grades 7, 8, 9, and 10 from 5 high schools in Changchun, China were randomly selected to complete a Chinese version of the Motivated Strategies for Learning Questionnaire (MSLQ, Pintrich & De Groot, 1990). Confirmatory factor analysis was conducted to verify the structure validity of the inventory. Academic achievement consisted of Chinese, mathematics, and English scores on end-of-semester exams. The relationships among the factors were analyzed with LISREL. The results indicated that learning strategies directly influenced achievement. Achievement goals had not only direct effects, but also indirect effects on achievement through learning strategies. Task value directly influenced learning strategies as well as effort and perseverance. Task value, self-efficacy, effort and perseverance all had an indirect influence on achievement through learning strategies. Control expectation had no effect on learning strategies, effort or perseverance. The sequence of significance of the effects of the factors on Chinese high school students' achievement was task value, effort and perseverance, self-efficacy, achievement goals, and learning strategies. Task value, self-efficacy, achievement goals, effort and perseverance, and learning strategies were able to explain 58% of the variance of achievement. Task value, self-efficacy and achievement goals accounted for 82% of the variance of learning strategies, and 52% of the variance of effort and perseverance. The results suggest that providing training of task value, effort and perseverance, and learning strategies might foster the academic achievement of Chinese high school students more efficiently.

D14   Gender Differences in Language Learning Strategies of College Students
Kai S. Cortina, University of Michigan, United States
Kelsea Lane, University of Michigan, United States

Research on language learning has led to an increased awareness regarding language learning styles and ways to improve the language learning process. As it is true for other domains, e.g. mathematics, one means of improving language learning is through a better understanding of effective learning strategies. Language learning strategies are of particular interest to strategy researchers for a better understanding of the acquisition process of foreign languages. Native language learning is, under normal circumstances, not a conscious process. Yet, when learning a foreign language the process is effortful and planned, and requires the implementation of strategies. This purpose of this study was to explain the gender differences in language

learning strategy use of college students learning German as a foreign language. In line with the work of Oxford and her colleagues (Oxford, Nyikos, and Ehrman, 1988; Oxford and Nyikos, 1989; Ehrman and Oxford, 1989; Green and Oxford, 1995; and Oxford, 1996), we expected to find gender differences favoring females. Furthermore, we expected gender differences to decrease significantly when controlling for variables reflecting the language learning history. The variables we hypothesized as contributing to the sex differences are exposure to family members or relatives that speak a foreign language as well as informal and formal experience with foreign languages. Significant gender differences favoring females were found using the Strategy Inventory for Language Learning (SILL) (Oxford, 1996). These gender effects were examined by controlling for exposure at home, informal exposure as measured by understanding, or formal foreign language exposure. Contrary to our hypotheses, these factors did not account for a significant amount of the gender differences noted. Additionally, post hoc analysis addressing a student's desire to continue studying German did not significantly explain the gender differences. Findings are discussed against the backdrop of gender socialization theory.

D15   The use of information technology and gender: A survey of 8th grade students in Croatia
Iris Marusic, Institute for Social Research, Croatia
Branislava Baranovic, Institute for Social Research, Croatia
Ivana Batarelo, Institute for Social Research, Croatia

Despite the increasing awareness about the importance of computer literacy, the current primary curriculum in Croatia offers ICT only as an elective subject, and up to date there are no studies offering reliable information on the actual use of ICT in the educational settings. Therefore the aim of this research was to investigate the level of computer and Internet use among Croatian elementary school students. Special reference was made to gender differences, since a number of studies indicate the existence of gender differences in the use of ICT among school students in various countries. The study was carried out on a representative sample of 121 school in Croatia. The sample of pupils consisted of 2674 pupils, 1322 girls and 1345 boys whose average age was 14. The administered questionnaire comprised items related to the use of computers at school and elsewhere, and to the assessment of the optional school subject of ICT on the following five dimensions: interestingness, comprehensibility, difficulty, usefulness for current life and importance for the future life. Our research findings show that of all places school is the last place where pupils use computers. About three quarters of Croatian pupils never

or rarely get to use computers at school, and even 80% either never use Internet at school or do so rarely. Data reveal some gender differences in the frequency of the use of computers outside school. The assessment of ICT as an elective subject reveals that boys find it easier and more comprehensible than girls, although both genders are equally aware of its usefulness and importance for the future life, and find it equally interesting. These findings have an implication for the creation of future educational policy regarding the inclusion of ICT as an integral part of the school curriculum.

D16   Teaching of lutheranism: what and how do teachers teach and why?
Elina Hella, University of Helsinki, Finland
Paivi Tynjala, University of Jyvaskyla, Finland

In Finland, religious education (RE) as a school subject is called Evangelical Lutheran Religion, because the majority of 85% of students belong to Evangelical Lutheran Church. Lutheranism can be seen as a complex, multidimensional phenomenon which has traditionally been intertwined with the culture, Christian religiosity and education in Finnish society. However, the role of Lutheranism in religious education is still unclear. This presentation focuses on the question of how teaching of Lutheranism is constituted by RE teachers. What meanings do the teachers assign to teaching of Lutheranism: what do they say that they teach about Lutheranism, about the way they teach it and about their reasons and grounds for those ways to teach it? The object of the study was approached from phenomenographic research perspective, because of its focus on both the content and structure of meanings in the experience. Thus, phenomenography was considered the most appropriate research approach to explore the qualitative variation in teachers' ways of arguing for their ways of teaching Lutheranism. Data collection and analysis were based on the phenomenographic methodology. 20 RE teachers, 6 male and 14 female from 15 different regions, were interviewed according to semi-structured procedure. Teachers' experiences of their teaching were identified in terms of differences and similarities in both content and structure of meanings. The preliminary results will be presented as the outcome space of categories of description and discussed to develop religious educational practice. Acknowledgement of teachers' descriptions of their teaching of Lutheranism serves as a tool for teachers to reflect and focus on relevant aspects for student learning of Lutheranism according to curricular goals. The results also reveal the role of Lutheranism as a subject matter of religious education as seen by the teachers.

D17   Educational beliefs of teachers of sacred subjects
Shira Iluz, Bar Ilan University, Israel
Yisrael Rich, Bar Ilan University, Israel

This research investigated the educational beliefs of teachers of sacred subjects to girls in Israeli religious high schools. Sacred subjects are unique because they have behavioral, emotional and moral purposes alongside academic goals. This study initiated scientific investigation in this field. We also explored effects of debates in Orthodox Jewish communities regarding womens' roles in family and society on educational beliefs of teachers of sacred subjects. Perceptions of Bible and Oral Law teachers were compared to those of literature and biology teachers followed by comparisons between Bible and Oral Law teachers. 255 teachers responded to questionnaires comprising three variable groups: Perceptions of discipline (e.g., well-defined); perceptions of student (e.g., importance of religious development and academic achievement); and teacher as life guide. 15 teachers were interviewed using the CQR method of analysis. Compared to teachers of secular subjects, teachers of sacred subjects perceived their academic disciplines as more static and holy. They stressed non-academic student features including religious affect and behavior and emphasized teaching for shaping student character. Additionally, teachers of sacred subjects highlighted their role as spiritual guide to female students whereas their secular subject colleagues emphasized academic achievements. Reflecting the debate on the role of women in Orthodox society, Oral law teachers differed on preferred topics of instruction and desired instructional methods. Some protested that Oral Law was intentionally taught at low conceptual levels to girls to maintain male scholarly superiority regarding sacred subjects. Although this study examined educational beliefs of teachers of Jewish sacred subjects to girls, implications are relevant for instruction of sacred topics in other faiths. Furthermore, secular subjects having prominent affective, moral or behavioral components might also be informed by this study (Osler & Starkey, 2002).

Development of expertise in specific domains
Discussant: Csikos Csaba, University of Szeged, Hungary

D18   Cognitive and motivational strategies in learning music theory and students achievement

Barbara Fritz, Elementary Music School Krsko, Slovenia
Cirila Peklaj, University of Ljubljana, Slovenia

The aim of the present study was to find out how students regulate their learning in Music Theory Learning (MTL). The research is based on social-cognitive theory of learning, which emphasises the importance of integration of metacognitive, cognitive and motivational processes in learning. The aim of our study was twofold: first, to construct the instruments for measuring cognitive and motivational processes in learning MT and second to examine the relationship between these processes and achievement in MTL. 457 fifth and sixth grade students from ten different elementary music schools in Slovenia (153 boys and 303 girls) participated in the study. Two questionnaires were constructed for the purposes of this study; the Cognitive Strategies Questionnaire (CSQ) for measuring cognitive processes in MTL and the Motivational Questionnaire (MQ) for measuring motivational processes in MTL. The factor analysis of CSQ revealed three different factors: strategies for solving convergent tasks, strategies for solving difficult tasks and strategies for solving divergent tasks. Factor analysis of MSQ revealed four different factors: perception of applicability and importance, anxiety, competence and inner interest, and lack of self-efficacy in listening comprehension. Students general and music abilities were also assessed. Further analysis showed significant correlation between achievement (results on Music Theory Achievement Test (MTAT) and final grades) and almost all motivational and cognitive factors. The best predictors of results on MTAT were abilities, anxiety and strategies for solving divergent tasks. On the other hand, the best predictors of final grades were competence and inner interest, abilities and anxiety. The implications for educational practice as well as future research were discussed.

D19   Gender and music education: Differences in the attitudes among students in compulsory education

Barbara Muzzatti, University di Padova, Italy

Several studies have appeared on gender- based choices of music instruments, on various music activities, and on the motivations for either studying music or playing a specific instrument, while little research has been published on boys' and girls' attitudes toward music education as provided in Italian compulsory education . The purpose of the present study is to check whether both the gender-based and age-

based attitudes towards musical instruments and activities found in previous studies, are also present in music education as taught in Italian schools. Six-hundred and fifty-two elementary and middle school Italian students took part at the study. The procedure consisted in administering a questionnaire about pupils' attitudes, beliefs, and feelings toward music education. Results are congruent with the existence of a female characterization of music education as early as the third grade, and seem to document a progressive decline in interest for this subject matter.

D20 Developing a 'big picture': Collaborative construction of multi-modal representations in history
Maaike Prangsma, Utrecht University, Netherlands
Carla van Boxtel, Utrecht University, Netherlands
Gellof Kanselaar, Utrecht University, Netherlands

Research has given us insight into conditions for effective use of pictorial representations in addition to verbal ones. Positive effects were established within the domain of science and technology and in the context of individual use of presented multi-modal representations. Current trends in the field of learning and instruction stress the importance of active knowledge construction and collaborative learning. The focus of our research is on the active construction of multi-modal representations in collaborative learning tasks in history. We address the question whether collaborative construction of multi-modal representations can contribute to the acquisition of a chronological-conceptual frame of reference that can be used as a basis for historical reasoning. Studies have shown that many pupils have difficulties with the acquisition of a coherent overview of significant historical events and developments and confuse phenomena and concepts. In an experimental study we compared the learning processes and outcomes of pupils who co-construct textual representations, textual-visual representations and textual-visual representations integrated in a timeline. The participants were 100 eleven to thirteen-year-old pupils in pre-vocational secondary education who worked in gender neutral dyads on a series of four tasks on significant historical developments in the Early Middle Ages. All participants took a pretest, posttest and retention test and peer interaction was audio taped and transcribed. We predicted that pupils who constructed the visual-textual representations would show higher scores on the posttests than pupils in the textual representation condition and that the pupils that integrated the visual-textual representations in a timeline would outperform the pupils in the other two conditions. We present the results of our analyses of pupils' performance and the quality of peer interaction in the three conditions.

D21   The role of knowledge development and ontological change in the development of competence in legal reasoning.

Fleurie Nievelstein, Open University of the netherlands, Netherlands
Els Boshuizen, Open University of the Netherlands, Netherlands
Jan van Bruggen, Open University of the Netherlands, Netherlands
Frans Prins, Open University of the Netherlands, Netherlands

Some domains in law - especially private law - are very hard to learn and to teach. Problem solving in private law is based on a knowledge base that is not often readily applicable. Although rules are available, the application and applicability of the rules is never a matter of straightforward verification. Law is a system that changes continually. Not only does the law itself change, the interpretation of rules varies with changes in society as well, (e.g., threat of terrorism, globalisation, individualisation, economic change) which makes it even more difficult to determine the applicability of rules. Findings in expert-intermediate-novice studies suggest that the underlying reasons of the difficulties might be the required knowledge structure and its ontological qualities that are intricately linked to domain specific reasoning skills. A first analysis of what makes private law difficult suggests that on top of the development of the right ontology, scripts and concepts, script negotiation and adversarial reasoning must be mastered. In this study we only focused on the question in which way domain knowledge in the field of private law differs between participants with different levels of expertise. The aim of the study is to gain more insight into the way knowledge of private law is structured in participants' minds to get a broader view of the difficulties students experience during legal reasoning. To answer this question a cognitive approach will be taken using methods used in expertise development and expert performance research. In our study we will perform a qualitative analysis on basis of thinking aloud protocols.

D22   Help-seeking as a self-regulatory skill and motivation in learning statistics with a web site

Nathalie Huet, University of Toulouse II, France
Fabrice Noury, University of Toulouse II, France
Paul Chotin, University of Toulouse II, France

This research supports the view of adaptive help-seeking as a self-regulatory skill (e.g., Puustinen, 1998). As noticed by Aleven et al. (2003), this issue has been mostly studied in traditional school contexts but not in computer-learning environment. This paper aimed to examine, on a web site in statistics learning, the impact of help-seeking and motivation on learning during problem solving according to the difficulty of the problem. Sixty seven students in psychology enrolled in a distance education had to solve easy and difficult statistics problems on a web site designed for their course. They could use spontaneously helps such as work-out problems, on-line course of statistics. In case of failure, they were presented automatically the helps for correcting their errors as a feedback of assistance (Huth & Narciss, 2001). Motivational variables were achievement goal orientations and self-efficacy and were respectively assessed by using the P.A.L.S (Migdley et al. 2000) and by asking after reading the problem, how sure they feel they could solve the problem. Results showed that more motivational differences were found on help seeking for difficult problems: (1) both performance-approach goals and performance-avoidance goals were negatively associated to the frequency of help used; (2) Mastery goals were positively associated to performance of problem solving although both performance-approach and performance avoidance goals were negatively related to performance; (3) Self-efficacy was positively associated to the amount of helps requested on difficult problems and performance for both easy and difficult problems. Besides, high performance-approach goals and high work-avoidance performance goals were positively related to a high number of giving up after a feedback of failure for both easy and difficult problems. Unexpectedly, no relationship was found between mastery goals and help seeking. Future research should investigate the effects of mastery goals on self-regulation in learning with computer environments.

D23   The Evaluation of the Web-based ARTIST, Assessment Resource Tools for Improving Statistical Thinking

Ann Ooms, University of Minnesota, United States
Joan Garfield, University of Minnesota, United States
Robert delMas, University of Minnesota, United States

As technology expands in educational settings, so does educators' interest in using web-based educational resources. The increased integration of online resources into the curriculum resulted in a growing need for high quality educational resources. Since there is no quality control in place to determine the credibility, quality, and accuracy of published websites (Branch, Kim, & Koenecke, 1999), educators, and

other users, are in need of a tool to guide them in evaluating the quality of information available on the Internet (Oliver, Wilkinson, & Bennett, 1997). In this paper we present a model for evaluating online assessment resources. We use the Web-based Assessment Resource Tools for Improving Statistical Thinking (ARTIST) as our example.

D24   *The development of conceptual understanding of global warming*
Tiina Nevanpaa, Institution for Educational Research, Finland

Conceptual development and structure of existing knowledge have been an issue of debate within theoretical frame of conceptual change. This paper introduces a research project that aims to clarify the development of conceptual understanding in case of abstract and complex phenomena, global warming. Thus the aim of this paper it to examine 1) how pupils` pre-instructional ideas develop on a two-year time scale (from grade 7 to 9), 2) what kind of changes in pupils` ideas take place during a learning period (grade 9) and 3) how these changes can be interpreted within frame of conceptual change? Pupils` pre- instructional ideas were examined by using a questionnaire with free-response items (7th grade, n= 415) and by essays (9th grade, n=45). Pupils` responses were analysed by using a phenomenographic approach in a practical manner. As a result, distinct categories reflecting qualitatively different ways to conceptualise global warming were generated. Based on this information and literature a 7 hour learning period was constructed and implemented at grade 9. After the learning period pupils` ideas were examined again. All the lessons were videotaped in order to get insight into the learning process of pupils. Results of this study raises interesting questions about development of conceptual understanding in case o f abstract and complex scientific phenomena. It seems that younger pupils` pre-instructional ideas are based on connection of separate scientific facts to every day reasoning. Proportion of scientific elements increased with age, but still lack of scientific elementary knowledge leads to faulty connection between concepts. However, it seems that older pupils` ideas of global warming were more coherent and theory-like compared to younger pupils conceptions. Thus it can be hypothesised that conceptual understanding of global warming starts from more or less separate facts followed by theory-based reasoning.

Learning and cognitive science
Discussant: Georgia Panagiotou, University of Cyprus

D25   *A trialogical approach to learning*

Sami Paavola, University of Helsinki, Department of Psychology, Finland
Kai Hakkarainen, University of Helsinki, Department of Psychology, Finland

It has been maintained that a strict confrontation between constructivism and sociocultural perspectives should be given up (Vosniadou & Hallden 2003; Anderson, Greeno, Reder, & Simon 2000). We also try to alleviate a strict dualism, but rather than analyzing similarities between two approaches, we present them as ideal types with a third approach. A basis for our ideal types is a distinction between two main metaphors of learning (Sfard 1998) and our own suggestion that a third one is needed (Paavola & Hakkarainen in press; Paavola, Lipponen, & Hakkarainen in press; Hakkarainen, Palonen, Paavola, & Lehtinen 2004). According to the acquisition metaphor of learning (a ìmonological approach), learning happens basically in an individual's mind. In contrast to this, the participation metaphor of learning (a ìdialogical approach) emphasizes communities, and participation to their activities and practices. Rather than epistemological issues, learning concerns identities, practices, social norms. A third approach, the knowledge-creation metaphor of learning (a ìtrialogical approach), emphasizes mediation, and mediating artifacts. We will present our project for developing the idea of a trialogue as a central feature of the third metaphor. The conception has its basis on L. S. Vygotsky's notion of mediated activity and Charles Peirce's ideas concerning triadic (object- and future-oriented) nature of sign-processes. Our presentation will concentrate on theoretical issues but we will also briefly analyze some ways schooling can represent the knowledge-creation approach. We present a project with one teacher and her grade 5 (11-year-old) students, entitled ìArtifacts where the aim was to learn to understand the role of artifacts in the past, present and in the future (Seitamaa-Hakkarainen et al. 2004). A central characteristic of this project is the involvement of students in sustained work for generating knowledge of artifacts where both conceptual and material artifacts were emphasized; as we maintain, in a trialogical way.

D26   An intentional analysis of students' descriptions and explanations of the seventeenth century
Liza Haglund, department of education, Sweden

The present paper deals with part of a study that investigated students' (age 11-12) reasoning about history. The issue at hand in this paper is students' explanations and description of the seventeenth century in Sweden, as presented to them by the Vasa Museum. A total of fifty-five students worked individually with three tasks on three

different occasions. Their tentative result challenges the idea that students' historical reasoning is best described in terms of levels. Some students used different types of explanations to explain the same phenomena. There was also a variety in how the students encountered the tasks and actualised their correspondingly different conceptual contexts. Within the same responses, there were shifts between conceptual contexts and explanations and students gave descriptions both generally and with reference to particular objects and circumstances, as if they were answering different questions. This raises the need for a new description or metaphor that accounts for complexity in historical reasoning, as well as further research that departs from a theory that takes this into account. Pointing to the difference between a teleological explanation and a causal one, may be enlightening for many students. But it seems that such a discussion must parallel one about different conceptual contexts, and how explanations can be valid in one context but miss the point in another.

D27   *Effect of reading aloud and simple arithmetic as a vehicle for activating prefrontal area in children on academic attainment*
Hajime Yoshida, Ritsumeikan University, Japan
Mariko Ishikawa, Ritsumeikan University, Japan

Recent studies indicated that performing very simple arithmetic such as 3 + 6 nd reading aloud activated prefrontal area by using fMRI or PET. Prefrontal area is regarded as control center of thinking, memory, control, or other higher cognitive functions. Activation of this area would lead to improvement of these higher cognitive functions. Thus, it would be assumed that activating prefrontal cortex by performing simple arithmetic and reading aloud lead to improvement of cognitive functions and then to one of academic attainment in pupils. The goal of this study was to confirm this hypothesis by interventional investigation. 103 fifth graders in the experimental (E) group were given one of three kinds of tasks in a day; simple arithmetic, reading aloud, and writing Japanese characters. This intervention lasted for three months. Before and after intervention, assessment test was administrated to check pupil's attainment on arithmetic and Japanese language. Pupils in the C group were given the pre- and post-tests. Total change score from the pre- to the post-test in arithmetic for the E group was significantly greater than one in the C group. In language, total change score from the pre- to the post-test in language for the E group was not different from one in the C group.

D28   *The relationship between motor skills and reading performance among 7 years old children*

Giorgos Daloukas, University of Thessaly/Special Education, Greece

According to recent studies 10-15 percent of the school population faces oral and/or written language difficulties, which are more severe in a 4-5 percent. On the other hand, 5-15 percent of school children seem to face movement control problems. Previous recearch found that children with specific reading disabilities appears also serious deficits in a large spectrum of movement skills such as balance and generally sharp kinetic ability. More recently has been suggested that motor impairments are restricted to a subset of the dyslexic population. The aim of this study was to investigate the possible relationships between motor skills and reading performance of typical seven years old children, in order to compare the two skills at the within-individual level. The sample consisted of 300 children. Children's reading performance evaluated with the Test of Reading Performance, which is constructed of six tasks: letter knowledge, phoneme blending, word identification, morphology knowledge, syntactic knowledge and passage comprehension. Movement evaluation was carried out using the motor test of Movement Assessment Battery for children which covers three major motor domains: manual dexterity, ball skills, static and dynamic balance. The results showed that there are significant correlations between reading and motor scores. Such results give additional support to recent views according the role of cerrebellum in both motor and cognitive functions, including reading. Our findings create a fruitful ground for the further study of movenent assessment as a means to predict later reading performance.

D29   Working at home for school: The significance of individual competences and scholastic stress factors
Petra Wagner, University of Vienna, Austria
Barbara Schober, University of Vienna, Austria
Christiane Spiel, University of Vienna, Austria

The issue "homework" is discussed from various perspectives throughout the twentieth century. Previous studies have shown an obvious variability in time students spend working at home for school, and very controversial results concerning the relationship between time investment and achievement were found. To clarify this unsatisfying research situation, a simultaneous look on different relevant determinants is necessary. So we analyzed the amount of time students invest at home for school in relation to other school related determinants. The basis of including these determinants was the "model of time spent on learning" (Helmke & Schrader, 1996). Among other issues this meta-model shows the relation of psychological

variables, learning time and school achievement. Regarding psychological variables the present study focused on academic self-concept, text-anxiety, depression, and pressure to perform. In sum, 595 Austrian students (312 girls, 283 boys) from various general secondary schools (74 girls, 43 boys), academic secondary schools (235 girls, 107 boys) and vocational schools (78 girls, 98 boys) were investigated. A diary was used to measure the amount of time invested in work for school, the individual competences and scholastic stress factors were measured with a questionnaire. To identify learning types we used cluster analyses and found three types of students according to their time investment: the minimalist, the homework-type, and the test-type. They differed in their individual competences and scholastic stress. Implications of these findings for explaining the often found very low correlation between time investment and achievement will be discussed.

D30   Learning styles: A longitudinal study in higher education

Vincent Donche, University of Antwerp, Belgium
Peter Van Petegem, University of Antwerp, Belgium

Studies concerning student learning in higher education indicate that learning styles can be distinguished using the diagnostic inventory of learning styles (ILS) of Vermunt (1998). This inventory is based upon a model of learning styles in which processing strategies, regulation strategies, mental models of learning and learning orientations are integrated. Few studies investigate the stability and change of these learning style components within a longitudinal research design. Some of these studies indicate that over time students become more meaning oriented between the first and third year of a study at the university. The former findings gave raise to a new study aimed to (1) test the generalisability of Vermunt's model of learning styles within a sample of 146 students from a Flemish institute of higher education in Belgium and (2) to test the stability and variability over time of learning styles. The ILS-inventory is found a reliable instrument to measure most of the distinguished learning style components of Vermunt. Learning style components significantly change over time. First year students who reached the third year of their study reported to carry out more concrete processing strategies and their learning is less externally regulated than in the first year. Learning conceptions of third year students shift also over time as can be indicated by a decrease of the conception of learning as an intake of knowledge and an increase of the conception of learning in which the use of knowledge is important. However these results will be analysed more in depth with several analysis techniques. The paper describes the empirical findings concerning these two main questions and discusses implications of this

research for both theory and practice.

D31   *Individual learning patterns in virtual reality environments*

Elhanan Gazit, Tel-Aviv University, Israel

Virtual reality learning environments (VE's) provide direct learning experience (Dede et al., 2000). The Virtual Solar System (VSS) is a non-immersive 3D virtual environment based on high-resolution spacecraft images of the solar system's planetary objects which revolve in their orbits around the Sun. The learner uses the computer mouse to change his/her viewpoint while "flying" in 3D space (Yair et al., 2001). This offers a new visual learning experience, which has not been systematically studied yet. The study main objectives were to describe and analyze learners' learning interactions during a free exploration task of the VSS and to study their conceptual development of the basic astronomical phenomena during pre-plan tasks. A systematic examination of ten students (6 boys, 4 girls, age 15-16) real-time learning interactions reviled that during a free exploration task, all students established ianchoring-dock points. Three different exploration patterns emerged: a superficial learning pattern, an object-based learning pattern in which the learner study in-depth the various celestial objects, and a flexible learning pattern in which the learner moves between a global observation pattern and a local observation pattern. Moreover, results showed that the conceptual development is a non-linear process which includes transitions between and within at least five dimensions: (1) a cognitive-local dimension, (2) a cognitive-global dimension, (3) a navigation dimension, (4) an interface dimension, and (5) an affective dimension. To conclude, the virtual reality environment affords the emergence of individual differences which are manifested in the multidimensional and emergent nature of the learning interactions patterns. Thus, this kind of learning calls for suitable scaffolding and guided reflection design. This multi-dimensional conceptual framework of the learning interactions might serve other related research areas which study learning interactions in various complex virtual environments.

D32   *Classic logic taught to 5th grade children: effects of a training*

Lucia Bigozzi, University of Florence, Italy
Beatrice Accorti Gamannossi, University of Florence, Italy

The aim of the present study is to evaluate the efficacy of a formal logic teaching process for children attending 3rd to 5th grade in primary school. Hypotheses: We assume an effectiveness of the training on formal logic competence, on logical

mathematic abilities, on mathematics, on logic comprehension in reading, on narrative structure. We also assume that the training effect is independent from the person who administers it. Participants: 196 children (104 males and 92 females, mean age: 9 years and 8 months) participated to this study. Children were divided in three groups: two experimental groups and one control group. Procedure: This is a longitudinal study. All the groups were given objective pre-tests and post-tests. The experimental groups followed a formal logic training: in one group (1) the trainer was an external experimenter, in another group (2) the trainer was the class teacher. The training (4 months, 2 hours a week) was about explanation, discussion, execution and collective correction of 90 teaching cards concerning the main areas of formal logic. The control group followed the standard teaching program. Data analysis: To verify the training efficacy a comparison among the initial and final means of the two experimental groups and the control group has been conducted through a repeated measures ANOVA. Results and conclusions: The teaching training is effective to enhance competence in formal logic, in logical mathematic, in narrative structure, in arithmetic, geometric, statistic and problem solving abilities. In each variable the training is effective independently from the trainer. As far as the task of comprehension of aesthetic-poetic language is concerned there are not significant differences among groups. Results will be discussed in relationship with their educational and teaching worth.

D33 *Students Intuitive Beliefs About Practice*
Virginia Hill, Fordham University, United States
Mitchell Rabinowitz, Fordham University, United States

Despite the common belief that expert performance is due to innate abilities, recent research in varied domains of expertise has shown that expertise is developed by daily practice over an extended period of time. Ericsson, Krampe, and Tesch-Romer (1993) posits that the salient component in developing expertise is deliberate practice, defined as highly structured, effortful activity, the explicit goal of which is to improve performance in any domain. In this study, a 22 item Practice Beliefs instrument was developed to assess students intuitive beliefs about the structure of practice. The 22 items were anchored in Ericsson's definition of deliberate practice (11 items that were consistent with the literature; 11 items that were polar opposites) with a four-point, Likert-scale: 4-Strongly agree, 3-Agree, 2-Disagree, and 1-Strongly disagree. The survey was completed by 34 graduate students who were enrolled in a beginning course in cognitive psychology. The results suggested that the sample population had an understanding of the efficacy of practice methodol-

ogy but were not clear on what constitutes deliberate practice. They also retained, to a great extent, popular, erroneous beliefs that people are born with talent, some people dont have to practice to achieve mastery, and good learners will be able to determine their own practice needs. These findings are relevant to curriculum development and the design of teacher or instructor training programs.

Mathematics Education
Discussant: Athanassios Gagatsis, University of Cyprus

D34   The Effect of Self-Explanation on Solving Mathematical Word Problems
Hidetsugu Tajika, Aichi University of Education, Japan
Narao Nakatsu, Aichi University of Education, Japan
Hironari Nozaki, Aichi University of Education, Japan

The purpose of the study was to examine how a metacognitive strategy known as self-explanation influences word problem solving in elementary school children. Participants were 73 sixth-graders. They were assigned to one of three groups, the self-explanation group, the self-learning group, or the control group. Students in each group took two kinds of test. The results showed that the self-explanation group and the self-learning group outscored the control group on a transfer test. In addition, high explainers who generated more self-explanations relating to deep understanding of ratio word problems outscored low explainers on ratio word problems and transfer tests. The self-explanation effect is discussed.

D35   The relation between computational skill and arithmetic word problem comprehension
Jose Orrantia, University of Salamanca, Spain
Santiago Vicente, University of Salamanca, Spain

In this work, and from an information-processing perspective, we examine the hypothesis that problem comprehension and computational processes interact during the solving of an arithmetic word problem. It is clear that both computational processes and problem comprehension can be expected to have an effect on performance in problem solving. However, little is known about the manner in which these factors contribute to differences in performance. We tested subjects with high and low skill in computation on a series of word problems, the content of which varied

on the basis of problem type (simple-complex) and on the numbers type included in the problems (positive integers-fractions). Performance data are presented and analyzed in terms of solution reaction times. The results revealed an effect of problem complexity. Overall solution time was significantly shorter for simple problems than for complex ones. There was also a main effect of number. Overall solution time was significantly shorter for problems that included positive integers than for problems that included fractions. The more important findings, however, concern the relation among complexity, number and skill. There was significant two-way interaction between skill and complexity when the problems included positive integers, but this effect there was no significant when the problems included fractions. When the problems included positive integers, differences between simple and complex problems were shorter for high skill subjects than their low skill peers. Our results not support the hypothesis that the processes involved inthe comprehension of arithmetic word problem text and the proces of computatation are independent of each other. The results suggest an alternative hypothesis: that the cognitive processes involved in solving the problems can occur in cascade, this is, one process begins before the other is completed. However, there is no cause to expect that automatized retrieval of computations will improve problem solving.

D36   Achievement and interest development in Swiss 8th grade mathematics classrooms: the role of different teaching features in traditional and reform-oriented classrooms
Monica Waldis, University of Zurich, Switzerland
Kurt Reusser, University of Zurich, Switzerland

In the context of the Swiss participation in the cross-cultural TIMSS 1999 Video Study (Hiebert et al. 2003) a representative sample of 140 videos of 8th grade mathematics lessons have been collected and analyzed. As a national extension, video data were complemented with a national teacher and student questionnaire and the TIMSS achievement test. The wide data corpus allows us to combine the perspective of students' and experts' (high inference video ratings) on features of instructional quality. The present paper aims to highlight the relationship between different teaching features - either associated with direct teaching or indirect teaching - and multiple educational outcomes as achievement and interest development. In a first, cross-sectional study, we explored the effects of distinctive teaching features known from literature to be positively related with either achievement or mathematical interest. Hierarchical linear regression analyses (Raudenbush & Bryk, 2002) of students' perceptions and video ratings showed rather small context effects

on achievement after the controlling of school type and students' socio-economical background. In contrast, students' perceptions of instructional quality explained a small amount of individual interest variance. Cognitive activation and instructional clarity seem to be of a certain importance. The second study shifts from a variable-centred to a group-centred research approach. Teachers' information about their use of instructional methods allowed a clear distinction between classes with rather traditional, teacher-led instruction (n=41) and classes with a more reform-oriented, student-centred teaching approach (n=43). Significant differences with a slight advantage for the reform-oriented teaching environment were found for the teaching features already examined in study 1. Students' perspective and experts' perspective converge in this point. However, longitudinal analyses of educational outcomes revealed a certain ceiling effect concerning interest development in reform-oriented classrooms between class 8 and class 9.

37   How do teachers' pedagogical content beliefs about teaching Pythagorean Theorem interact with pupils' achievements and views on the teaching style?
Miriam Leuchter, University of Zurich, Switzerland
Kurt Reusser, University of Zurich, Switzerland
Christine Pauli, University of Zurich, Switzerland

Teachers' instructional action is closely related to their beliefs about teaching and learning. This analysis (1) uses concrete instructional situations to record teachers' pedagogical content beliefs in the context of a standardized videotaped three-lesson unit on the Introduction to Pythagorean theorem, (2) establishes links between teachers' beliefs, pupils' achievements and perceptions of the teaching style, and (3) relates teachers' beliefs as well as pupils' achievements and perceptions to instructional actions observable in the video data. The perceptions of the teaching style of a teacher on the one hand from the point of view of the pupils as participants in the instruction and on the other hand from the perspective of researchers as video observers demonstrate the extent to which the teachers' beliefs are reflected in the perceived instructional practices. The influence of teachers' pedagogical content beliefs on pupils' achievements indicate the importance of the integration of beliefs for successful measures of teacher training and further development. Within a Swiss-German video study on teaching and mathematical understanding (N=40 classes, Year 8/9 (Klieme & Reusser, 2003), a semi-structured interview concerning a concrete, thematically standardized, videotaped instructional unit recorded teachers' pedagogical content beliefs. Pupil perceptions of the teaching style (N=980) were measured with questionnaires, their achievement with two tests. Statistical

analysis enabled the linking of the pupil, teacher and video data and an examination of the congruence of the three perspectives.

D38   The role of students' age, problem type and situational context in solving mathematical word problems

Vesna Vlahovic-Stetic, University of Zagreb, Faculty of Phylosophy, Croatia
Zeljka Mendek, 6th Elementary school Vukovar, Croatia
Daria Rovan, University of Zagreb, Faculty of Phylosophy, Croatia
Daria Rovan, University of Zagreb, Faculty of Phylosophy, Croatia

The aim of this research is to verify hypotheses regarding the importance of understanding situation in mathematical word problems that follow from Reusser's SPS (Situation Problem Solver) model by exploring efficiency of Children's mathematical word problems solving as a function of age, problem type and situational context of the problem. Children of three age groups participated in the study: preschool kindergarten group, first grade and second grade students. The final sample was formed of 67 kindergarten children, 79 first grade students and 85 second grade students. Testing was conducted by 20 specially trained senior psychology students. Two categories of word problems were used: change problems and compare problems. Every child was tested twice, one time with neutral context problems and other time with familiar context problem. Repeated measures analysis of variance with age, situational context and problem type as independent variables was performed with Children's performance as a dependent variable. The main effects of age, situational context and problem type were significant, as well as the interaction of age and problem type. Our research results indicate that older children are more successful than younger children in solving mathematical word problems and that the Children's performance on the change problems is better than on compare problems. Results also showed that Children's performance on the problems with familiar context was better than performance on the problems with neutral context. These results confirms Reusser's essential hypothesis that adding additional sense to the problem text would facilitate designing the situational model of the problem. Implications for teaching mathematical word problem solving are discussed.

Science Education
Discussant: Kostas Korfiatis, University of Cyprus

D39   Attitudes and conceptions of teachers and students toward two lab methods: virtual versus conventional

Naftaly Dov, Hebrew University of Jerusalem, Israel
Moti Frank, Technion - Israel Institute of Technology, Israel

The purpose of this study was to examine attitudes and conceptions of teachers and students toward learning and instruction in two lab environments - a computerized simulation (by means of EWB - Electronic Work Bench software) and under conventional methods (learning and instruction with students performing hands-on experiments). The participants were 12th grade students (N=248) and their teachers (N=67) in 22 groups in electricity and electronics laboratories in Israeli high schools. Qualitative and quantitative methods of research were combined in this study. Questionnaires were given to students and teachers. An anonymous attitude questionnaire was given to students to determine their views and grasp of laboratory methods. Data from teachers was gathered through an anonymous survey. The teachers' responses indicate that most of them conducted lab lessons through an idiosyncratic combination of both methods. They used the EWB simulation program for a number of purposes, the main one of which was having students do virtual experiments as preparation before performing them in the traditional method. The findings gathered from students' and teachers' questionnaires focus on the main advantages and disadvantages of the EWB computerized simulation versus the conventional method in the electricity and electronics laboratories. In our presentation we will detail the advantages and disadvantages of each method according to our findings.

D40   Students' understanding of primary science concepts, and their perceptions of classroom interactions
Bruce Waldrip, University of Southern Queensland, Australia
Jeff Dorman, Australian Catholic University, Australia
Darrell Fisher, Curtin University, Australia
John Green, University of Southern Queensland, Australia

The overall aim of this study is to investigate relationships among students' perceptions of cultural factors that affect their primary classroom learning environment, teacher-student interactions, students' understanding of science concepts and attitude towards science in upper primary school science classes. The instruments to 100 primary school classrooms across three Australian states. This list of concepts were those concepts that are common to teaching science in each of these states for years 5-7. The internal consistency/reliability ranged from 0.62 to 0.83 suggesting that each QTI scale has acceptable reliability, especially for scales contain-

ing a relatively small number of items and for the Perceptions of Cultural Factors affecting Learning Environment they ranged between 0.74 and 0.85. Female students were more likely to have more positive attitudes towards science, rated equity higher as well as teamwork being more desirable than individualisation. As well they perceived higher levels of leadership, helpingfulness, understanding, and student responsibility, and less dissatisfied, admonishing and strict behaviours. As the year level increased, student attitudes decreased. Where students displayed greater understanding of science concepts, they were more likely to be male, and to have teachers as displaying more leadership. Students who had better understanding of the science concepts tended to perceive greater equity, teamwork, congruence of learning between home and school, perceived more leadership, helping, student responsibility and less uncertain interpersonal behaviours. All of the scales of the QTI were found to be associated with students' attitudes. This study examined actual science content knowledge. Those students who had lower science understanding were more likely to display less favourable interactions. The study adds to present learning environment research by examining whether students' perceptions of culturally sensitive factors of their learning environment and teacher- student interactions is influenced by their understanding of science concepts.

D41   Crystallized or dynamic conception of teaching Science. Some reflections after the implementation of an EU co-operation project in rural areas of El Salvador
Alberto Nagle Cajes, Universidad ORT-Uruguay, Uruguay

The aim of the work is to explore rural teacher's change of conception of Science education in primary schools in eastern countryside areas of El Salvador. Traditional teaching practice in basic education has often stressed out the development of technical skills which keep learners ìon task creatingìteacher centered classroom for the transmission of the teacher's knowledge. The new paradigm on learning sees the role of the teacher in another way. The new teacher structures the course content and the classroom environments in order to facilitate the engagement of student's activities which promote learning and deep understanding. A comprehensive intervention in a sample of schools was carried out, in order to bring some methodological changes in teachers practice. The following questions guided the present investigation: What are the conceptions of teaching science held by participants? How

do these conceptions change as participant's progress through the implementation of an innovation in their schools? How do these teachers see the relationship between learning and understanding? How do the teachers describe their usual way of teaching? Primary sources of data were verbatim transcripts of 15 semi-structured formal interviews with participants. The analyses reveal that the teachers have an almost crystallized conception of teaching science. The analysis shows two phenomenographic categories of description. In one category the teachers stressed out their purpose to foster student appreciation of scientific knowledge and scientific phenomena in their daily lives. Another group of teachers consider teaching as a mission whose ends lie beyond scientific literacy. The ultimate goal of teaching is to help student's become responsible citizens and human beings.

D42   A case study of utilization and evaluation of the effectiveness of the ìi tool in an inquiry based biology laboratory course
Nilgun Tatar, Gazi University, Turkey
Fatma Sasmaz Oren, Gazi University, Turkey
Dilek Erduran, Gazi University, Turkey

Nowadays, one of the most significant problems is the quality of learning in educational settings. Students should learn how to do inquiry, how to find and interpret data and be able to apply their learning in different situations. In this point, inquiry-based teaching, which is a student centered method, is assessed as the teaching method A tool ìI was developed by Phillips and German (2002) to help teacher and student in the classroom where used inquiry-based teaching method. In this study the inquiry ìI tool was used. In this study; we apply inquiry-based learning method by using a tool ìI and evaluate efficacy of this tool in biology laboratory course on osmosis diffusion subject. This study is conducted a case study research. Study was executed in Gazi University, Department of Science Education Teaching. Students selected randomly in the second grade classroom. In the first group used ìI tools based on inquiry-based learning. In the second group used traditional teaching methods. Each group consist of 25 students. To determine effectiveness in academic achievement, after the study 5 open-ended questions were asked on both experimental group and control group. Furthermore, to evaluate effectiveness of this tool we performed interview with 6 students. In conclusion of the study, according to the students who applied inquiry-based teaching method, this tool rather effective. We observed that this tool facilitates following of experimental process, increases students' participation of the course and academic achievement. According to interviewer results, students have positive attitude against the tool. Since

iI tool in front of the students, they have a chance study as a scientists in all of the phase scientific process in laboratory course. This provide probability them to develop their inquiry and investigation abilities. Simultaneously, the tool facilitate guiding and evaluating for teacher.

D43   Mistakes and Negative Knowledge - Idle Capacities in Teaching Science Concepts? Findings of a Video Study in Physics Instruction
Lena Meyer, Leibniz-Institute for Science Education (IPN), Germany
Tina Seidel, Leibniz-Institute for Science Education (IPN), Germany
Manfred Prenzel, Leibniz-Institute for Science Education (IPN), Germany

For students, mistakes in the classroom often go along with individual disappointment and low graded achievement. From the teachers' point of view, student mistakes are often connected with disruptions in the planned sequence of teaching and are negatively associated. However, mistakes can be used to reveal prior knowledge, to outline concepts and to develop negative knowledge. Within the scope of a mistake culture in the classroom, negative knowledge terms declarative and procedural knowledge about matters and processes respectively, in order to determine outside elements or procedures. By exposing those knowledge's relation to science concepts, it fulfils the task to encompass the concept by developing negative knowledge about what are not corresponding components and how procedures do not work. It is assumed that negative knowledge utilized for constructive concept formation, and a mistake culture on closer examination of the blending of learning and test situations in the classroom play a dominant role in the quality of concept formation and perceived learning conditions. The sample includes 22 German physics classes and combines students' questionnaire data with high and low inferent video analysis. The findings show that the utilization of negative knowledge and a positive mistake culture is associated with a more positive perception of supportive learning conditions and learning motivation, as well as with the long-term development of students' scientific literacy.

D44   Determining the relationship between basic science process skills and attitude toward science in primary school
Dilek Erduran, Gazi University, Turkey
Nilgun Tatar, Gazi University, Turkey
Fatma Sasmaz Oren, Gazi University, Turkey

The purpose of this study is to investigate whether there is a relationship between

basic process skills and attitudes toward science in second grade students of primary school.

The research was conducted in 2004-2005 fall semester a sample of 250 students. The sample consist of 150 students at Erdemir primary school in Karabuk, 50 students at Akpinar Primary school and 50 students of Nenehatun Primary School both settled in Ankara. In this research, an attitude instrument (Attitude toward Science in School Assessment) was implemented to measure students' attitudes toward science by designed Germann (1988). In order to evaluate basic scientific process skills ì Science Process Skills Assessment (SPSA) instrument was used. The science process test adapted by the Mason City Schools, August,1993, in the Iowa Assessment Handbook (Enger and Yager, 1998) was used. For using these instruments given permission by Germann (to Attitude toward Science in School Assessment) and Yager (to Science Process Skills Assessment). These instruments (Science Process Skills Assessment, Attitude toward Science in School Assessment) was used to assess the relationship between attitude toward science and basic scientific process skills. All student data collected have been confidential. Student data were analyzed using quantitative methods. Quantitative data was gathered in order to answer the research questions (SPSA) and Attitude toward Science in School Assessment (ATSSA) instruments posed in this inquiry. It was examined correlation relationship by using SPSS package program on analyzing data. Mid-level correlation was detected between attitudes toward science and basic scientific process skills. According to the results, it was found that conclusion skills of many students were low in contrast to classifying skills. Students' who have negative attitude toward science, science process skills lower than others. Results tabled, interpreted and appropriate suggestions have been presented as given percentages.

D45   Development of Australian High School Students' Understandings of, and Attitudes About Biotechnology Processes
Vaille Dawson, Edith Cowan University, Australia

One of the essential outcomes of science education is to enable students to develop a deeper understanding of the world around them, and to be able to engage in relevant discourse about science in everyday life. There has been significant emphasis placed on the importance of scientific literacy in science education. A high level of scientific literacy can help young people to question the claims of the scientific community, weigh up evidence about science issues, use critical thinking skills and enable them to use their understanding of science to make well informed decisions. One area of science that will increasingly impact on our society is the

field of biotechnology. The aim of this study was to determine how understandings and attitudes about biotechnology processes develop as students progress through high school. In a cross sectional study, data was obtained from written surveys of students in Years 8, 10 and 12. The results indicate that students' ability to provide a correct definition and examples of biotechnology, cloning and genetically modified foods was very poor amongst Year 8 students but improved in Years 10 and 12. Students in all year groups had a better understanding of cloning than biotechnology and GM foods. Year 12 students studying biological science had the best understanding. Most students approved of the use of biotechnology processes involving micro-organisms, plants and humans and disapproved of the use of animals. However, Year 8 students' attitudes were less favourable than Year 10 and 12 students. An awareness of the development of students' understandings and attitudes may lead to a more appropriate use of biotechnology curriculum materials and thus improved biotechnology education in schools.

D46   *Classroom talk and science education*

Zilda Fidalgo, ISPA - Instituto Superior de Psicologia Aplicada, Portugal
Filipa Ferreira, ISPA - Instituto Superior de Psicologia Aplicada, Portugal
Joana Sequeira, ISPA - Instituto Superior de Psicologia Aplicada, Portugal
Isabel Matta, ISPA - Instituto Superior de Psicologia Aplicada, Portugal

The aims of this study are: a) To observe how teachers of young children developed classroom talk on a scientific theme, and b) To adapt to Portuguese the method of classroom talk analysis proposed by Wegerif and Mercer (1997), Wegerif, Mercer and Rojas-Drummond (1999).

Four preschool and primary school teachers and 63 children (4-7years) participated. Teachers were invited to give a 3 session lesson about the properties of the air, which were videotaped and transcribed verbatim.

The following key-words coded exploratory/non exploratory, were selected from the transcripts: let's see what is going to happen/what happened; what happens Ö; because; why; as (comparative/causal); if; so. Cohen's K values ranged from 1 to .62. The discourses was segmented in Spiral and Loop IRF exchanges and discursive actions identified (13), inspired from Dimension/Action matrix of Edwards and Mercer (1987) and Wegerif, Mercer and Rojas Drummond (1999). Loop IRF exchanges were negatively correlated with the key word exploratory use let's see, and action a) building knowledge from one to another; b) asking questions that explore pupils' levels of understanding, and positively correlated with a) making explicit the ground rules or demands of the task. Concerning the exploratory use of

the key-words, differences between teachers and between children were registered. Concerning Loop versus Spiral IRF exchanges, discourse with the seven years old children showed significantly more Loops, associated to more direct questions, explicitly links of prior knowledge to current activity, and recapped learning with pupils. These results are encouraging both concerning the validity of coding systems used and information obtained. However, Loop versus Spiral IRF exchanges was essential to characterize classroom discourse with 7 years old children as the more away from socio-cultural model. Further developments of coding system are needed to enable to characterize teaching and learning practices.

D47   Giving priority to evidence in science teaching:A first year elementary teacher's specialized practices and knowledge
Lucy Avraamidou, University of Cyprus, Cyprus
Carla Zembal-Saul, The Pennsylvania State University, United States

The purpose of this qualitative case study was to examine the nature of a first-year elementary teacher's specialized practices, knowledge and beliefs for giving priority to evidence in science teaching and explore the possible sources from which this knowledge was generated. Data included three audio taped interviews, six video taped classroom observations, lesson plans and samples of students' work. The findings of this study revealed that: a) Jean gave priority to evidence in her teaching practices by constantly engaging the students in collecting evidence through observations and tests, recording and representing evidence and using that evidence to construct explanations; and b) critical experiences during her preparation to teach and specific university coursework acted as sources through which this aspect of PCK was generated. This study adds to the value of the concept of PCK within the domain of research on science teaching (Van Driel, Verloop, & de Vos, 1998) by illustrating how to study and what to look for when studying this specific aspect of PCK. At the same time, this study underscores the need for further research and larger scale studies in the area of teachers' specialized practices, knowledge and beliefs for giving priority to evidence in science teaching that will contribute to a better understanding of its nature, sources and development.

Motivational Social and Affective Processes
Discussant: Monique Boekaerts

D48   Is math something scary?Attitudes and beliefs toward math and math anxiety in secondary school students

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In today's society a smaller proportion of women, in comparison to men, are engaged in the professions connected with mathematics and similar subjects, and they are less frequently enrolled in the faculties where math is an obligatory subject. According to some authors, the mathematics is the reason why there is a relatively small number of women in the well paid, prestigious careers (Hyde, Fennema, Ryan, Frost and Hopp, 1990.). Because of that it seemed interesting to investigate what general attitudes do secondary school students have toward mathematics, do they see it as a male domain, do they think that math abilities are inborn and do they experience math anxiety. Participants in the study were students from all four classes of the two language oriented and one science oriented secondary schools (N=531). Two scales were used in the study: Scale for measuring attitudes and beliefs toward math and Scale for measuring math anxiety. Results show that science oriented students have more positive attitudes toward math and they believe more that math abilities are not inborn. Science oriented students and girls do less believe that math is a male domain. Language oriented students and girls had more intensive math anxiety. There was no significant interaction effect between educational orientation and gender on any variable. Obtained results were commented in regard to students' educational orientation and different gender role socialization process.

D49   Are parent's beliefs, practices and personal characteristics linked to negative self-appraisal of competence in children?
Valerie Dubois, Universite du Quebec a Montreal, Canada
Therese Bouffard, Universite du Quebec a Montreal, Canada
Mathieu Roy, Universite du Quebec a Montreal, Canada
Marie-Eve Vaillancourt, Universite du Quebec a Montreal, Canada

Children's appraisal of competence is a motivational resource that is strongly linked to their functioning and achievement (Bandura, 1986). Young Children's appraisal of competence is thought to be usually positive, but Phillips (1984, 1987) showed that some children tend to underrate their competence. The present study's aim was to investigate the factors that may be involved in causing this self-defeating phenomenon. Since, in the constructivist perspective, children build their perceptions of competence through interactions with significant social agents, parental variables

like the types of educational practices used, sense of efficacy, appraisal of their own competence when they were young and their appraisal of their child's competence were examined. 560 parent and child from fourth and fifth grade agreed to participate in this study. Results showed that parents are somewhat capable of perceiving how accurate their child is at evaluating their competence. This was done by confronting the parent's evaluation of their child's self-judgement of competence with a standardized score of regression of perceived competence by the child on IQ. As for the effect of parental variables on the distribution of children in groups that overestimate, underestimate or estimate accurately their competence, we found that, while parental practices were not linked with the child's accuracy of perceived competence, some parental beliefs and personal characteristics of the parents were linked. Parent's belief in an incremental conception of intelligence was higher in the group of children that underestimates their competence, while parent's self-efficacy was higher in the group of children that overestimates their competence. It was also noted that parents of children in the underestimating group had a lower perception of their competence when they were children. The discussion will focus on the mechanism through which parents' beliefs may impact on their child's sense of competence.

D50   *Mothers' Expectations and Family Climate Before and After Cochlear Implantation*

Amatzia Weisel, Tel Aviv University, Israel
Tova Most, Tel Aviv University, Israel
Rinat Michael, Tel Aviv University, Israel

The purpose of the present study was to examine functioning and stress among families with hearing-impaired children as a function of both the time passed since the cochlear implantation and parents' expectations from the implant. The participants were 64 mothers of hearing impaired children in different time ranges of implantation: candidates, up to 3 years after implantation, and more than 3 years after implantation. Three questionnaires were used: 1) ìIn My Family, for assessing family functioning (Olson, Russell & Sprinkle, 1979; 1980; 1983). 2) The Parental Stress Index that examines stress among mothers of children with special needs, and, 3) Expectations from the Cochlear Implant Questionnaire which measures parental expectations regarding communication, self image, social adjustment, academic achievements, family, and rehabilitation demands. The main results of the study were (a) As the time from the implantation increased, the levels of expectations related to communication and academic achievements decreased. (b) Families with higher level of cohesion reported less stress than families with less coherent cli-

mate. (c) Positive correlations were found between parents' expectations regarding communication, social adjustment, and family climate and the current performance of the child in these domains. (d) Contrary to our hypothesis parents' expectations in the areas of self-image and academic achievements were not related to the child's current performance in these domains. (e) The level of stress of the families did not change as a function of the time from the implantation. (f) Mothers with higher level of education expressed less stress than mothers with lower level of education. The implications of these results to the rehabilitation process will be discussed with special emphasis on the relatively high expectations before the implantation and on the need to include the family perspective in the rehabilitation process.

D51   peer interaction and social identity dynamics: Workings of the epistemic triangle
Charis Psaltis, University of Cambridge, United Kingdom

While the productive role of social interaction between peers in promoting cognitive development has been clearly established, the communicative processes through which this is achieved have not been clearly identified. This paper reports two studies in which 226 Greek-Cypriot pupils 6.5 to 7.5 year (first graders) and 256 pupils of the same age were presented correspondingly with the Piagetian task of conservation of liquid and a spatial perspective taking task. Both male and female non-conservers worked with a conserving partner in either same or mixed-sex dyads, thus creating four different pair types. The pairs were asked to discuss their conflicting answers and agree upon a joint response. Sociometric measures of popularity and academic reputation were collected through peer nominations and teacher's evaluations. Cognitive progress was assessed by pre to post-test gains in pre-test-interaction-posttest (immediate and delayed)design. The results indicated that the type of conversation established during the interaction was strongly related to the outcome and that the gender composition of the pairs and the academic reputation and popularity of the pupils influenced the type of conversation which occurred. These results are discussed in relation to the general model of socio-cognitive conflict and extend Chapman's (1991) theoretical framework of the epistemic subject-other-object triangle by unravelling the role of social gender identity dynamics and other sources of asymmetries (academic reputation and popularity)in mediating the way in which the conflict is jointly expressed and resolved and individual cognitive progress takes place.

D52   Comparing two methods for investigating peer relationships: conceptual

and methodological issues
Katja Kosir, Department of Psychology, University of Ljubljana, Slovenia
Sonja Pecjak, Department of Psychology, University of Ljubljana, Slovenia

In sociometric research tradition, popularity is defined as the degree to which children are liked or accepted by their peers. However, it has been suggested recently that popular students may represent a less homogenous group that has been commonly assumed. Research indicates that it should be distinguished between two definitions of popular students: (1) popular students as those students who are well liked by many and disliked by few peers and (2) popular students as those students who are described as popular by their peers. The main purpose of the present study was to examine the relationship between sociometric and peer perceived popularity in students of different grades of elementary and secondary school. Additionally, the age differences in the relationship between sociometric and peer perceived popularity were examined. Another purpose of the study was to investigate the differential relationships between concepts of popularity and some students' characteristics. The participants were 321 boys and 329 girls who ranged from fifth grade of elementary school (the mean age approximately 11 years) to third grade of secondary school (the mean age approximately 11 years). Data were collected using sociometric test, peer interpersonal assessments, and self-concept questionnaire. The results of this study confirm previous findings that peer perceived popularity is a construct that is distinct from sociometric popularity. There are some substantial differences in relations between indices of perceived popularity and sociometric indices between students of primary and secondary students, i.e. between early adolescents and middle to late adolescents. It seems that perceived popularity and sociometric popularity are rather similar constructs in elementary school students, whereas in secondary school students they become almost unrelated to each other.

D53   *Comparison between co-peer tutoring and near-peer tutoring*

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Yeung Lapyan, The Hong Kong Polytechnic University, Hong Kong
Patrick Lai, The Hong Kong Polytechnic University, Hong Kong

Effectiveness of Co-peer Tutoring (CPT) and Near-peer Tutoring (NPT) in university study is investigated. CPT scheme was implemented in a class of nine students. Having involved in CPT, six of them volunteered to be peer tutors of thirty five tutees in the NPT scheme held in the semester that followed. Results of in-class observation, pre and post-test questionnaires and focus group interview were used to

evaluate the effectiveness of the two different models of peer tutoring scheme. The results suggested that most of the students have a positive attitude to the scheme. About half of the students first joined CPT with negative attitude but they changed their mind after participating in the scheme. Tutors in NPT generally had positive attitude in peer-tutoring scheme, they find that it is a valuable experience for their personnel grown as take part in designing the course content. However, significant change of attitude to the scheme does not appear again on the tutees in NPT. This result was owing to reduction of course contents, ability of peer tutors or relative lower participance of the tutees to the tutors. We find that NPT can benefit the tutors much more than the tutees in their ability of management and responsibility, however, it take huge amount of administrative work in monitoring the scheme. In the other hand, CPT request less resources and it benefits on both the tutors and tutees as the participants were requested to act both of the roles, which increased their participance.

D54   Intersubjective consciousness: Learning computer game making in companionship

Christina Aderklou, University of Gothenburgs, Senegal
Berner Lindstrom, University of Gothenburgs, Senegal

The need to study what happens when children on their own create games and learning material in computer game programs has becoming more urgent as computers and computer games have become every-day artefacts in Children's worlds. What can we learn from children playing and creating software that could generate new pedagogical approaches in school? We used material, tools and processes that were more familiar from the Children's every-day living, rather than from the teacher's perspective. The pedagogical situation was based on acceptance of Children's sense of self-agency (Stern 2000). Three Swedish classes were involved in the studies one with 8 year olds, and two with 11 year olds. In the latter group we listened to Children's self-observations and reflections. In the eight year olds group we set up an experimental situation. The task in both groups was to learn advanced complex digital tools for the purpose of making digital school material (as well as and have fun). The concept of learning in companionship (Trevarthen 2002) and shared endeavour was used instead of instruction in complex digital learning situations at school. Intersubjective consciousness was defined to have three dimensions in the two studies. The first dimension of intersubjectivity concerns the present moment of being-with-someone, here-and-now; the second concerns the changes in role, and the third involves sharing with a not present unknown other. Results show an increase in self-agency and intersubjective consciousness was expanding to children-to-become-pupils. This was evident in game production, understanding of the educational theme and learning idea, aesthetic sensibility, future playability, altruistic dialogues and changed roles as a result of new thoughts and experiences. The study indicates that computer game playing should be taken seriously as a context for different forms of learning and for finding new strategies for teaching, learning and transmission of knowledge account at school.

Teacher Professional Development
Discussant: Niki Tsaggaridou, University of Cyprus

D55 Differences in teachers' perception of instructional events depending on their school experience
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Sirje Sisask, University of Tartu, Estonia
Kaja Oras, University of Tartu, Estonia
Kaarel Haav, University of Tartu, Estonia

This paper introduces a study of differences in teachers' perceptual capabilities as reflected in teachers' comments of observed lesson events. The aim of the study is uncovering and defining indicators of differences in novice and expert teachers' perceptual capabilities. Another aim of this study is comparison of its results with findings of other similar studies. The elaboration of research methodology for this study was based on the implementation of four consecutive tasks: developing a procedure for selecting teachers with different and identified levels of professional development as research subjects; producing a stimulus material for eliciting reactions reflecting differences in research subjects' perceptual capabilities and fixing conditions for the experimental study; developing a reliable methodology for recording and analyzing the elicited reactions by the stimulus material; and carrying out a comprehensive analysis of research outputs leading to the definition of indicators of teaching expertise and to the ways of their identification. A special focus was given to the provision of reliability of the categorization procedures of the research subjects' transcribed comments used for the qualitative content analysis. To this end the entire research design was thoroughly analyzed and adjusted in terms of structuring the stimulus material used for eliciting comments of research subjects, of the meaning and size of units (ideas, themes or frames) used for the qualitative content analysis, and of criteria used for the categorization of these units. The achieved relatively high reliability of categorization procedures of teacher comments justified a following cross-cases content analysis of comments by categories and by experience groups of research subjects. The preliminary findings of confirmed that there are clear qualitative differences in novice and expert teachers' perception of instructional events and other features characterizing teaching in the classroom.

D56   Teacher conceptualisations of quality in adolescent fiction: multiple perspectives, multiple practices

Rosemary Hopper, University of Exeter, United Kingdom
Debra Myhill, University of Exeter, United Kingdom

Set in the United Kingdom context of a National Literacy Strategy which focuses closely on analytical approaches to reading a variety of fiction and non-fiction; and alongside concerns that the private reading of fiction by adolescents may be diminishing, this paper explores secondary school (11 - 18) teachers' views on the fiction available to adolescents for use in the classroom and for private enjoyment. Perceptions of quality in this fiction are examined, referring to earlier findings by Whitehead (1977), Sarland (1994) and Benton (2000) and considered in relation to a notion of a canon of literature for the young reader. The research which the paper draws upon is a pilot study, the first stage in a longer proposed study, into perceptions of quality in fiction for adolescents. The findings of this research draw on semi-structured 26 interviews with teachers, librarians and classroom assistants (TAs) from secondary schools in the UK in which they spoke about fiction for adolescents and how they interpreted quality in these texts. This paper reports on the multiple perspectives of quality expressed by teachers and illustrates the difficulty in identifying clear criteria of quality. The findings of this study are related to teacher education and the need identified by the Office for Standards in Education (OFSTED) UK for teachers to have a wider knowledge of fiction for adolescents to support the development of reading within a school context.

D57   Video-Based Lesson Analysis as a Vehicle for Improvement of Teacher Pedagogical Content Knowledge

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Research on teaching and teacher knowledge emphasizes the importance of teachers knowing and understanding subject matter in ways that enable its use in teaching (i.e., pedagogical content knowledge). The complexity of pedagogical content knowledge makes it challenging for educators to convey and for teachers to learn. A recent approach to teacher education and professional development sees the engagement in video-based analysis of practice as a promising way to foster teachers' pedagogical content knowledge. Despite this growing interest in video-based analysis of practice, there is little empirical research on the effects of the use of video analysis on the improvement of teacher knowledge. Lacking are also studies

that document the teacher learning process. This study aims at documenting the learning process of a group of 50 pre-service mathematics teachers and a group of 16 in-service mathematics teachers who participated in a video-based lesson analysis course. Teachers were asked to complete a series of written analysis tasks focused on the integration of content and teaching strategies. Participants learning process was documented through their written responses to analysis tasks. Their improvement in lesson analysis abilities was assessed through a pre- and post-test. The qualitative analysis of teachers' responses to course tasks unveils teacher thinking process while engaged in lesson analysis. Pre-service teachers' analysis abilities improved significantly. Initial analyses of the in-service teachers' pre-test show a better ability to reflect on the videotaped lesson than observed in the pre-service teachers' pre-test. In-service teachers provide comments and alternatives that are more elaborated. The data collected will inform the design of future video-based lesson analysis courses. The analysis of teachers' learning process will assist in the development of courses that are tailored to different levels of teacher analysis abilities.

D58   The Use of the Research Lesson Approach for Professional Development involving ìa Knowledgeable Other
Chris Dowson, Hong Kong Institute of Education, Hong Kong

There has been recent interest in active ways of raising teacher effectiveness through techniques such as teacher coaching and direct guidance. (Staub, 2004; Fischler, 2004). One methodology for examining and improving teaching in schools that is emerging in western settings is the use of research lessons, also known as lesson studies. The research lesson approach has its origins in Japan. It is essentially a process of professional development for groups of teachers who engage in critical analysis of the teaching of a topic or education aspect of a subject through observation with an objective of creating the most effective way of teaching the identified critical elements of the topic or education aspect. In this study of the teaching of ESL to deaf Cantonese speaking learners, data gathering includes direct observation, video recordings, discussion, interviews and open-ended survey. There is extensive involvement of the researcher in this study. This has been referred to as the involvement of a ìknowledgeable other. In research lessons the functional roles of facilitator, teacher and lesson observer are shared by the researcher and teacher. Following on from a description, the initial barriers, solutions and findings, use of ìa knowledgeable other and the research lesson approach, as a research instrument and professional development device with groups of teachers teaching English as a

second language to deaf Cantonese speaking students are reported.

D59   Teacher Efficacy, Perceived Organizational Support, and Commitment of Science Teachers Participating in a Teacher Support Program
Anastasia Kitsantas, George Mason University, United States
Donna Sterling, George Mason University, United States
Wendy Frazier, George Mason University, United States
Jennifer Hansen, George Mason University, United States
Juanita Matkins, George Mason University, United States
Molli George, George Mason University, United States
Charalambos Vrasidas, Cardet, Cyprus

The purpose of the present study was to determine the impact of a program for new provisionally licensed teachers, the New Science Teachers' Support Network (NSTSN), on their self-efficacy to teach science, perceived organizational support, and commitment to their profession. The NSTSN provided a multi-faceted support system (coaching, mentoring, science methods courses, and a website) to twelve (N=12) provisionally licensed science teachers. Teachers were asked to complete three online surveys, 2 self-efficacy scales and the school support scale, before and after exposure to the NSTSN. It was hypothesized that following the intervention, teachers would report significantly higher self-efficacy beliefs to teach science effectively and that they would be more committed to teaching. It was also expected that teacher's self-efficacy would be highly correlated with their commitment to teaching. Partial support for most of the hypotheses was found. The results suggest that the six elements of support provided by the NSTSN significantly enhanced teachers' self-efficacy to teach students of diverse backgrounds. In addition, teachers felt more efficacious in enlisting community involvement following the intervention. Although no significant differences emerged for perceived organizational support, continuance, affective, and normative commitment, there were significant correlations between these subscales and teacher self-efficacy suggesting that efficacious teachers are more likely to be committed to their school and the profession. Overall, the findings of the present study show that educational interventions such as the NSTSN may be helpful in assisting novice teachers, particularly provisionally licensed teachers to improve their instruction skills and remain in the profession. The results are discussed from a social-cognitive perspective.

D60   Implementation of the Early Reading and Early Math Strategies
Marie Jose Berger, University of Ottawa, Canada

Renee Forgette-Giroux, University of Ottawa, Canada

The study of the Implementation of the Early Reading and Math Strategies is a multifaceted research investigation including both quantitative and qualitative research methodologies. Sponsored by the Ontario Ministry of Education (Canada), it has been designed to gather data over a two-year time period in order to provide a comprehensive picture of, and feedback on, the implementation of the Early Reading and Early Math Strategies Initiative Towards Professional Development. The research project explores many dimensions of the initiative. To begin, the study seeks to provide a greater understanding of current practices in reading and mathematics instruction and the leadership role of Principals in the context. Collecting and examining evidence of changes in teacher knowledge, classroom practice, and school leadership as a result of participation in this initiative is another dimension of the study. Finally, the effect this initiative has had on student achievement is explored.

Teacher professional development and vocational education

D61   Change to PBL in Danish Engineering Education
Annette Kolmos, Aalborg University, Denmark

During the last ten years, Higher Education has undergone tremendous changes. A lot of these changes are caused by institutional and external factors, as government policy concerning resources, educational and quality assurance policies. The framework set by government, is rather simple to describe. However, at the institutional level, institutions have developed many different pedagogical models, using very different strategies for development. Nearly all Danish Engineering institutions have implemented elements of Problem Based and Project Based Learning (PBL). Particular 5 Engineering University Colleges have undergone changes towards PBL. Pedagogical Network for Danish Engineering Education (IPN) has been one of the central agents in the change processes for engineering education in Denmark. IPN has been responsible for staff and faculty development at the engineering university colleges and has been running the co-ordination for exchange of experiences among all Danish engineering institutions. However, it is not the same PBL-model which has been developed at the 5 different institutions - it is very different PBL-models, developed on the basis of very different development processes. In this article, results concerning the change processes at 3 different institutions will be presented. The research results are based on interviews with rectors, central change

agents and staff developers at the institutions. The result is clearly underpinning the theory, that only top-down decisions at institutional level together with a pool of motivated staff, will cause changes at a system level. A bottom-up approach with decentralised development at departments leads to a variation within the institution, but it might be difficult to develop curriculum models at system level.

D62   Processes of change of teachers' conceptualisation and practice
Teresa Guasch i Pascual, Open University of Catalonia, Spain
Montserrat Castello, Open University of Catalonia, Spain

The aim of this research is to analyse the processes of change of teachers' conceptualisation and practice in teachers who were participating in a training process about how to teach and learn a learning procedure (note-taking). The participants were four teachers from three Secondary Schools. They participated in a training process in teachers' learning context, with the aim of facilitating professional knowledge construction and to help teachers to make more explicit the representations that support their practices. During the training sessions, they shared the sense and meaning of note-taking, knew a methodological proposal about the teaching and learning of note-taking, and designed and carried out a didactical sequence to teach learning procedures. The methodological proposal was different for each teacher: a) strategic teaching of note-taking procedures; b) technique teaching; and c) usual teaching. The process consisted of weekly between one of the researchers and a teacher. The results from the analysis of resistances and agreements shared with the researcher during the training process, and the analysis of the recorded sessions, allow us to conclude that: 1) the initial conceptualisation of note-taking and its teaching and learning have an effect on the way of interpreting the training process, and therefore on the assimilation of the contents studied in the various sessions; 2) we can infer that the reflection and expounding of different viewpoints through the training and the teaching-learning process influence the change of the teachers' mental representations, and consequently their practice; 3) teachers' dominance theory is linked to the teaching methodology, and therefore directly affects the type of interaction in the classroom.

D63   Opportunities for teachers' professional development in three countries
Raimo Rajala, University of Lapland, Finland
Maria Flores, University of Minho, Portugal
Aki Tornberg, University of Lapland, Finland

The issue of teachers' professional development is becoming increasingly important for the national teachers' inservice training systems. In this comparative study teachers' opportunity for learning at school is regarded as a key factor to be capable to develop professionally. Also, the type of teacher community is seen to be related to opportunities to develop professionally. Leadership plays an important role in realizing policy promoting development and growth of organization members. And, finally, meaningful job content itself allows for workers development in great many respects. The research questions are as follows:

(1) What is the situation of teachers' professional development in Finland, Serbia and Monte Negro, and Portugal?

(2) How factors bearing on opportunities for learning at work, teachers' professional orientations, school leadership and job contents are related to professional development in the three countries?

The data of the research will be collected via closed ended questionnaires. The main research variables are professional development, opportunities for learning at work, school leadership, teachers' professional orientation and job content. Teachers represent primary and secondary levels of teaching in the focal countries. At the moment, the final data collecting procedure is being completed. The pilot study data is however available (N=89). Descriptive analyses of the pilot data suggest that the opportunities for regular professional development and motivation for it varied countrywise. Analyses into the relationships among the key variables were carried out using multiple regressions. The analyses suggest that both opportunities and motivation for regular professional development were predicted by good opportunities for learning at teaching work, high community orientation in teaching staff and effective leadership at school.In the final data, these tentative finding will be are revalidated. The results will be discussed with respect to the differences and the similarities between the three counties in teachers' professional development.

D64 *The professor's multimodal explanation and lecturers' training*

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Marina Castells LLavanera, Universitat de Barcelona, Spain

This investigation arises motivated to the necessity of the Lecturer's Formation and it is developed in the line of Professor's discourse analysis. We select the electromagnetism like study topic taking account that, for its nature, it facilitates the development of the capacity of engineering student's abstraction, But, how to analyze the discourse of a professor and what theory to select for the analysis of this? In this investigation, the opportunity is presented, to study the theoretical mark of Perelman and Olbrechts, and apply it in the discourse analysis of the Physics Professors, being that an environment different to the juridical one accustomed. This research is oriented to develop a doctoral dissertation at the University of Barcelona, and is carried out in Venezuela, in the Faculty of Engineering of the University of Carabobo, taking like reference the expositive discourse of a professor in Electromagnetic Physics. The instrument of gathering of data is based on the direct observation, non participative and using like support the recording in video of the classes and notes of the investigator's field. The theoretical framework has proven to be effective in capturing key aspects of physics explanations from a rhetoric-argumentative perspective; in fact, it is useful to identify the specific characteristics of the expositive discourse of physics professors and the resources used by them when looking for the adhesion of students to the theses that are being presented, what communicative modes the professors use and what functions they have in the coherent construction of scientific meanings. It is sought to guide the results of discourse analysis towards the professional improvement of the lecturers.

D65 *The PISGA in Israel: A new model of professional development for in-service teachers*

Anat Raviv, Haifa University, Israel
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A major change in the in-service education of teachers was introduced in 2003 in Israel. Former teacher developed centers, jointly operated and administrated by ministry of education and local municipalities were replaced by a new organizational phenomenon called 'PISG"A', the new name signaled a new conception of teacher education for practicing teachers. The PISG"A centers aim is to offer an answer to the frequent changes in the education field, country priorities and the educational agenda of the Israeli ministry of education. In order to develop teacher's knowledge

and building new practical ideas and experience the teacher's training will be based on professional growth, experience and learning from the materials and methodological tools that are offered combined whit reflection on the learning/ experience action (Zeichner, 1993; Schon, 1988; Zilbershtein, Ben-Perez, Ziv 1998). Studies suggest that professional development experiences that include most of these characteristic can have a substantial positive influence on teachers' classroom practice and students' achievement (Kroath, 1990; Nespore & Barlyske, 1991). The paper critically explores the experience of the "new" frame of in-service for teachers in the PISGA centers in Israel from dual perspective (an instructor/lecture in the PISGA and a visiting teacher educator from Canada and the U.S.A who has spent nearly 25 years as a Dean of education in large teacher education institutes). It presents teachers views and experience that participate in the training program and as well as offering suggestions for change.

The authors of the proposal and paper have identified a number of principles of success which have relevance not just for the Israeli PISGA, but for teacher education elsewhere.

D66   Professional development: an Activity-Theoretical study of expansive learning in good practices
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M. Stam, Polytechnic of Amsterdam, Netherlands
G.T.M. Ten Dam, University of Amsterdam,, Netherlands
J.H.A.M. Onstenk, Polytechnic InHolland, Netherlands
W.L. Wardekker, Free University of Amsterdam, Netherlands

Educational innovation requires teachers to be lifelong learners and change agents: without teachers who are willing to change their day-to-day practice and simultaneously change the context for this practice, educational innovation cannot take place. Whether educational innovation will in actual fact take place depends to a great extent on whether teachers are capable of further developing their competencies and whether they are capable of creating a challenging and nurturing learning environment for themselves as well as for their students, with the help of the broader context of the school. This paper focuses on the development of the competencies of teachers who work within the context of good practices in innovative vocational schools in The Netherlands. The good practices were selected because they were developed in a bottom-up, rather than a top-down way. We report some tentative results of four qualitative case studies that look into the expansive learning, individual and team-learning, that takes place in these good practices'. The activity theory is

the theoretical framework that helped us analyse our data. The tentative conclusions deal with the tensions and contradictions in the activity system, or between activity systems, as the motor of the ongoing development and growth of competencies, by teachers and by teams of teachers. The study reports on factual developments, on experiences and on the developments of attitudes and visions of teachers. It ultimately focuses on the development of meaning within teams and personal sense-making by individual teachers with regard to the innovation process.

D67   Is the teachers' understanding of learning reflected in their preparation of lessons? A project to foster self-regulated learning in vocational education
Astrid Elke, University of Basel, Switzerland
Sandra Grieder, University of Basel, Switzerland
Corinne Tiaden, University of Basel, Switzerland
Gerhard Steiner, University of Basel, Switzerland

The complete research project is designed to optimise learning processes in vocational education. Therefore teachers are trained in workshops to encourage students to use learning strategies. This part of the project focuses on the teachers' influence on the students' learning processes. 32 teachers were asked in a standardized inter-view about their cognitions of learning and their procedure when preparing lessons. The data were processed by TAMS Analyser. We wanted an answer to the questions: a) What are the teachers' conceptions of learning? b) Are the teachers' conceptions of learning reflected in their conceptions of the lessons? c) Do learning strategies play any part in the teachers' beliefs about learning and lesson preparation? d) Can any changes be found after the intervention? The teachers' concept of learning was divided into surface processing (content focus and competence focus) and deep processing strategies (meaning focus teachers and growth focus). One third of the teachers mentioned more than one learning concept. With regard to lesson preparation for one third of the teachers the curriculum was the only important orientation. Other important structuring procedures were development according to content, learning process, starting phase of the lesson, and aim of the lesson. There is no systematic connection between learning concept and lesson preparation. With regard to learning strategies, they were rarely mentioned. In con-text with the learning concept some teachers referred to cognitive strategies and hardly any to motivational ones. Metacognitive strategies could not be found. In the lesson part of the interview only very few teachers mentioned cognitive strategies. The results show that learning strategies are not considered often when describing what learning is or how to prepare a lesson. Furthermore the understanding of learning is not consist-

ently transferred to the development of lessons. The effect of our workshops will be analyzed in due course.

Learning and Instructional Technology
Discussant: Charalambos Vrasidas, Cardet - Intercollege, Cyprus

D68   Overcoming the tyranny of distance via an Interactive Satellite System in university education in remote Australian outback
Juhani Tuovinen, Batchelor Institute of Indigenous Tertiary Educati, Australia

This research sought to assess the value of a satellite-mediated interactive distance learning (IDL) system for University programs in remote northern Australia. The IDL system has used in two Australian states for school education. 167 remote sites can be reached simultaneously in the Northern Territory (NT) from two studios. Each of the two studios can broadcast and be in two-way communication with all of the sites in NT. This is one of its key attractions for education at any level. The system allows a clear full-sized video of the teacher and good quality sound to be displayed to all students. The students' pictures are not available to the teachers, but they can hear the students. The system also includes an Internet connection between the students and the studio. Many different systems are used to provide interactivity over distances, with variation in quality of and the numbers of sites linked. Many factors that could influence the teachers' and students' experiences of interactive video teaching have been studied, such as participants' prior experiences, the availability of support staff, etc. Overall, it appears students learning in interactive video-mediated contexts learned as well as in normal face-to-face teaching situations or better. The university community indicated varying amount of interest in the use of this system. Some programs with up to 1000 scattered students were interested. Others felt that there were too many resource, time or training limitations for the system to be worth using. This study highlighted the importance of the interacting technical, organisational, support, pedagogical, discipline-specific and human relational aspects of the satellite-mediated interactive programs. The significance of this study demonstrates how these issues can be fruitfully tackled in planning, designing and implementing distance courses mediated by a live interactive audio-visual communications system over huge distances under extremely demanding conditions.

D69   An equitable postmodern curricular praxis for internationalised web-based distance learning in higher education
Henk Eijkman, Monash University, Australia

While universities are increasingly offering their courses transnationally, and via internationalised curricula, little research attention is devoted to equity considerations despite the increasing participation of socio-culturally diverse student cohorts. This study addresses this under-researched aspect of internationalised web-based curricula by asserting that all students in transnational programs need to be able to engage, on an equal footing, with issues of difference, conceptual dissonance, hypercomplexity, and competing value systems. Moreover, they increasingly need to be able to do so in web-based distance learning environments which provide the most cost-effective delivery platforms for internationalised curricula. The study uses a comprehensive review of learning theories in conjunction with a qualitatively-oriented case study of a web-based access program to reveal how a critical post-modernist curricular praxis is better placed to promote the equitable educational engagement and learning outcomes for socio-culturally diverse student cohorts in internationalised curricula. This study is of particular significance because its critical theoretical review of dominant learning theories in web-based programs and empirical case study focused specifically on equity considerations. The analysis of the review and of the data obtained from staff, students and the content analysis of the access program's curriculum indicate that curricular practices framed by cognitivist and even constructivist assumptions continue, in the final analysis, to be tied to individualist curricular practices which inhibit students' ability to respond adequately to issues of difference, diversity, hypercomplexity, conceptual dissonance and competing value systems that are inherently social rather than individual in nature. Instead, the analysis points to the efficacy of a distinctly social and critically pragmatic framework for curricular praxis which enables students to collectively and critically explore and compare knowledges, cultural values, and practices embedded in their own and their academic discourses and thereby engage equitably with a world that is not just diverse but multi-aspectival in its presentation.

D70   Opening notes in a forum on line: An analysis proposal
Ilaria Mancini, University of Rome La Sapienza, Italy
Barbara Maroni, University of Rome La Sapienza, Italy

Moving from possible application of some aspects of Conversational Analysis (Sacks, Schegloff, Jefferson, 1974) and of Sequential Analysis (Bakeman, Gottman, 1986) to forum on line for collaborative knowledge building, in a previous work we examined on line discourse development in a community (Mancini, Maroni, 2004). We analysed turn-taking referring to modalities of selection for the first referent and to modalities of opening note (Ligorio, Maroni, Mancini, 2004). Aims of this study are:- To single out specific aspects of this CMC asynchronous context; - To extend the analysis to forum differently marked for participants and aim of the discussion. We chose forum so that they would be homogeneous referring to participants and activity. Participants are grown up people, discussing about a theoretical topic. Data are forum on line notes from Synergeia, a web based platform. We use two category systems: Receiver and Opening. Categories of Receiver are Community or Specific Participant. To single out Opening as unit of analysis we consider the syntagm and categories are: Nominal, Verbal, Prepositional, Adjectival, Adverbial, Wh, Connection and Interjection. We expect to single out specific aspects of this CMC asynchronous context and to find out preferences in selecting receiver and using syntagm modalities.

D71   Identity for learning in the web: A methodological proposal
Paola Francesca Spadaro, University of Bari, Italy
Vito Fabio Fraccascia, University of Bari, Italy

The main core of this study is the relationship between identity and learning, in particular, digital identity and computer-based learning. The relationship between identity and learning was developed in the past (Bruner, 1997), and now is a field of interest for many researchers studying the specific effects in digital environments (Ligorio, Pugliese, Spadaro, 2004; Talamo, Ligorio, 2004). In their current studies they use concepts as ´dialogical self[a] (Hermans, 1996), ´self positioning[a] (Harre' e Van Langhenove, 1991) and ´participation[a] (Wenger, 1998) that because of their complexity are difficult to be operationalized for the research. In this study we suggest an analysis method we call ìintegrated, by which we think it is possible to study the features of such complex concepts within collaborative learning contexts mediated by asynchronous digital environments. This approach is a combination of qualitative and quantitative methodologies through a three-step-procedure. Such

methodology will be supported by some examples of preliminary researches.

D72   Online Mentoring to Enhance Authentic Learning
Irja Leppisaari, Central Ostrobothnia Polytechnic, Finland
Riina Helenius, Central Ostrobothnia Polytechnic, Finland

This paper deals with the Online Mentor Project, which aim is to develop a new leverage model for the needs of online education. The model is expected to strengthen the relationships of higher education, working life and meaningful learning. As representatives of the working life, online mentors provide a link of more authentic problems and experiences as well as new models of thinking and working to distance learning. The development of expertise in mentoring takes place in AVERKO's online courses, which are organised in co-operation with students, tutors and representatives of the working life for this project. Learning tasks, theme discussions and practical examples connected with the real working life seem to enhance authentic learning. Meaningful learning connects knowledge into situations, where theory and its elucidation are connected. At its best, mentoring promotes active and critical reflection, where both students and mentors examine their experiences and views, and doing so, construct new knowledge together. Through the project, students will be given an opportunity to enrich their learning through accounts of authentic problems experienced by experts. Online mentoring makes online teaching and learning in higher education more working life oriented than before.

D73   Integrating different aspects of the learning and teaching process. How understanding, dialogical teaching and pedagogical sensibility interrelate creating dynamic learning environments
Kyriaki Doumas, Department of Education, Lund, Sweden

This study investigates how teachers, students and object of learning interrelate in a classroom situation within the institutional framework of formal schooling, when dynamic, complex, meaningful and joyful learning environments are created. Further more some other issues are considered such as the role of the school subject, (humanistic and natural sciences), and the level of education. A qualitative approach was adopted exploring the experiences of students as they were expressed in semi-structured and in-depth interviews. The recent years themes concerning the construction of the space of learning have been explored by many scholars in the educational research field. It has been pointed out the distinction between the intended object of learning and the the ireal, the enacted, object of learning which

can be quite different as it is constituted jointly in the interaction between teachers and students in the particular classrooms. The space of learning, is investigated here in a wider form as the pedagogical teacher-students interrelation is explored as possible constitutional element of the learning process. The following aspects were distinguished through the analysis of students' interviews: In-depth understanding as a result of dialogical teaching carried out with pedagogical sensitivity and sensibility. However, these three aspects are conceived as interwoven elements, all essential for the enhancement of the learning potentiality of the teaching process. The space of the enacted object of learning which is constituted in the teacher-students interrelation integrates cognitive, emotional and ethical aspects. Learning then is not only an intellectual dynamic but an empowerment of the whole person which brings even meaning and joy.

D74   Designing and Implementing a Technology-enhanced Inquiry-Based Learning Environment: Developing an integrated understanding of geology
Xornam Apedoe, University of Georgia, United States

The quality and characteristic of students' science knowledge, and the methods of teaching science have been under question for many years (e.g. Duschul & Hamilton, 1998) and new initiatives have been taken to redefine and re-conceptualize what science education should look like. The innovation explored in this study was the use of inquiry-based learning activities supported by access to, and use of, resources in a digital library. Of primary interest here was how a technology-enhanced inquiry-based learning environment could be structured to support the appropriation of, and engagement in, scientific practices and discourse, helping students develop an integrated understanding of geology. Preliminary findings suggest that a number of factors within the technology-enhanced inquiry-based learning environment may have a significant influence on student development of integrated understanding of geology. For example, differing levels of instructor knowledge for not only geology content, but also for pedagogical knowledge of inquiry-based teaching techniques appears to play a significant role in fostering and hindering student desire to appropriate and participate in inquiry processes. Implications of these and other results for the design and implementation of technology-enhanced inquiry-based learning environments in undergraduate geology and/or other science courses will be discussed in further detail during the presentation.

D75   Spatial Framewokrs in imagined navigation
Sofronis Sofroniou, University of Cyprus, Cyprus
Marios Avraamides, University of Cyprus, Cyprus

Past research on spatial frameworks (e.g., Franklin & Tversky, 1990) has shown that a set of orthogonal axes centered on our bodies is used to encode and remember the locations of objects that surround us. Work by Avraamides & Carlson (2003) has extended the spatial framework research to situations in which we imagine ourselves moving within a perceptually available space even in the absence of any objects. The present work examines the conditions under which the spatial framework model can be used to characterize imagined navigation. The results of our experiments suggest that an embedded perspective is critical for the spatial framework model to apply. Instead, the occasional updating of the imagined facing direction - proposed by Avraamides & Carlson (2003) as a precondition for spatial frameworksódoes not seem necessary.

D76   Fostering the Comprehension of Diagrams by Interpreting and Constructing Diagrams in Multimedia Environments
Jessica Phillipp, University of Education, Freiburg, Germany
Rolf Ploetzner, University of Education, Freiburg, Germany

The goal of an empirical study was to investigate how learners gain knowledge about representational systems and how learning activities like interpreting and constructing diagrams can foster their comprehension. For learners it is often difficult to understand the affordances and constraints of representational systems and to use them flexibly in different domains. From an instructional design perspective, multimedia learning environments offer a wide range of possibilities for teaching the use of external representations like graphs and diagrams. They facilitate many forms of presenting, constructing and manipulating them. But only little is known about the effectiveness of such activities like constructing or interpreting diagrams. Our study therefore analysed whether self-construction of representations or the interpretation of presented representations is more successful in supporting learners to understand representational systems and to apply these representational systems as a reasoning tool. Taking into account the research about learning with worked-out examples and several transfer paradigms, different combinations of interpreting and constructing diagrams were considered. We compared four groups of fifth graders regarding learning and transfer outcomes. In a treatment phase they had to solve kinematic problems of increasing difficulty using distance-time-graphs. On each level of task difficulty the students had to solve two tasks with structurally identical diagrams. The first group solved both tasks interpreting presented diagrams. The students of the second group had to construct the diagrams in both tasks themselves.

In a third group, the students were given a diagram in the first task and had to construct their own diagram in the second task. Finally, the students of the fourth group had to construct their own diagram in the first task and solved the second task with a presented diagram. We compared the four groups regarding their performance in two post-tests considering short and long term effects.

24 August 2005　　　　12:30 - 13:30　Conference Center　　　　　Room A

Keynote Address

Chair: Anastasia Efklides, Greece

When effective becomes meaningful and when learning becomes participation-Conceptual shifts in research on social interaction in learning and instruction
Paivi Kristiina Kumpulainen, University of Oulu, Finland

This keynote address will provide a historical overview of research on social interaction in learning and instruction. Whilst using our own experiences and empirical research work as points of departure, the presentation will illuminate conceptual shifts in social interaction research across time. Specific attention will be directed to changes in research purposes and related questions, conceptual frameworks, as well as data collection methods and analysis. These theoretical and methodological choices are suggested to be linked with the ontological and epistemological assumptions each strand of research has followed in a given time and historical context. This is also reflected in the ways in which the concepts of social interaction, learning and instruction and their interrelationships have been defined. Via the review, the keynote address shows how social interaction research in the field of learning sciences has become a rich and vivid area of scholarly investigation. In the presentation, introductions will be given towards studies of social interaction embedded in a process-product paradigm, cognitive perspective, as well as in socio-cultural and situated perspectives. The methodological approaches applied by these studies have often drawn on psychological and domain-specific analyses, discourse analysis, ethnomethodology as well as on ethnography. A unifying trend in recent studies is seen in the acknowledgement of the dynamic interplay between multiple agents and contexts mediating the opportunities for individual and communal action and learning. The recognition and a wider comprehension of the dynamics of these agents and contexts has become an important research agenda for recent investigations. In sum, via the illumination of conceptual shifts in social interaction

research across time, the keynote address aims at furthering the dialogue about the potential and challenges each strand of research has brought towards understanding the psychological, social, linguistic and cultural elements that shape the practice of learning and instruction in diverse contexts.

24 August 2005   12:30 - 13:30 Conference Center   Room B

Keynote Address

Chair: Andrea Karpati, Eotvos University, Hungary

On warm conceptual change: The role of personal epistemology in knowledge restructuring
Lucia Mason, University of Padua, Italy

In their classic 1993 article, Pintrich, Marx, and Boyle called for research on ìhot conceptual change, that is, for affective, motivational, and situational factors that may affect knowledge changes to be considered. Until then -- but even now to a certain extent -- research on conceptual change was focused on students' prior knowledge structures, developmental changes, and teaching strategies. This presentation introduces a line of research on warm conceptual change by analyzing the role of personal epistemology in knowledge revision processes, which was included by Pintrich (1999) among the motivational beliefs acting as resources or constraints. As it comprises beliefs about the nature, source, and justification of knowledge, personal epistemology is necessarily influential in knowledge restructuring. Starting from a theoretical perspective with the paradigmatic approaches to the investigation of personal epistemology, the outcomes of the few studies which have examined its effects on conceptual change, will be then reviewed. They suggest that students who believe in knowledge as immutable, absolute and certain, and made up of compartmentalized facts cannot engage in conceptual change to the same extent as students who believe that knowledge is hypothetical, evolving, and interconnected in its structure. To this regard the open question is how epistemological beliefs facilitate or impede the knowledge restructuring process. The mechanisms implied in these processes, such as systematic processing, will be discussed with reference to a ìdual process model of conceptual change in which intentionality is a key aspect. Examples from my own research will illustrate the argument. In addition, the significance of the development of epistemological thinking and the orchestration of powerful learning environments which enhance beliefs about knowledge and knowing will

be outlined in the light of outcomes from intervention studies.

24 August 2005   12:30 - 13:30   Conference Center   Room C

Keynote Address

Chair: Roger Saljo, Gothenburg University, Sweden

Hands and minds: Possible educational implications
Demetris Natsopoulos, University of Cyprus, Cyprus

Handedness as an index of functional brain asymmetry has stimulated great re-
search interest for the last three decades, since Levy's work in 1969. This has cul-
minated in a number of theories and a vast literature spanning many areas, such as
neuropsychology, neurology, genetics, biology and educational psychology. One of
the more prominent is Annett's theory of human balanced polymorphism (1985).
According to this theory hand preference and hand skill are associated with cerebral
function (speech lateralization, mathematical thinking, spatial cognition, arithmetic
and reading ability and higher general intelligence). Both extreme left- and right-
handed individuals are at risk to develop deficits in the areas of cognition in contrast
with those individuals, left-and right-handers, who are mildly biased to dextrality.
A second school of thought, also biologically oriented, posits that handedness need
not involve cerebral function, and individuals less biased to the right are not intel-
lectually advantaged (McManus et al., 1993; 2002). A third theory, which draws
upon neuropsychological literature, distinguishes between pathological left-hand-
ers, as the result of brain injury, and normal left-handers in the general population
(mainly Bishop, 1990; Coren, 1992). Finally a theory by Geschwind (Geschwind
and Galaburda 1985) claims that left-handedness is only partly genetic and partly a
result of the intrauterine influences, such as excessive levels of testosterone, which
causes delay of development in left-handers, learning disorders, and sometimes
yields left-handers talented in space cognition and language. This invited talk is
intended to give an overview of our current understanding and the speaker's em-
pirical work (Natsopoulos et al., 1998, 2002). In addition, I intend to demonstrate:
(i) whether handedness is linked to cognitive deficits in general, (ii) specifically, if
there exist subgroups of handedness that may be at risk to develop such cognitive
dysfunctions, and (iii) whether intervention programs can be devised to help those
individuals with difficulties.

Symposium
Mathematics Education

DEVELOPING PROCEDURAL FLEXIBILITY IN ELEMENTARY SCHOOL ARITHMETIC

Chair: Lieven Verschaffel, University of Leuven, Belgium
Organiser: Lieven Verschaffel, University of Leuven, Belgium
Discussant: Elsbeth Stern, Max Planck Institute for Human Development,
                Germany

One of the most important recent issues in (research in) mathematics education is how students can be taught curricular subjects so that they develop adaptive expertise. In his foreword of the book The development of arithmetic concepts and skills. Constructing adaptive expertise edited by Baroody and Dowker (2003), Hatano (2003, p. xi) describes adaptive expertise as ìthe ability to apply meaningfully learned procedures flexibly and creatively and opposes it to routine expertise, i.e. ìsimply being able to complete school mathematics exercises quickly and accurately without (much) understanding. Although the constructs of adaptive and routine expertise were introduced by Hatano already more than two decades ago (Hatano, 1982), and although terms like adaptivity and flexibility have been used with increasing frequency by researchers and practitioners in the field of mathematics education, only few systematic and deliberate attempts have been made to rigorously study (a) adaptive expertise as a competence, (b) the acquisition of adaptive expertise, and (c) the cultivation and (d) assessment of adaptive expertise in the academic domain of mathematics. The overall aim of this symposium is to present four new studies dealing with teaching and learning to make use of arithmetical strategies in the domain of elementary school arithmetic in an adaptive or flexible way, and to reflect on the psychological and instructional implications of these studies for different groups of pupils, including mathematically weak and disabled children.

Strategy development in elementary school Children's simple addition
Dietmar Grube, Georg-August-Universitat Goettingen, Germany

Elementary school children's strategy use in solving simple addition and subtraction tasks seems to shift from counting strategies to direct retrieval from knowledge base and to decomposition strategies (also based on knowledge retrieval) very slowly. This view is supported by two different lines of research, the chronometric approach (e.g. Ashcraft & Fierman, 1982) and the observation/interview approach (e.g. Carpenter & Moser, 1983). In the present study, the technique of ìarticulatory suppression (AU) was adopted from research related to Baddeley's working memory model in order to gain further evidence of the course of strategic change. It was argued that if children solve simple addition tasks using verbal counting strategies, continuous articulation of an irrelevant word during calculation should reduce addition performance (Hitch, Cundick, Haughey, Pugh, & Wright, 1987).

In two experiments, children were continuously articulating (experimental condition) or were tapping the space bar of the computer keyboard (control condition) while performing a simple addition verification task (sums < 20). In Experiment 1, first-, second-, third- and fourth-graders were tested at the end of the school year. In Experiment 2, second- and fourth-graders were tested at the beginning of the school year. Here additional observation/interview methods were implemented. In both experiments, the effect of AU occurred only with the youngest age group and only with problems involving sums passing over ten. Therefore, this study did not demonstrate any use of counting strategies by children at the end of the second grade and older. The results of the observation/interview method implemented in Experiment 2, however, indicated ample use of verbal counting strategies for both age groups. It is proposed that the distinction between use of (indicated by observation/interview) and dependence on verbal counting strategies (indicated by AU) contributes to a more complete view of strategy development in simple addition.

Split or jump? Children's strategy choices in the number domain up to 100

Joke Torbeyns, University of Leuven, Belgium
Lieven Verschaffel, University of Leuven, Belgium
Pol Ghesquiere, University of Leuven, Belgium

This study aimed at analysing the adaptive nature of children's strategy choices in the domain of adding and subtracting up to 100, starting from Lemaire and Siegler's theoretical and methodological framework. In their model of strategy change, Lemaire and Siegler (1995) distinguish four parameters to characterise children's strategy competencies, namely strategy repertoire, distribution, efficiency, and adaptiveness. To gather unbiased data about strategy efficiency and adaptiveness, Siegler and Lemaire (1997) propose the choice/no-choice method, which requires testing all subjects in two types of conditions, namely (a) a choice condition, in which subjects can use their preferential strategy on each item, and (b) one or more no-choice conditions, in which they have to solve all items with one strategy.

Sixty-nine second-graders of different mathematical achievement levels solved a series of additions and subtractions up to 100 both before and after they had received systematic instruction in the topic. At both measurement times, the series of items was offered in one choice condition and two no-choice conditions. In the choice condition, children could choose between the split and the jump strategy on each item. In the two no-choice conditions, they were instructed to solve all items with, respectively, the split and the jump strategy.

Our analyses revealed a surprisingly low number of adaptive strategy choices both before and after instruction in the number domain up to 100. Only high-achieving children took into account item characteristics during the strategy choice process; neither high- nor low-achieving children fitted their strategy choices to their individual strategy performance characteristics. These results might be explained by the strong instructional focus on the jump strategy, which might have prevented children to develop the necessary knowledge and skills to flexibly apply diverse strategies in the number domain up to 100.

Development of young children's strategic competence in numerosity estimation

Koen Luwel, University of Leuven, Belgium
Robert Siegler, Carnegie Mellon University, United States
Lieven Verschaffel, University of Leuven, Belgium

This study used the microgenetic method to investigate the discovery and development of a smart numerosity estimation strategy. The task consisted of estimating

numerosities of blocks presented in a 10 x 10 grid. This task allows for the use of two strategies: the addition strategy whereby estimates of different subgroups of blocks are added to a running total and the smart subtraction strategy wherein the number of empty squares is subtracted from the total number of squares in the grid. Thirty-nine second graders, who had not discovered the subtraction strategy yet, were assigned to two conditions differing in terms of the frequency of items eliciting the subtraction strategy (10% vs. 90%) in the practice sessions. Pupils ran eight sessions (three test sessions, four practice sessions and one transfer session). Data were analysed in terms of: the rate of discovery and generalization of the subtraction strategy, overall task performance, and adaptiveness of strategy choices. Results revealed that participants discovered the subtraction strategy earlier in the subtraction than in the addition condition, in terms of the number of sessions but not in terms of the number of critical trials. Second, the generalization of the subtraction strategy increased with increasing session number, and was larger in the subtraction than in the addition condition. Third, during the study we observed an improvement in overall task performance on the trials with the highest numerosities. Finally, the adaptiveness of strategy choices tended to increase during the course of the study and was somewhat larger in the subtraction condition than in the addition condition. These results suggest that a small, well-selected number of critical items might be sufficient to promote the discovery and the subsequent development of a strategy.

Traditional and realistic strategies used for solving division problems in Dutch national mathematics assessment at the end of primary school
Cornelis M. van Putten, Universiteit Leiden, Netherlands
Gabrielle Rademakers, Hogeschool InHolland, Netherlands
Meindert Beishuizen, Universiteit Leiden, Netherlands
Jan Janssen, Citogroep, Netherlands

In this study we collected and categorized the strategies used to solve division problems in the Dutch national mathematics assessment of 1997 at the end of primary school. Traditional long division algorithms were used in 43% of the written solutions; realistic strategies were seen in 22% of these solutions, and mental solutions (only an answer, no working) in 31% of the cases. Most students were consistent in their strategy use over the set of problems: 46% could be characterized as using a traditional strategy either exclusively or combined with mental solutions; 29% as using a realistic strategy exclusively or combined with mental solutions; 19% as exclusive mental problem solvers. On average students correctly solved 5 of the 10 problems. Division word problems without decimal fractions were more often

solved correctly than word and number problems with decimal fractions. Student achievement in the traditional strategy group was significantly better than in the realistic strategy group. The decrease in Dutch national achievement for written arithmetic over the 1987 - 1997 period might therefore be attributed to a certain extent to the assumedly increased number of students using realistic strategies since the introduction of realistic mathematics textbooks at the end of the 1980s and in the 1990s.

E 2   24 August 2005   14:30 - 16:30   Room A108

Symposium
Teaching and Instructional Design

MAKING LEARNING POSSIBLE: THE ROLE OF PEDAGOGY FOR EN-HANCING LEARNING

Chair: Jonas Emanuelsson, Gothenburg University, Sweden
Organiser: Ulla Runesson, Gothenburg University, Sweden
Discussant: David Clarke, Melbourne University, Australia

The overall aim of the symposia is to discuss constraints to and possibilities of learning from the point of view of the object of learning. A common theme in the presentations, although not always explicitly advocated, is: pedagogy matters! These papers all relate to teaching and learning practice and, are illustrated by examples from different subjects from primary to university level. The papers have another thing in common, they are grounded on the same theoretical premises   learning means to be aware of certain aspects of that which is learned. In her paper Vikstr?m reports that differences in students' understanding of life circle were related to those aspects they discerned and were aware of. If learning implies the awareness of critical aspects, consequently, to provide learning implies sensitising the learner's attention to these aspects. In their paper, Watson and Mason discuss this in terms of the mathematical problems students encounter, particularly how these affords generalisations. In flour of the papers (Holmqvist et al., Ling & Ying, Pang & Marton, and Runesson) the authors demonstrate how teachers can systematically explore the critical aspects of learning in a learning study so they can be enacted effectively. The results from these studies clearly show that, whether or not the learners had the opportunities to experience the critical aspects had consequences for the learning outcomes. One observation that be drawn from these studies is that it is important

to take the learners' acts of awareness into consideration, rather than the acts them-selves.

The paradox of pedagogy
Ming-Fai Pang, University of Hong Kong, Hong Kong
Ference Marton, Gothenburg University, Sweden

One of the few principles that all educationalists seem to agree on is that learning takes an active involvement on the part of the learner. Moreover, it is generally assumed that the more active the involvement is, the better learning will result. Pedagogy, on the other hand, is about helping the learners, making it easier for them to learn. Bringing these two principles together might then mean that the more powerful the pedagogy is, the less powerful the learning becomes. This sounds not only counter-intuitive, but clearly paradoxical. We will try to point out a way of solving this paradox, by means of an empirical study in which two groups of teachers set out for finding the best way to teach a difficult concept/phenomenon in Economics. Both groups worked according to the learning study model (which is a combination of design experiments and Japanese lesson studies). One group varied one aspect of the phenomenon at a time, and brought the different aspects together subsequently, while the other group let all aspects vary at the same time. Following the above paradox, the second group would outperform the first group (because of higher active involvement), but in actual fact the opposite happened (the first group outperformed the second group, both on immediate and a delayed test of under-standing after learning). These results could be interpreted within the framework of variation theory: Pedagogy is not so much supposed to make learning easier, but to make learning possible. When learning is possible and the learners want to learn - they will. If pedagogy fails to make learning possible, it fails to support learning at all. But making learning possible is not enough. Only the learner can make it happen. By realizing this, our results can be understood and the above paradox can be solved.

LEARNING PATTERNS: How contrasts affect students' learning outcomes
Mona Holmqvist, Kristianstad University College, Sweden
Laila Gustavsson, Kristianstad University College, Sweden
Anna Wernberg, Kristianstad University College, Sweden

This study aims to describe the ways different patterns of contrasts used in edu-cational settings affect the students' learning outcomes. Learning can be seen in

different ways by teachers. If learning in some way is seen as similar to building a house, a teacher can give the students a detailed description of how to build, without concerning if they have built before. They just build by the description, while the teacher has already decided exactly how this should be carried out. The students do not even take the risk to make mistakes; they always succeed if they follow the directions. In a second way, a teacher can focus upon the buildings the students have started to create by themselves, without giving them a detailed description. During the creation phase the building becomes even better than the students have planned by themselves. The initial plans my have been altered, because of the suggestions from the teacher in combination with a deeper understanding by the student. Finally, the teacher can recognize how the students have built models of a learning object but would like them to build knowledge different from what the student already has. The student can be forced to tear down her/his own beliefs. In all three examples above the way contrasts are used to make the student see the critical aspects of the learning object differ and affect the learning outcome, both in a short and long time perspective. An understanding for which pattern of contrasts each learning situation needs is often an implicit knowledge that teachers create during experience. In this study we make this phenomena explicit by describing the patterns we have found in five different learning studies in three different school subjects, combined with an analyze of how the different patterns affect the students' learning outcome.

Sequence and variation: A learning study of the angle concept
Ulla Runesson, Gothenburg University, Sweden

In mathematics education, it is well recognised that it is necessary to see the angle as turning in order to understand the concept fully and, consequently, that the concept should be taught accordingly. The teachers in this study anticipated the significance of this on the basis of what they had got to know about their students' pre-knowledge on a diagnostic test. The teachers worked in an explorative process called the learning study. This is premised on variation theory. From a variation theory perspective learning implies being able to discern critical aspects of that which is learned. Promoting learning possibilities implies providing for the learners to attend to those aspects. A learning study is a cycle of planning and revising the lesson. It starts with one teacher teaching the first lesson planned on the basis of a pre-test of the pupils' prior knowledge. The lesson is videoed and after the lesson the pupils are tested. Based on The test results and on the teachers' reflections of the recorded lesson, the lesson plan is revised. Next, the second teacher teaches her class according to the new plan. This lesson is similarly videoed taped and the

pupils are tested. Then, if necessary, the lesson plan is further revised. To identify critical aspects of the space of learning afforded to the learners, the data from this learning study was analysed to reveal differences in the teachers' handling of the object of learning and how this was reflected in pupils' learning outcomes on a post-test. Although, angle as turning was brought out in all the lessons, the students' learning outcomes were different in the different classes. It is demonstrated that how the idea of turning was sequenced and varied was both a critical constraint and an opportunity for learning.

Enriching student learning: Structuring tasks which limit possible generalisations
Anne Watson, University of Oxford, United Kingdom
John Mason, Open University, United Kingdom

This paper presents issues and practices which address the effects of variation in mathematical questions. It is a theoretical paper based on our extensive experience working with learners of mathematics, beginning and experienced teachers and teacher educators. Learning mathematics is seen as becoming acquainted with generalisations of several types: concepts, techniques, classes of objects, properties, relationships and theorems. Through detailed consideration of examples from classroom practices we look at some typical classroom mathematics questions and ask what generalisation, and hence what learning, is afforded for the learner by the variations and in variances within the question sets. Paradoxically, the more constraints are imposed in sets of traditional mathematics questions, the more likely they are to afford appropriate generalisation for the attuned learner. We go further and claim that all learners generalise in all situations, and may be frustrated when it is not clear how to do so. They may not, however, be attuned to generalise in the ways expected by the teacher. We give several examples of the ways in which careful attention to dimensions of possible variation (a notion derived from Marton) and ranges of permissible change afford direct access to conventional mathematical structures through placing limitations on possible generalisations. It may seem at first as if we are advocating a return to textbook exercises as an alternative to problem-solving, activity-based teaching. On the contrary, we show that the learning skills, and the quality of learners' mathematical engagement, in each kind of situation are remarkably similar.

Using patterns of variation to teach electro-chemical series in Hong Kong

Mun Ling Lo, The Hong Kong Institute of Education, Hong Kong
Helen Hung Hoi Ying, The Hong Kong Institute of Education, Hong Kong

This paper describes how a team of teachers and researchers in Hong Kong worked together to develop a research lesson on electro-chemical series in a Learning Study at Secondary 4 level in the subject of Chemistry. Learning study is premised on a conceptual framework that builds on three types of variation: variation in students' understanding of a specific object of learning (V1); variation in teachers' understanding and ways of handling the object (V2); and the use of patterns of variation based on the Theory of Variation (V3). The study reported in this paper illustrates how the conceptual framework, in particular, the use of patterns of variation, helps to enhance student learning. In this study, the same teacher taught the research lesson in two cycles to two Secondary 4 Chemistry classes in the same school. The two cycles of research lesson were videotaped, analyzed and triangulated with the student learning outcomes in a diagnostic test administered before and after the lesson, and a post-lesson group interview with a sample of students. Whereas the theoretical framework of variation was employed to analyze what patterns of variation were created and hence what was made possible to learn in the lessons, the results of the pre- and post- test were compared to trace the students' progress in categories of questions that measured for their understanding. In the research lesson, patterns of variation which served the functions of ìseparation and ìgeneralization were used to help the students to understand how the electro-chemical series is derived, and to discern that the order of the metals in the series and the potential difference between any two given metals are constant and independent of the reference metal used. The student learning outcomes showed that there was substantial growth in the students' understanding of these concepts.

The characteristics of critical aspects and their role in constituting patterns of variation

Anna Vikstrom, Lulea University of Technology, Sweden

The aim of this study was to analyse the characteristics of critical aspects and the role they play in constituting patterns of variation and making certain kinds of learning possible. These were identified in an empirical study where the lifecycle of angiosperms was learned. The identified critical aspects defined different ways of experiencing the life cycle. Six teachers and their students (aged 7-12) participated in the study. The relationships between the characteristics of the critical aspects, the

patterns of variation that constituted the space of learning and the learning outcome were investigated. Before the lesson the teachers and the researcher established the object of learning. In order to understand how the students experienced the object of learning, the students were interviewed before and after the lessons. In order to get a good picture of how both teachers and students related to the object of learning, observations and video recording of lessons were made, as well as stimulated recall interviews with both students and teachers. All recordings were transcribed in verbatim. The result shows that critical aspects can be described in terms of being specific or general with respect to the object of learning. They were identified to be more or less dependent on relations to each other and that relationship were identified as hierarchical. For some aspects it was only the relation to general aspects that made it possible to constitute patterns of variation. The critical aspects were also identified to be characterised of the presence, or absence, of a physical reference, which here refers to a link to a visible object or process. A conclusion is that, for understanding the lifecycle of angiosperms the specific critical aspects are dependent on relations to general aspects and of the patterns of variation and physical references that relation offers.

E 3   24 August 2005   14:30 - 16:30   Room E003

Symposium
Instructional Design

INSTRUCTIONAL DESIGN IMPLICATIONS OF COGNITIVE LOAD THEORY: SEQUENCING AND DESIGNING LEARNING TASKS

Chair: Liesbeth Kester, Open University of the Netherlands, Netherlands
Organiser: Jeroen van Merrienboer, Open University of the Netherlands, Netherlands
Discussant: Peter Gerjets, Knowledge Media Research Center, Germany

Cognitive load theory has traditionally been involved with teaching problem solving. As an alternative for conventional problems that students had to solve independently, alternative instructional methods were developed that made a heavy use of worked examples, completion assignments, process models, etc. But the backbone of instruction is still seen as a succession of ìlearning tasks that students perform. Two issues are pertinent to current research: How those tasks are sequenced and how students are supported to learn from them. With regard to sequencing, it is

clear that learners cannot start with very difficult tasks. This would overload their cognitive system. Therefore, tasks are sequenced in such a way that ìintrinsic load is decreased in the beginning of the learning process. Furthermore, tasks should differ from each other on dimensions that also differ in the real world. Variability helps learners to abstract away from their concrete experiences and develop general ideas that allow for transfer of learning. Mindful abstraction causes ìgermane cognitive load. Well-designed instruction must thus find a balance between decreasing intrinsic load and increasing germane load.

With regard to learner support, worked examples, problem cues, and instructional aids all aim to decrease extraneous load, which is not relevant to learning, and increase germane load. The contributions to this symposium focus on sequencing and support. Ayres presents results for an isolated-to-interacting-elements approach to sequencing; Olina et al. present results on combining cued problems with randomization as a sequencing technique for redirecting learner's attention; Van der Meij discusses results of using worked examples with or without conceptual information; Seufert and Br?ncken present results on the effectiveness of auditory and visual instructional aids, and van Merrienboer and Kester present results on dynamic task selection, where both the task sequence and the amount of support is determined on the fly.

Interactions between the isolated-integrated elements effect and levels of expertise
Paul Ayres, University of New South Wales, Australia

Pollock, Chandler, and Sweller (2002) found that a strategy that isolates interacting elements was an effective instructional method for some learners, but not all. This present study investigated this strategy further by studying the impact of prior knowledge and an additional technique of increased practice on key computations. Element isolation was achieved by subdividing specific mathematical tasks requiring consecutive computations into partial tasks requiring only individual computations. Experiment 1 demonstrated that the proposed element-isolation strategy was effective. Two groups of grade 8 students were given a mathematical problem-solving task. One group solved whole problems whereas the second group solved an equivalent set of partial problems (Isolated). The isolated group made significantly fewer errors and rated cognitive load lower. In Experiment 2 three groups received different learning materials. During acquisition one group followed an isolated format, a second group followed a fully integrated format, and the third group (Mixed) switched from an isolated to an integrated format. Test problems revealed a significant interaction between learner knowledge and instructional strategy. Students

with poor mathematical knowledge benefited the most from receiving the isolated treatment. In contrast, students with greater mathematical knowledge learnt more by completing fully integrated problems. The mixed mode was not found to be effective. In Experiment 3, computations that caused the most errors in the domain were targeted for extended practice. During acquisition, one group received an equal amount of practice on each computation, whereas a second group received the equivalent amount of practice overall, but three times the amount on targeted computations. On test problems a significant interaction was found: students with the highest mathematical ability benefited from the targeting approach, whereas students with the least mathematical expertise did not. The two interactions identified in this study are discussed in terms of cognitive load theory.

Applying cognitive load theory to teaching comma rules to us high school students
Zane Olina, Florida State University, United States
Robert Reiser, Florida State University, United States
Xiaoxia Huang, Florida State University, United States
Jung Lim, Florida State University, United States
Sanghoon Park, Florida State University, United States

This study was an attempt to test the concepts of cognitive load theory in a real classroom setting. It investigated the effects of (a) cued versus conventional and (b) blocked versus random practice problems on learner performance and perceived mental effort on tasks involving the correct use of comma rules. The participants were more than 300 US high school students, grouped by ability level (lower-ability and higher-ability). It was anticipated that cued problems would reduce learner extraneous cognitive load, while problems presented in a random order would increase learner germane cognitive load. The treatments yielded significant differences in learner perceived mental effort, but no performance differences were identified. Among lower-ability students, conventional practice problems presented in a random sequence yielded the highest perceived mental effort ratings. In contrast, there was a trend for higher-ability students to perceive cued practice problems as more difficult than conventional problems, regardless of the problem presentation sequence. This initial study shows promise for possible applications of cognitive load theory in a real classroom setting. However, our study also raised a number of issues warranting further investigation, including: the nature and extent of cues for decreasing learner extraneous load; the nature and extent of practice and relevant prior knowledge for schema acquisition; student perceptions and experiences with the different problem types and presentation sequences; and the need for an as-

sessment instrument that would help make more accurate distinctions between the difficulty of a given task, student motivation to perform that task, and student perceptions of the mental effort they invest in performing it. Discussion of the results of the study and the issues it raises should help set directions for additional studies examining cognitive load theory in classroom settings.

Worked examples in instructions for end-users of software
Hans Van der Meij, University of Twente, Netherlands

Background. Worked examples are concrete instructions that display a solution for a specific problem that represents a problem type. Research has shown that worked examples can positively affect learning. Most of the research on worked examples has been done in domains such as physics and mathematics in which students work on a limited set of problems. This study explores their role in instructions for end-users of software. Two instructional variants are pitted against each other: concrete instructions versus mixed instructions. The main questions are: (a) what are the critical design characteristics of worked examples in instructions for end-users of software? (b) Do concrete and mixed designs have different effects on the user? Method. Sixteen participants worked with the Concrete Instructions, fifteen used the Mixed Instructions. During key moments in training users answered a question about cognitive load. Knowledge and skill was tested with an immediate and delayed post-test. Results. Participants with Mixed Instructions had a significantly higher score on the most complex items from the immediate knowledge test. Participants with Concrete Instructions, on the other hand, scored better on moderately complex items from the delayed knowledge test. Conclusion. In the designs of the user instructions three structural elements have been manipulated: (a) task explanations, (b) direct instructions to act, and (c) screen shots. The findings for these variations have been equivocal. In-depth examinations of the users' reflections during training are called for to discover how users processed their instructions. Also, a further study is needed on the nature of the explanations given to the users. Such explanations should be linked to the kind of strategic reasoning one would like to model for the user.

Cognitive load and the format of instructional aids for coherence formation
Tina Seufert, Georg August University, Germany
Roland Bruencken, Georg August University, Germany

A cognitively high demanding process in understanding complex learning mate-

rial presented with multimedia is to build referential connections between multiple representations like text, pictures, charts or formulas. The main question addressed in the present study is, how this process of building referential connections, called coherence formation, can be fostered by means of instructional design, and which role cognitive load plays in this context. In an experimental study 58 university students learned with a multimedia program containing six different representations on a chemical domain. Understanding the whole material the six different representations had to be integrated to a coherent mental model by building multiple referential connections. The process of coherence formation was supported by instructional helps, which were presented either visually or auditory (factor 1: modality of help). Learner's cognitive capacity was assessed by a pretest (factor 2: high vs. low cognitive capacity). Knowledge acquisition was assessed by a recall and a comprehension test. With respect to recall, the results show a significant main effect of the cognitive capacity, with respect to comprehension a significant ATI-effect between the modality and learners' cognitive capacity could be obtained, indicating that comprehension values are decreased especially for learners with low cognitive capacity and visual instructional aids. The results are in line with cognitive load theory and show that the effectiveness of instructional aids depends on the amount of additional cognitive load which it adds to the learning situation, on learners cognitive capacity and on the demands of the learning task: for a high demanding learning task low loading (auditory) instructional help seems to be most effective, while a high loading (visual) help seems to overload especially learners with low cognitive capacity.

Cognitive load theory as a basis for the dynamic selection of learning tasks
Jeroen van Merrienboer, Open University of the Netherlands, Netherlands
Liesbeth Kester, Open University of the Netherlands, Netherlands

Van Merrienboer's four-component instructional design model describes how learning tasks fulfill the role of a backbone for an integrated course or educational program. Three requirements for this backbone are: (1) learning tasks are organized in simple-to-complex task classes, (2) learners receive support and guidance for the first learning task in a task class after which support slowly disappears (scaffolding), and (3) learning tasks within the same task class show a high variability in order to allow for transfer of learning. In a flexible educational program, it should be possible to take differences between students into account. Thus, in a process of dynamic task selection new learning tasks are selected in such a way that they are adapted to the needs of individual students. Some students are better able to acquire

new competencies and need therefore less practice and support than other students. In addition, elsewhere-acquired competencies of new students should be taken into account, which makes it even more important to be able to select suitable learning tasks for students at any given point in time. In the framework sketched above, this means that for each individual student, it should be possible to select the best ìtask class to work on (i.e., select tasks at the right level of difficulty) and to select a learning task with the optimal level of guidance and support within this task class. Furthermore, this task should be selected in such a way that variability of all tasks within the same task class is guaranteed. Electronic learning environments allow for such personalization of instruction. In this presentation, recent experimental studies on dynamic task selection on the basis of the 4C/ID-model and Cognitive Load Theory are discussed.

E 4   24 August 2005   14:30 - 16:30   Room A010

Symposium
Metacognition

CURRENT ISSUES IN THE TRAINING OF METACOGNITION

Chair: Annemie Desoete, University of Ghent, Belgium
Organiser: Eleonora Louca, Dep. of Psychology, Cyprus College, Cyprus
                Isabel Garcia-Gomez, University of Seville, Spain
                Csaba Csikos, Hungary Department of Education, Hungary
                Annemie Desoete, Univerisity of Ghent, Belgium
                Anat Zohar, Hebrew University of Jerualem, school of Education,
                Israel
Discussant: Erik De Corte, University of Leuven, Belgium
The aim of the symposium current issues in the training of metacognition with as chair A. Desoete (University of Ghent, Belgium) and as discussant E. De Corte (University of Leuven, Belgium) is to present some examples or good practices of metacognitive trainings and to discuss several current issues regarding the useful-ness of those trainings.

Despite the different emphasis researchers have given to the metacognitive con-structs, teachers, educators and therapists came to believe that it is worthwhile to promote metacognitive skills of students. Hartman and Sternberg (1993) summa-rized the literature and presented four main approaches: promoting general aware-

ness by modeling by teachers, improving metacognitive knowledge, improving metacognitive skills and fostering on learning environments.

In a first presentation Louca (Cyprus College) will elaborate on the construct of metacognition and on 17 teaching strategies for the promotion of metacognition. The next presentation by Aguilera-Jimenez, Garcia-Gomez and Mora-Roche (University of Sevilla Spain) will describe teaching patterns that promote metacognition and a maximum progress in primary students. In addition Csikos (University of Szeged Hungary) will elaborate on a metacognition-based training program in grade 4 in the fields of mathematics and reading. Desoete (University of Ghent, Belgium) will discuss a metacognition-based training program in grade 3 in the fields of mathematics. The fifth presentation by Zohar and Peled (University of Jerusalem, Israel) will be on the effects of explicit meta -strategic teaching regarding variable control on students' strategic and meta - strategic thinking".

Teaching strategies for the promotion of metacognition
Eleonora Louca, Dep. of Psychology, Cyprus College, Cyprus

Metacognition essentially means cognition about cognition. Flavell (1981) distinguishes between metacognitive knowledge and metacognitive experience. Matsaguras (1994) explains that metacognition refers to both people's awareness and control, not only of their cognitive processes, but of their emotions and motivations as well. A number of strategies are described, which teachers can use to facilitate Children's metacognitive development and promote the monitoring and regulation of one's own cognitive enterprises. The educational implication of the application of metacognitive strategies such as self-awareness and self -monitoring, is to develop independent learners who can control their own learning and learn how to learn for life.

Teaching Patterns that promote metacognition
Antonio Aguilera-Jimenez, University of Seville, Spain
Isabel Garcia-Gomez, University of Seville, Spain
Joaquin Mora-Roche, University of Seville, Spain

Within the context of a broader research on cognitive and metacognitive enrichment (Mora, 1995, 1997) the aim of this presentation is to describe the most effective teaching patterns for achieving maximum progress in cognitive and metacognitive abilities. Three groups of Primary students who had taken part in a cognitive

enrichment programme, called ìComprehending and Transforming (Mora, 1991), showed different gains from pretest to posttest. It has been established that teaching interaction patterns play a main role in relation to those differences (Aguilera & Mora, 2003, 2004) but explanations about why these teaching patterns provide such an enrichment remain unclear. We?ll give a description of those ìActivating Teaching Patterns and discuss the place they have in the research literature summarized by Hartman and Sternberg (1993). We conclude that ìfostering on learning enviroments is the most relevant field, although not the only one.

A metacognition-based training programm in grade 4 in the fields of mathematics and reading
Csaba Csikos, University of Szeged, Hungary

The aim of this paper was to test the hypothesis whether explicit teaching of meta-cognitive strategies yields better achievement in various types of mathematics and reading tasks. We restrict the use of the term metacognitive to conscious and deliberate mental processes, and we use the expression metacognitive strategy in accordance with the psychological definitions of procedural metacognitive knowledge. The experiment involved 4th grade students from 8 schools. The schools were selected from a larger set of schools participating in a project -Differential treatment and evaluation of lower SES students. 4 schools were labeled as experimental and from each school there was one experiment class chosen. The other 4 schools were labeled as control and all of their 4th grade classes were control classes. There were two pre-tests: mathematics achievement test and reading test (with document texts), and there were four post-test: the two pre-tests re-administered, a mathematics word problem test (10 parallel tasks from Verschaffel et al. 1994), and a reading test with various types of texts. The metacognition-based training consisted of 15 mathematics and 15 reading lessons that were integrated into the regular subject content. The training aimed to develop students' achievement in both strategy-level and drill-like tasks by means of developing declarative and procedural metacognitive knowledge. Our results suggest that the training had a significant positive effect on students' achievement. These findings may point to the importance of the use of metacognitive strategies in basic skill instruction.

A metacognition-based training program in grade 3 in the fields of mathematics
Annemie Desoete, Ghent University, Belgium

This contribution is devoted to the relationship between metacognition and math-

ematical problem solving skills in lower-elementary-school children. Within the second and third approach of Hartmans and Sternbergs (1993) model a study is presented on 84 third graders were 42 children got a training on improving the metacognitive prediction skill and 42 got a regular math course. The results of good and poor math solvers are analyzed separately.Results show that metacognition can be trained and has some value added in the intervention of young children solving mathematical problems. It should be emphasized that metacognitive skills do not develop spontaneously with a traditional mathematics instruction in regular schools. Metacognition needs to be taught explicitly in order to develop. Presentation elaborates on the improving metacognitive knowledge-approach. Within this approach a study is presented on 84 third graders were 42 children got a 5-session during training on improving the metacognitive prediction skill and 42 got a regular math course. The results of good and poor math solvers are analyzed separately. Results show that metacognition can be trained and has some value added in the intervention of young children solving mathematical problems. It should be emphasized that metacognitive skills did not develop spontaneously with a traditional mathematics instruction in regular schools. Metacognition needed to be taught explicitly in order to develop.

Effects of explicit meta-strategic teaching regarding variable control on students' strategic and meta-strategic thinking
Anat Zohar, Hebrew University of Jerusalem, Israel
Bracha Peled, Hebrew University of Jerusalem, Israel

The study's objective is to assess the effects of explicit teaching of meta-strategic knowledge on gains in students' strategic and meta-strategic thinking and to compare between these effects for students of low and high academic ability. Participants were 41 students. Each student participated in five weekly sessions that lasted approximately 30 minutes each, in a transfer assessment session and in a retention assessment session. Only the experimental group received explicit meta- strategic instruction. Strategic ability was measured by interviews that led students in performing the simulated "experiments" with the computerized task, asking them to draw inferences and to justify them. Meta-strategic ability was measured by asking students explicit questions about the process of their investigation and about the rule of variable control, and also by asking them to evaluate and to explain experiments of fictitious students. The findings show that explicit meta-strategic teaching affects the quality of students' strategic and meta-strategic thinking about control of variables. Teaching effects were preserved for three months after instruction, and

across three different tasks. Teaching effects were larger for students with low academic achievements than for students with high academic achievements.

E 5   24 August 2005   14:30 - 16:30   Room E004

Symposium
Reasoning

STATISTICAL REASONING AND SITUATED MODELLING IN THE WORKPLACE AND IN EDUCATION

Chair: Celia Hoyles, Institute of Education, University of London, United
              Kingdom
Organiser: Richard Noss, Institute of Education, University of London, United
              Kingdom
              Arthur Bakker, Institute of Education, University of London,
              United Kingdom
Discussant: Koeno Gravemeijer, Freudenthal Institute, Utrecht University,
              Netherlands

This symposium will consider the changing nature of modelling and statistical reasoning in workplaces, and the implications of this for education and work-based learning. Ubiquitous technology means that sophisticated analytical techniques are no longer the preserve of highly trained professionals, but are now available to nearly all employees. With this comes an increasing expectation for employees to make use of those techniques and to be able to develop and use models of work processes. Thus there is an emerging need for employees to have functional mathematical and statistical knowledge and a ìsituated understanding of modelling that are grounded in their workplace situations and in the technological artefacts that surround them. A conventional approach to modelling is that techniques are learnt ìout of context and then ìapplied in context, but educational research, particularly on situated cognition, has shown the limitations of that approach. By making a crossover between researchers in workplaces and researchers in school and university education an intention of this symposium is to debate the situatedness of modelling and statistical reasoning in the workplace, and the need to re-conceptualise mathematics and statistics education at the school and university levels. The symposium will embrace two themes:
(1) the forms of modelling and statistical reasoning carried out in a variety of work-

place settings (Hoyles, Kent, Noss & Bakker);
(2) attempts by educational researchers to improve statistical reasoning: in the workplace (Bakker, Noss, Kent & Hoyles, using simulations and dynamic statistics software), at university level (Niglas, by focussing on how students combine everyday language with statistical language to situate formal techniques in students' everyday world) and at school level (Meletiou, using dynamic statistics software).

Enhancing the teaching and learning of early statistical reasoning in elementary schools: A study in Cyprus
Maria Meletiou-Mavrotheris, Cyprus College, Cyprus
Efi Paparistodemou, University of Cyprus, Cyprus
Despina Stylianou, City College, The City University of New York, United States

The research discussed in this article comes from an ongoing multifaceted program for the teaching and learning of early statistical reasoning in Cyprus. The program has two closely interrelated aspects - design of a strong empirical research component within which to examine the development of statistical reasoning and the teaching of statistics in early grades, and design and development of instructional materials and supporting teachers' guides informed by the study's empirical findings. The initial stage was concerned with the design of a line of instructional materials for the development of statistical reasoning. Central to this design was the functional integration with existing core curricular ideas of dynamic statistics software, which provide students with the opportunity to model and investigate real world problems of statistics. Next, professional development seminars for the teaching of statistics with the use of technology were designed and organized. We are currently at the implementation stage of the program. One of the teachers that had attended the seminars implemented the instructional materials in her sixth-grade classroom with the support of the design team, and four more teachers will do so in the upcoming months. The paper discusses insights gained from the study regarding teacher content and pedagogical knowledge of statistics and how this might impact student learning. Preliminary analyses confirm earlier findings of the research literature which indicate that teachers have a weak knowledge base in statistics. At the start of the professional development seminars, teachers exhibited a strong deterministic mindset. They consistent focused on measures of central tendency when analyzing or interpreting data distributions, and ignored variation. However, teachers' explorations during the seminars with the Dynamic Statistics Software Fathom helped them improve their conceptions of variation and distribution. They began to appreciate the uncertainty and variability inherent in statistical data.

Switching between everyday and statistical languages to develop students' statistical reasoning

Katrin Niglas, Tallinn Pedagogical University, Estonia, Estonia

In 1994, an action research project was initiated at Tallinn Pedagogical University (Estonia) with the aim to work out and implement a new course in statistics for students of social sciences and pedagogy. It was considered important to develop the students' ability to understand the practical, real life meaning of statistical concepts as well as the ability to communicate statistics in two different (Estonian) languages: in so called ìstatistical language and ìeveryday language understandable also to a layman. As a result of the first two cycles of action research project the structure of the course was proposed and the preliminary results of the project reported. Later the structure of the basic course has not changed considerably. However, the development of the teaching style that would meet the aims described above took considerably longer time. The overall attitudes towards the course over the years of the project have been mainly positive, although many students have reported difficulties in comprehension of the concepts studied. In spring term 2004 about 200 students who had completed various data analysis courses were given semi-structured survey questionnaires focussing especially on the communication aspects of the course. The paper will give an overview of the main results which tend to support strongly the approach that assumes the active involvement of students and emphasises the development of communication skills.

Situated modelling and statistical reasoning in the workplace: An analysis of Techno-mathematical Literacies

Celia Hoyles, Institute of Education, University of London, United Kingdom
Phillip Kent, Institute of Education, University of London, United Kingdom
Richard Noss, Institute of Education, University of London, United Kingdom
Arthur Bakker, Institute of Education, University of London, United Kingdom

The Techno-mathematical Literacies in the Workplace project is investigating the needs of employees in a range of industrial and commercial workplaces to have functional mathematical and statistical knowledge that is grounded in their workplace situations and in the technological artefacts that surround them. By carrying out case studies in workplaces we have identified a set of Techno-mathematical Literacies (TmL) which turn out to be important for understanding and improving work processes. This presentation focuses on statistical reasoning and what we call

situated modelling, that is how employees construct knowledge about models of processes that depend on mathematical and statistical issues as situated in the workplace. For instance, situated modelling helps to make invisible causes of problems visible by using mathematical signs (tables, graphs, charts, etc.). From a semiotic perspective this implies that people need to interpret signs and know how to respond, but their actions also depend on the activity system in which they operate. Theoretically, we are developing a framework which combines activity theory with semiotic analysis. Activity theory provides a sophisticated ìmacro-level account of how knowledge is acquired in becoming part of a workplace community, but the ìmicro-level analysis of knowledge at individual and group levels has been less well theorised, and we are investigating how a provisional semiotic analysis (based on the formulation of Peirce) may complement the theory. We illustrate our analysis of the TmL of situated modelling with several examples: from a food manufacturing company involved in process improvement, and from a pharmaceutical company where a data collection and analysis computer system has recently been installed as a tool for continuous process improvement. In both cases, we consider a range of ìtechno-mathematical signs which mediate individual understanding and simultaneously serve as boundary objects for communication between individuals in different activity systems within a workplace.

Developing learning opportunities for techno-mathematical literacies in the workplace
Arthur Bakker, Institute of Education, University of London, United Kingdom
Richard Noss, Institute of Education, University of London, United Kingdom
Phillip Kent, Institute of Education, University of London, United Kingdom
Celia Hoyles, Institute of Education, University of London, United Kingdom

This presentation follows from the first presentation of the ìTechno-mathematical Literacies in the Workplace project. It discusses the development of ìlearning opportunities for Techno-mathematical Literacies ó that is, flexible resources for learning that can be incorporated within, or be presented alongside, workplace training materials. Using the methodology of design experiments, we iteratively design, prototype and evaluate learning opportunities using simulations and other software tools. The learning opportunities deal with both the macro- and micro-level of work processes. On the macro-level, we use simulations with contextual pictures and video to help employees get an understanding of the key stages of the work process and understand what the key process variables are and how they interact. On the micro-level, we use educational statistics software (TinkerPlots) to focus on the

statistical ideas that are key to work processes. Our research suggests that above all employees have to deal with many forms of variation and to identify stable features of processes; for example, the common and special causes that generate variations in manufactured products. Thus our learning opportunities aim at developing a situated understanding of variation, target values and distributions, all in the context of production. We will present the results of using the first prototypes of learning opportunities built around the statistical aspects involved in industrial production. The focus will be on a pharmaceutical company in which supervisory managers are learning about how to make use of a production data system and its outputs as tools for process improvement, and communicating with process data to senior managers, engineers and production operators.

E 6   24 August 2005   14:30 - 16:30   Room E102

Symposium
Moral Development

CHEATING: AN EDUCATIONAL AND MORAL CHALLENGE FOR SCHOOLS AND UNIVERSITIES

Chair: Kari Smith, Oranim Academic College of Education, Israel
Organiser: Nava Maslovaty, Bar Ilan University, Israel
              Kari Smith, Oranim Academic College of Education, Israel
Discussant: Per Lauvaas, Hoegskolen i Oestfold, Norway

This symposium is jointly organized by SIG 1 (Assessment and Evaluation) and SIG 13 (Moral and Democratic Education). Cheating, violation of academic rules, has become a widespread phenomenon in assessment situations among learners of all ages and in various assessment contexts and it crosses cultural boundaries. It is a moral issue all educators, parents, teachers, and faculty, as well as students, are faced with and can choose to challenge. The symposium which includes five papers, representing four countries, USA, Sweden, Israel and Australia, and with a Norwegian discussant, presents a truly international perspective on current research into the problematic area of academic dishonesty. The context and the focus of the studies vary, one of the two American contributions enquire why high school pupils cheat even though they know it is morally wrong, and what impact this has on their moral development. The Swedish study and the second American contribution examine the role technology plays in the increase in pupils' dishonest academic

behaviour in their respective contexts. A different perspective has been taken in the Israeli study which looks into teachers discourse while discussing moral dilemmas focused on cheating in an in-service setting. The Australian paper presents a more optimistic view as it examines why some learners choose not to cheate in spite of the fact they are aware of how widely spread the phenomenon is among their peers. The discussant, Norwegian Per Lauvas, will discuss the papers in light of his rich knowledge and experience as educator and researcher in the field of education and assessment in particular. This symposium contributes new information to an extremely important, yet rather neglected area of research, the meeting point of assessment and moral education.

Moral judgment and its neutralization: Why students cheat, even though they know it is wrong
Jason M. Stephens, University of Connecticut, United States

The widespread and growing nature of academic cheating is well documented in the research literature. One of the most troubling aspects of its prevalence is that many students who report cheating believe it is morally wrong or unacceptable to do so. Stephens (2004), for example, found that nearly half of the high school students in his study who reported engaging in behaviors they considered cheating also indicated that they believed that cheating was morally wrong. Given that adolescence is critical period in identity formation (Erikson, 1968), including the development of a moral self (Damon & Hart, 1988), this incongruity between judgment and action is especially troubling. This paper present findings from field-based studies of academic cheating among middle and high school students in the United States. This mixed-methods study (surveys and interviews) brings together insights from several theoretical frameworks - including Turiel's (1983) domain theory, Kohlberg's (Kohlberg & Candee, 1984) theory of moral development (with its emphasis on responsibility judgments as a significant moderating variable in the relation between judgment and action) and Bandura's (1986) social cognitive theory to examine the relations between students' domain and responsibility judgments related to academic cheating and their engagement in academic cheating. By building on and extending existing theoretical and methodological approaches to understanding students' judgments related academic cheating, this study aims to offer important insights into why so many students even when they think it is wrong to do so. Such insights are critical to the development and implementation of intervention strategies aimed at ameliorating the widespread problem of academic cheating during adolescence and the troubling belief-behavior incongruity often associated with it.

This is clearly needed as current efforts to reduce cheating are often narrow in scope - relying primarily on the threat of punishment - and largely ineffective.

What's so original? The discourse on education and dishonesty in the wake of a technological revolution
Lars-Erik Nilsson, Kristianstad University, Sweden
Anders Eklaf, Kristianstad University, Sweden
Torgny Ottosson, Kristianstad University, Sweden

The purpose of this paper is to discuss research interests implied by the discourse on student cheating. Earlier research on cheating has primarily been concerned with two issues. One has been to investigate (a) the extent to which students' cheat and the other issue has been (b) and student attitudes towards and reasons for cheating attempting to explain why students cheat. Today's discourse on cheating has focused on the use of technology on example being plagiarism. Proposed ways to deal with cheating also involve technology. It has been suggested that technology provides ways to analyse texts and compare to students' style of writing and to scan databases for presumed originals. This however is not the only suggested cause and remedy for cheating and plagiarism. It is also suggested that such student behaviour is caused by teaching strategies in education and that given assignments invite cheating. It is further suggested that cheating and plagiarism can be explained by changing ethics among students, implying cheating and plagiarising to be acceptable. Cutting corners through downloading papers is just another way to get the assignments done. Another suggestion is that students are unaware of what is considered proper ethics in academia and need to be informed about rules for citing and taxonomies for paraphrasing, but also what the consequences of for breaking such ethics are. We argue that this way of looking at cheating and plagiarism disregards the real problematic questions by treating academic and educational work as stable practices that are little influenced by changes in society or new tools. It disregards difficult questions about identity and what is to be considered original work or copies as new tools influence work practices.

How students, teachers, and parents judge cheating on the internet
Althea Scott Nixon, UCLA, United States
Yasmin B. Kafai, UCLA, United States

We investigated how and why different stakeholders in a school communityóstudents, teachers, and parentsójudge the appropriateness of two uses of the compu-

ter and Internet and predict each other's moral judgments and reasons. The first computer use we selected involves cheating with text on the Internet by violating copyright infringement laws on plagiarism: Students copy text from the Internet at home and at school in order to complete a class assignment. The second computer use involves cheating with home and school rules for browsing the Internet: Students' browse the Internet without permission from their teachers or parents. Results show that there were contextual and developmental differences in participants' moral judgments for the cheating with Internet text. Looking across home and school contexts, although almost all participants judged it inappropriate for students to browse the Internet at home or at school without permission, fewer participants judged it inappropriate to copy text from the Internet at home than to do so at school. Developmental differences show that fewer children than adults judged cheating with Internet text as inappropriate, and fewer children than adults were able to predict that these differences in moral judgments existed. Many participants gave social conventional reasons and moral reasons for why it was inappropriate to do these behaviors, and many participants (especially students) gave personal reasons for why it was appropriate to do these behaviors. This pattern indicates that children and adults judge uses of the computer and Internet more harshly when they are based on moral values or on socially constructed rules than when they are considered to be of personal choice, without consequences affecting other individuals. Participants were more able to predict each other's moral reasoning for the cheating on Internet rules. We discuss several possible explanations for these findings and implications for classroom practice.

Teachers' modes of coping with students' cheating on exams and assignments
Nava Maslovaty, Bar Ilan University, Israel

This paper focuses on several topics: A workshop on the teacher's moral role; an assignment aimed to develop strategies for coping with cheating in school; teachers' narratives regarding cheating on exams and assignments. Research shows that 50% to 90% of students admit to having cheated on exams and assignments. Cheating stems from the desire to obtain higher grades and to advance scholastically, and occurs because school assignments are too difficult or time consuming. Teachers' strategies for coping with cheating show a relationship between the content of the dilemma and the preferred strategy for dealing with it. A need was identified for a workshop to enhance teachers' ability to cope with issues of honesty and with other dilemmas that arise in the classroom. In such a workshop for graduate students majoring in Education, participants wrote papers describing and analyzing an actual

dilemma they experienced, as either students or teachers. They analyzed the possible coping strategies according to two broad theories addressing school dilemmas: character education (Lickona, 1991) and the cognitive developmental approaches (Kohlberg, 1980; Selman, 2003). Participants were also required to reflect on their learning process. Teachers who participated in the workshop described cases of cheating on exams and assignments, from the perspective of various role-players in the school - students, teachers and the principal. The events occurred on all levels: elementary, junior high and high school. All the events were characterized by pressure to succeed which ultimately led to a willingness to cheat. In these cases, the teachers employed varied strategies to cope with cheating in various situations, from ignoring them completely, through explaining to the students that what they had done was inappropriate in a one-on-one discussion with the student or in a class discussion.

Why students maintain academic honesty and do they know how?
Mark Freeman, University of Sydney, Australia
Henrikka Clarkeburn, University of Sydney, Australia

Academic honesty has become a crucial aspect in higher education and assessment not just because it has become easier to be dishonest with the plethora of information at the touch of a key via the internet (Underwood and Szabo, 2003), but because it is having a major impact on reputations of universities and senior academic managers (The Age, 2002; Newcastle Herald, 2004). This paper outlines a study among undergraduate economics and business students to investigate student motivation to maintain academic honesty and their knowledge of honest academic practices before and after a deliberate intervention to improve it. Over 300 students completed an online learning activity on academic honesty designed both to investigate their perceptions and to assist their understanding of academic honesty. The online activity was embedded in an elective course during academic year 2004 and the completion of the modules, but not their results, contributed to the course mark. The three-part activity entailed a pre- and post survey gathering anonymous data on student perceptions and knowledge of academic honesty - how serious they perceive various types of dishonest academic practices, how common they believe them to be, and why they may or may not choose to undertake their learning in an academically dishonest manner. Sandwiched between the pre and post surveys was a series of self-managed learning modules to assist students understand honest academic practice. Various role play scenarios were used to increase engagement. The results indicate that students have strong knowledge on technical aspects of honest

practices, but lack the ability or motivation to judge situations and apply them appropriately. Further, the strongest motivator for students to adhere to honest practices is fear of getting caught. These results are discussed in relation to improving compliance and developing effective methods of assisting students to understand honest academic practice.

E 7   24 August 2005   14:30 - 16:30   Room E103

Symposium
Social Interaction in Learning and Instruction

MENTORING AS AN INFORMAL LEARNING EXPERIENCE

Chair: Cheruta Wertheim, Beit Berl Academic College, Israel
Organiser: Hildegard Muller-Kohlenberg, Universitat Osnabruck, Germany
              Cheruta Wertheim, Beit Berl Academic College, Israel
              Lea Kozminsky, Kaye College of Education, Israel
              Lena Rubinstein-Reich, Malmo University, Sweden
              Barbara Fresko, Beit Berl Academic College, Israel
Discussant: Hildegard Muller-Kohlenberg, Universitat Osnabruck, Germany
              Barbara Fresko, Beit Berl Academic College, Israel

The purpose of the symposium is to promote an understanding of mentoring as an informal learning activity which can contribute to the social, emotional and cognitive development of both children at-risk and their mentors. Research results from studies of four mentoring schemes in Germany, Sweden, and Israel will be presented. In all cases mentoring is carried out by young adults, generally college students. The mentored children include children of immigrants, children from broken homes, children from economically disadvantaged backgrounds, and children with learning disabilities. Two studies examine the effects of mentoring on the children. In the first study, mentoring takes place in face-to-face weekly interactions between mentors and children, and in the second study mentoring takes place online. The third study examines the professional contribution of engaging in mentoring for the mentors who are teacher training students, whereas the fourth study explores the impact of providing guidance to mentors with respect to their own development through the mentoring activity. Common features of the different mentoring schemes will be discussed, as well as theoretical and practical implications of mentoring as an educational tool. Papers to be presented:

1. Informal learning compensation for the lack of basic competencies and the prevention of deviant behavior - Hildegard Muller-Kohlenberg, Universitat Osnabruck, Germany
2. The impact of online mentoring on self-efficacy perceptions of pupils with learning disabilities - Lea Kozminsky, Kaye College of Education, Beer Sheva, Israel
3. Learning within an institutional free zone effects of mentoring on student teachers' professional development - Lena Rubinstein Reich, Malmoe University, Sweden
4. The contribution of guidance to learning through mentoring

Informal learning compensation for lacking basic competencies and prevention of deviant behavior
Hildegard Muller-Kohlenberg, Universitat Osnabruck, Germany

The enormous significance of informal learning refers to the incidental, often unconscious, life-inherent learning en passant in numerous ordinary sites of every-day life. Children, who participate in mentoring programmes, live in particular circumstances that offer scarce primary experience. Mentors, therefore, are primarily challenged with the task of offering them a broader scope of child-adequate experience. These processes of learning may be of a various nature: They could take place incidentally and unconsciously (incidental, implicit learning), or within a reflective didactical framework incorporated into every day life (informal learning). These learning processes may also include entering into contacts with youth workers or voluntary (creative) groups (non-formal learning), or consist of a particular task within the frame of homework assistance (complementary to formal learning). In general mentors in the Balu und Du Project, which will be presented, are young persons who commit themselves voluntarily to work with children in primary school. Most programmes are located at universities where the mentor's work is accompanied by a regular course, during which the mentor-child relation is the subject of discussion and where additional information is offered from the area of pedagogy and development psychology. What do children learn from their mentors? Excerpts from regular diaries - which the mentors send weekly by e-mail -show that basic competencies improve significantly during the course of the programme. These include the following: learning how to learn, media competencies, increased level of activity, widening the area of interests, decision making, taking responsibility, setting up moral criteria and other basic abilities that facilitate the learning process at school and supporting the entrance into adult life. Evaluation results show further that core behaviour dimensions develop in a desirable way.

*Learning within an institutional free zone effects of mentoring on student teachers'
professional development*
Lena Rubinstein-Reich, Malmo University, Sweden

Considerable changes have occurred in the teaching profession including greater
emphasis on social dimensions, relational competence and an ability to understand
complexity and diversity. Teacher education seems to fail to prepare for this and
in spite of numerous studies of teacher education there is limited knowledge of
the actual process of learning to teach. Institutions like schools and universities
have their own logic that influence the relationship between children and teach-
ers, how they relate to each other and how they communicate. The relationship is
often characterised by asymmetry in power, control and discipline. The impact of
an institutionalised setting will be explored in this paper in the light of results from
an evaluative study of student teachers mentoring school children on a personal
one-to-one basis and how that contributes to their professional development. The
study is based on empirical data that focus on the benefits of the mentoring program
through the eyes of the mentors/student teachers and include written narratives,
follow-up interviews and questionnaires. Contrary to the institutionalised setting
of teacher education the relationship between child and mentor in mentoring can
be defined as taking place in an institutional ìfree-zone They relate to each other as
individuals. Mentor do not primarily act within the role of a professional teacher
or teacher-to-be. Meetings take place in different contexts and the relationship is
not fixed to a specific place as the school or after-school centre. Being involved
in a mentoring project seems to provide student teachers with special experiences
and understandings, which according to themselves are difficult to attain in regular
teacher education. Through the example of one child, they learn about relational
competence and understand complexity.

The contribution of guidance to learning through mentoring
Barbara Fresko, Beit Berl Academic College, Israel
Cheruta Wertheim, Beit Berl Academic College, Israel

Providing guidance to mentors is necessary for successful mentoring programs in-
volving children at-risk. However, a debate exists regarding the intensity, focus, and
mode of such activity. Since mentors are non-professionals, many believe they re-
quire on-going advice from specialists in order to deal with the challenges of work-
ing with disadvantaged children. Others advocate minimal guidance and encourage
mentors to utilize their own personal resources in an innovative and natural way.

Few studies have investigated guidance for mentors. In the present study the effects of guidance on mentoring outcomes for mentors is examined. This study was conducted in the framework of the PERACH Project in Israel which deploys thousands of students yearly to work with schoolchildren from needy social backgrounds. Minimal guidance is provided by project coordinators who are also students. Since mentors in many teacher training colleges are often provided additional guidance by professional staff members, our study focused on student mentors who were preparing to become schoolteachers. 321 mentors from 12 colleges completed the research questionnaire. Variables included satisfaction from mentoring, contribution of mentoring to professional development, and guidance framework, format, and content. One-third of the sample did not receive guidance beyond the minimum provided by the project. As for the others, most received combined individual and group guidance from either college pedagogic specialists or psychologists, while some received only group or individual guidance. Mentors were generally satisfied with their mentoring experience and reported that mentoring contributed to their professional development as future teachers. They especially learned about children, improved their ability to cope with difficult situations, and improved communication skills. Mentors who received additional guidance reported greater professional development. Guidance content and format were found to influence both contribution and satisfaction.

E 8   24 August 2005   14:30 - 16:30   Room E111

Symposium
Teacher Education

TEACHERS' LEARNING COMMUNITIES: A SOCIOCULTURAL PERSPECTIVE

Chair: Michal Zellermayer, Levinsky College of Education, Israel
Organiser: Michal Zellermayer, Levinsky College of Education, Israel
                Synnove Matre, South Trondelag University College, Norway
Discussant: Lily Orland-Barak, Haifa University, Israel

During the last fifteen years, teacher learning has been envisioned as a collaborative enterprise for saving schools from within (Hord, 1997; Lambert et al., 1996). This vision resulted from the emerging image of the professional teacher as one who thinks systematically about her practice as a member of a learning commu-

nity (Sachs, 2003; Cochran-Smith & Lytle, 1999; Day, 1999; Lieberman & Miller, 2000; Furlong, 2000). The purpose of this symposium is to highlight the usefulness of a sociocultural approach for analyzing teacher collaborative learning. The symposium includes four studies of communities of teaching practice situated in various face to face or virtual sites for teacher collaborative learning conducted in Norway, Israel and the United States. These studies focus on learning environments for teachers in which the educational goal is to advance collective knowledge in a way that supports the growth of individual knowledge (Bielaczyc & Collins 1999, Scardamalia & Bereiter 1994). In these environments, the goal of the educational practice is to foster the teachers' pedagogical content knowledge as well as to empower their sense of belonging to an educational community which may include peers, children and teacher educators. The studies identify factors that enhance or obstruct teachers' learning within such communities. More specifically, they address the following questions: What and how do pre- or inservice teachers learn in professional communities? How do they engage with their subject matter? How is their learning supported and structured by the other participants, resources, artifacts and activities present within the group? How does learning in a community strengthen teachers' sense of agency, inter-subjectivity, accountability and ownership of the classroom learning environment? How do the larger socio-cultural systems in which teachers participate influence the sense they make of their own experience as learners and its relation to their classroom practice?

Empowering preservice teachers' ownership of their learning environment: An empirical account of an online learning community
Chrystalla Mouza, University of Delaware, United States

This study has three primary objectives. First, it reports on the development of an online learning community that included pre-service and in-service teachers, school children and teacher educators. Second, it documents the ways in which the members of the community interacted with each other, with particular emphasis on the collaborative exchanges among pre-service teachers and school children. Third, it investigates pre-service teachers' learning of content and pedagogy. The learning community included 24 pre-service teachers, 2 teacher educators, 56 school children, and 5 in-service teachers. All members were affiliated with the University of Delaware. At the time of the study, the pre-service teachers participated in a study abroad trip to Ireland in which they studied Irish literature and culture as well as adolescent development. To facilitate social interaction a dynamic computer supported collaborative learning environment was developed. The environment

included asynchronous communication tools that facilitated sharing of experiences among the participants. Data for this study were collected from multiple sources from January to April, 2003. These sources included transcript analysis of online interactions, classroom observations of school students, online surveys administered to pre-service teachers, and interviews conducted with pre-service and in-service teachers as well as school students. Findings indicated an increased sense of ownership of the learning environment on the part of the student teachers, who essentially shaped the direction and frequency of interactions with the students as well as the nature of the discourse. Utilizing the asynchronous communication tools, school students posed questions based on topics covered in their classroom about Irish history and culture and the pre-service teachers responded. This interaction with school students and participation in a learning community enhanced the pre-service teachers' learning of Irish literature, culture and adolescent development. In addition, interaction with the tools in the environment enabled pre-service teachers to enhance their technology proficiency.

Intersubjectivity - a presupposition for participation in a community of learners?
Vivi Nilssen, Sor-Trondelag University College, Norway

This case study focuses on Sara, a cooperating teacher, and five student teachers learning to teach math in her class of third graders. Its purpose is to show how Sara facilitates the student teachers' development of pedagogical content knowledge. Building upon the work of Matusov (2001) and Wertsch (1984) I use the term intersubjectivity to explain how Sara establishes the practice field as an arena for learning. My work is particularly related to Matusov's notion's of "community of learners" in which three aspects of intersubjectivity construct the participants' learning: having in common, coordination and human agency. The data consist of 25 audio and videotaped supervision conferences of Sara and the student teachers and 6 interviews with Sara. In these interviews, the videotaped conferences were discussed. I also conducted one interview with each of the student teachers. Data were collected through two periods of three weeks field experience. The data analysis shows that Sara facilitates student teachers learning through two intertwined features: she designs and allows experiences and she establishes a community of learners. The study describes Sara's efforts to design the practice field as an arena for students' learning about kids' math learning. Specifically it shows how Sara creates a space for the three aspects of intersubjectivity to develop: A shared focus of attention for the student teachers, space for respectful disagreement and engagement in a caring practical action. The importance of this finding can be highlighted in the context of

Edwards and Collison's (1996) claim that student teachers rarely see themselves as learners in classrooms full of pupils. They seem to already know how to teach and are eager to act as competent practitioners who need to train and get feedback from the cooperating teacher, and their mentors contribute to this transmission image of learning to teach.

Accountable talk in student teachers' on-line conferencing
Dagrun Kibsgaard Sjohelle, Sor-Trondelag University College, Norway

Computer conferencing can help students examine their ideas in a social context of different perspectives and to develop collective ways of understanding. However, the students' participation mode in this kind of communicative practices is of great importance. There are certain conditions that have to be met to make collaboration on the net a successful disciplinary tool that can foster disciplinary engagement. The purpose of this study is to focus on how the students develop accountability to others and to disciplinary norms in a learning community.

In my work, I focus on accountability in the sense of both disciplinary and social responsiveness. The research questions were

1. What participation modes do the students use in the electronic mediated cooperative working process?

2. How do they contribute to the collective knowledge construction?

The participants are two students groups in a class of 32. My main data source consists of the students' net conversations about the topic Analysis of a 9th grade student's text in the context of the Norwegian Didactics course in which I was the instructor. I initiated the activity, but the students had been given the authority to communicate without my interfering. They had to be responsive to each other in certain ways. Data consisted of two different net conversations during a period of three weeks. The discourse analysis of these conversations shows that the two groups took two different approaches to the same task. One approached the textual analysis in a harmonic and caring manner. The other adopted a more conflict-oriented participation mode, but their ìaccountable argumentation seemed to prove a positive contribution to knowledge construction. The study indicates themes that would be of interest in the field of web-mediated collaborative learning in teacher education concerning peer tutoring and peer scaffold.

Developing agencies in communities of practice
Edith Tabak, Levinsky College of Education, Israel

This qualitative, interpretive study focuses on a group of cooperating teachers in one elementary school in a partnership program in Israel. It aims to investigate the factors enhancing or obstructing the development of agency in a teachers' professional learning community, which included ten cooperating teachers, ten student-teachers and the clinical supervisor. The data collected during one academic year consisted of transcriptions of twenty teacher meetings at the school, participant observations by student-teachers and cooperating teachers of each other's teaching, reflective diaries written by the student-teachers and by the clinical supervisor, seven open interviews with the principal and the cooperating teachers, transcriptions of ten conferences between student-teachers, cooperating teachers and the clinical supervisor, historical documents produced by the school. The data was analyzed through the identification of themes through a dialectical process with the activity theory literature on teachers' collaborative learning in communities (Wenger, 2004; Engestrom,1999; Edwards, 2000), discussing how the experience of agency arises out of engagement in the social world. The validation process included (a) triangulation of the various data sources, (b) collaborative interpretation of the data, (c) comparison between the data and Engestrom's model and its application to teacher learning. (Edwards, 2004). The themes identified were: (a) Historical factors constructing teachers' conceptions of learning; (b) Teachers' interpretations of their learning experiences; (c) Teachers' understandings of their membership in the community. The main finding was that the factors obstructing the teachers' development of agency were mainly related to artifacts developed in the past that had lost their relevance for the teachers' work and, at the same time, limited their activity space. The factors enhancing their agency were related to inquiry tools that allowed them to question the validity of the "dead" artifacts and enabled them to act according to their immediate interpretation of the situation.

E 9   24 August 2005   14:30 - 16:30   Room A008

Symposium
Motivation

MOTIVATION AND SELF CONTROLLED LEARNING

Chair: Manfred Hofer, University of Mannheim, Germany
Organiser: Thea Peetsma, University of Amsterdam, Netherlands
                Manfred Hofer, University of Mannheim, Germany
Discussant: Marold Wosnitza, University of Koblenz-Landau, Germany

In the literature on self-controlled learning it is recognized that students' capabilities to motivate themselves and to organize their learning efficiently are limited. As a consequence, this symposium pursues the aim to identify factors that determine students' investment in learning. These determinants can be regarded as resources students more or less dispose of to facilitate their study behaviour.
More specifically, four classes of motivational factors for self-regulated learning are investigated. (1) Learning with or without knowing about an alternative action opportunity describes situations entailing different motivational consequences. The experimental study by Fries et al. asks whether students' learning is deeper when alternative leisure activities are not into reach. (2) Parents educational values are potential resources in organizing self-controlled learning. Van der Veen/Peetsma ask whether the degree parents value schooling is related to self-regulation in the lowest type of secondary school. (3) Classroom environmental variables can facilitate students to seek help from teachers and class-mates. Karabenick et al. try to identify variables of classroom climate related to students' help-seeking behaviour. (4) Perels/Schmitz evaluate experimentally a training program that promotes students' capabilities in planning and monitoring their study-behaviour.The program includes the use of a diary and is directed also to parents. Wosnitza will discuss in which ways the papers contribute to explain motivational factors in self-regulated learning and to help students in school investment.

Motivational interference: The impact of attractive alternatives on learning
Stefan Fries, University of Mannheim, Germany
Franziska Dietz, University of Mannheim, Germany
Sebastian Schmid, University of Mannheim, Germany
Manfred Hofer, University of Mannheim, Germany

Students constantly face situations, in which they are engaged in a school-related task (e.g. doing their homework) while attractive alternatives such as playing computer games or meeting friends are also available to them. Such alternative opportunities for action could affect motivation and performance (cf. Lens, Lacante, Vansteenkiste, & Herrera, in press). In order to test these influences of alternative activities, an experiment was designed, in which students learned under different conditions of presence of the alternative task. The experimental setting was designed in order to mirror the typical situation of students having to learn for school in the afternoon while other activities are also present (e.g., television). Seventy-seven students (mean age: 16.9) participated in the experiment. The psychological presence of the alternative activity was systematically manipulated in the experiment. This was done by changing the sequence in which participants had to work on the different activities (video/text vs. text/video) and by manipulating the availability of the alternative activity during learning. Students still waiting for watching music videos were expected to report more motivational interference and to have worse learning results than those first watching the videos. Furthermore, the availability of the alternative task should be detrimental for learning. The first hypothesis was supported: Students from the first condition (video/text) reported less motivational interference and had better learning results than students from the other conditions. Availability had no effect on learning. Implications of the study for reconstructing motivation to learn within a context of competing motivational tendencies are discussed.

The development in self-regulated learning behaviour of first-year students in the lowest type of secondary school in the Netherlands
Ineke Van der Veen, University of Amsterdam, Netherlands
Thea Peetsma, University of Amsterdam, Netherlands

For decades educators have been concerned about the decline in achievement, motivated behaviour and motivational beliefs of children after the transition from primary to secondary school. This phenomenon occurs in various countries, yet, we can expect that the decline in motivation of students in the lowest school type can

be more extensive, as the percentage of early school leavers is highest there. Many explanations have been given for the phenomenon of the decline in motivation and achievement after the school transition. The decline has been explained by a lack of person-environment fit, i.e. poor integration of young adolescents in the school environment. Furthermore, goal orientations, shifts in the relevance of domains concerning the future time perspective, and the degree parents value schooling may be of importance. The latter has not been studied often related to the decline in motivation and may be of importance specifically for the lowest type of secondary school, as in this type of school children from low educated parents, including ethnic minorities, are overrepresented. It has frequently been found that ethnic minority parents, more than Dutch background parents, want and expect their children to attain a high level of education. Dutch working class parents have been found to be more pessimistic, or realistic. In this study we will try to explain the development of self-regulated behaviour of first year secondary school students in the lowest type of secondary school by the extent parents value education, students' well-being, goal orientations and motivational beliefs. About 730 students filled in a questionnaire. The data will be collected in three waves, the first has taken place shortly after the students started the first year (September), the next waves will take place February and May 2005. The data will be analysed with multivariate repeated measures analysis.

Help seeking and perceived classroom context
Stuart A. Karabenick, University of Michigan, United States
Akane Zusho, Fordham University, United States
Toni Kemple, University of Michigan, United States

Whether and how learners seek help remains an ongoing focus of research on the dynamic interplay between motivation and self-regulated learning. Substantial evidence indicates that seeking help when necessary can be an adaptive learning strategy that successful learners are especially likely to employ when they reach an impasse. Investigation of the contextual characteristics that facilitate, and those likely to discourage help seeking, has centered on achievement goal structures. Recent studies of elementary, middle school and college students have established that perceptions of classroom emphasis on mastery and performance goals predict help seeking and help avoidance, respectively. The present study provides further evidence regarding how students' perceptions of their classroom achievement goal structures relate to help seeking during middle and high school years. We also examined dimensions of perceived classroom context, based on Ames' TARGET

framework, that are believed to affect motivation and therefore characteristics that potentially influence help seeking. Results are based on data obtained from a multi-grade cross-sectional study that involved the population of middle and high school students (N = 14,000+) in mathematics classes (N = 400+) in a large, ethnically and culturally diverse metropolitan area of the United States. Structured surveys assessed students' approach and avoidance help-seeking patterns, and their perceptions of classroom achievement goals (mastery, performance approach, performance avoid), academic press, teacher support for collaboration, caring, fairness and respect, and support for help seeking and questioning. Our analyses, using HLM, focus on: (a) how approach and avoidant help-seeking patterns and perceived context differ as a function of grade level; (b) relations between class context features; and foremost (c) how perceived context predicts approach and avoidant help seeking patterns.

Improving self-regulated learning
Franziska Perels, TU Darmstadt, Germany
Bernhard Schmitz, TU Darmstadt, Germany

The aim of the study is the implementation and evaluation of a training program to improve the self-regulative competence of 5th grade students. A parent training program was also implemented in order to increase the effects of this intervention. Therefore parents were trained how to support their children?s learning behaviour outside school. Both trainings are based on a process adaptation of Zimmerman's model of self-regulation. In this article, we focus on the student's training program. The aim of the student's training program is to enhance the self-regulative competence by specific strategies. These should support the students in choosing and applying suitable learning strategies for homework, in observing their use and in evaluating their efficiency continously in order to adjust them. The strategies are taught by means of contents of a specific subject, in our case mathematical problem solving. The students keep a diary in order to improve Children's self-reflection and self-evaluation (monitoring). In addition, an ambition of this diary was to survey the daily learning behaviour outside school. The study is based on a 2 (parent training yes/no) x 2 (student training yes/no) design with 86 students and 63 parents assigned to the training conditions. A problem solving test and a self-regulation questionnaire is applied before and after the training sessions for the purpose of evaluating the intervention. After the pretest, the training takes place in ten 90 minute training sessions. The results show a significant improvement of self-regulative competence of the students. A combination of parent and student training leads

to the best effects. The process evaluation of the training referring to the diary data confirms the results of the pretest-posttest comparisons. Important implications for research and practice can be drawn from these results.

E 10   24 August 2005   14:30 - 16:30   Room E113

Symposium
Science Education

COMING TO KNOW THE UNIVERSITY CULTURE OF LEARNING IN SCIENCE AND ENGINEERING

Chair: Cendric Linder, Uppsala University, Sweden
Organiser: Ake Ingerman, Chalmers University of Technology, Sweden
Discussant: Caroline Baillie, Faculty of Applied Science, Queen's University, Canada

Students on the brink of studying science and engineering are at the gateway of new ways of understanding and interacting with the natural (and technological) world. However, their understanding of the idea of the subject and domain does not necessarily recognize the fundamentals and underpinnings (culture) as understood by their teachers. In this symposium, we will use different perspectives to explore how students close to the gateway (before and after starting university) understand such underpinnings of science and engineering. We will also explore possible ways of developing this understanding in these students. Tom Adawi and Cedric Linder describe the different ways of understanding heat and temperature for mature adults previously unschooled in university physics, illuminating their conflicts between everyday thought and scientific thought and its resolution.
Brandon Reed, Jenni Case, Ake Ingerman and Cedric Linder present different ways of understanding technology, a central product and process of engineering, among pre-university students. Camilla Rump and Lars Ulriksen have investigated first year physics university students' experience of the ìface of physics, and how this relates to their view of the nature of knowledge in physics. Rebecca Lippman Kung, Anna Danielsson and Cedric Linder discuss a method for assessing students' use of metacognition in the introductory physics laboratory, and study how different types of laboratories affect their metacognition. John Airey and Cedric Linder present an analytical model drawing on multiple theoretical perspectives to better understand the links between learning and the discourse of university science for first year

students.

Metacognition in the student laboratory: Is increased metacognition necessarily better?
Rebecca Lippmann Kung, Uppsala University, Sweden
Anna Danielsson, Uppsala University, Sweden
Cedric Linder, Uppsala University, Sweden

In this study metacognition during the student laboratory is explored, with an aim towards quantizing the amount of metacognition used by the students and evaluating how the laboratory setup encourages the use of metacognition. Six different groups of university students were analyzed using videotapes of their behaviour during three types of introductory physics laboratories: the typical ìcookbook laboratory, the ìcookbook laboratory with added ìexplain your reasoning questions and an open-ended laboratory where students must design an experiment to answer a question. Videotaped data was transcribed and then coded with respect to the general behaviour of the group, including off-task, logistical (data taking, report writing, etc.) and sense-making behaviour (discussions about the experimental design, physics concepts, physics formulas, their data, etc.). Any verbal comments judged metacognitive were marked. Within the studied laboratories, there does not appear to be much difference in the amount of metacognition. However, there is a difference in the result of the metacognition. Students in the ìcookbook laboratory frequently evaluated their own understanding, usually in the negative sense: ìI dont get this. They then continued reading the manual or collecting data. Students in the other laboratory types were more likely to change their behaviour as a result of a metacognitive statement. For example, students might move from taking data (logistical) to discussing how to understand a certain result (sense-making). While the students in general found it easy to evaluate their understanding, students in the typical ìcookbook laboratory were less likely to change their behaviour as a result, perhaps because they did not view such action as possible, allowed, or approved of in the situation. These results indicate that it is important to consider the outcome of metacognition, and that the laboratory setup can help encourage students to change their behaviour as a result of their metacognition.

What's hot and what's not: a phenomenographic study of lay adults' conceptions of heat and temperature

Tom W. Adawi, Chalmers University of Technology, Sweden
Cedric Linder, Uppsala University, Sweden

This paper reports on a phenomenographic study investigating how lay adults describe heat and temperature in a selection of everyday situations involving thermal phenomena. Two groups of adults participated in the study ó some with only basic schooling in physics and some who were taking an introductory survey course in physics for the general public, but without any prior experience of physics at the university level. Data were collected through interviews (N=10) and written comments to a homework assignment dealing broadly with the topics of heat and temperature, collected from the whole group attending the course (N=60). The data were analysed using a phenomenographic approach, aiming at identifying and describing the qualitatively different ways in which heat and temperature are described. Five conceptions of heat and temperature were discerned from the data. These different ways of describing heat and temperature, and the logical relations established within and between them, constitute the main results of the study. The conceptions were also analysed in terms of internal consistency. The results indicate that heat is always described as something that is contained in objects and sometimes also described as a kind of substance. Temperature is often described as a measure of the amount of heat in an object and sometimes also described as a property of the material from which an object is made, and thus the idea of thermal equilibrium is not always appreciated. This paper examines these findings and discusses their wider implications for teaching and learning thermodynamics. In particular, the study illuminated conflict threads, not previously described in the literature, between everyday thought and scientific thought, and also patterns of the resolution.

Learners' conceptions of technology

Brandon Reed, University of Cape Town, South Africa
Jenni Case, University of Cape Town, South Africa
Ake Ingerman, Chalmers University of Technology, Sweden
Cedric Linder, Uppsala University, Sweden

This paper reports on the outcome of an investigation into learners' conceptions of technology. The results are based on interviews with learners in their final two years of schooling in and around Cape Town, South Africa. Learners need to be technologically literate and have a firm grasp of the nature of technology to be

best equipped to make worthwhile contributions in this increasingly technological world. Lately, these learners might not be getting this through the direct experience of tinkering and engaging with technologies as they may have in the past. Further, it is important to illuminate questions about what they conceive technology to actually be - the focus of this paper - and not only how they gain technological knowledge. An analysis of literature relating to the description of the ìmeaning of technology shows it to be defined variously as,technology having a social aspect, technology as applied science, technology as the precursor to scientific theory, a product centred view of technology, a process centred view of technology. Each learner in the study was given a disposable camera and asked to take photographs in the days leading up to the interview of anything that they considered to be technology. Learners were interviewed about the photographs that they had taken and how these related to their conception of technology. This study was undertaken using a phenomenographic approach and resulted in a series of logically related categories of description that describe the variation in the learners' conceptions of technology at the collective level. At this stage the preliminary findings bear some useful relation to the categories above identified in the literature. The findings contribute to the process of understanding how technological knowledge may be gained and point the way to increasing learners' contribution to the increasingly technological world.

Looking for links between learning and the discursive practices of university science
John Airey, University College Kalmar, Sweden
Cedric Linder, Uppsala University, Sweden

The study presented here follows a group of Swedish physics undergraduates and their experiences of learning university physics. Students attend lectures in both English and Swedish after which semi-structured interviews using stimulated recall are conducted focusing on the concepts taught and the discourse encountered. The student experiences are compared to the intended learning objectives as detailed by the course lecturers, and cross-referenced with the language and practices observed in the lectures. The aim of the presentation is to examine the feasibility and fruitfulness of characterising student learning as an interplay between experiential and discursive components. The paper discusses the extent to which scientific concepts may be interconnected with our discourses about them, suggesting a learning trajectory starting with discourse imitation which leads to concept experience. In this characterisation student discourse is initially a poor imitation of specialist dis-

course, but this gradually spirals towards something which approximates legitimate specialist discourse about the concept. Similarly, the initial student experience of the concept behind the discourse will be both tentative and fragile. As students become more familiar with the specialist discourse they experience more and more facets of the concept which were previously inaccessible to them. Although preliminary results will be available for presentation at the conference, the main purpose of the presentation is to contribute to the understanding of the links between learning and the discursive practices of university science.

Should physics be fun?-What physics curricula expect of students and students expect of physics
Camilla Rump, University of Copenhagen, Denmark
Lars Ulriksen, Roskilde University, Denmark

There is a general agreement among physicist, that physics is a particular way of thinking; a conception of the world. This view of physics could be termed ìthe true face of physics. This may, however, not at all be the face students see in the first year of studies. As it is, first year teaching is not primarily planned to show students what physics is about. Rather, the intention is to equip students with the necessary preconceptions and skills for practising physics - later on. An analysis of the first year physics major curriculum at the University of Copenhagen has lead to the concept of ìthe implied student, analogous to ìthe implied reader of a novel. The ìimplied student is interested in the general and abstract, rather than the concrete and is a hard-working person with a strong ability to discipline one self to pursuing understanding even if the teaching calls for surface learning. This implied student differs from the actual empirical student, e.g. regarding conceptions of what physics is about. This may be part of the explanation for rather significant drop-out rates. Initiated by an educational reform, a new initial physics course in Newtonian mechanics has been designed. It was the hope that this course would show a more ìtrue face of physics to the students, and give room for students to choose their own line of learning and pursue their own interests. Initial results indicate that this has been achieved to a certain degree, but there is still room for improvement, and furthermore that the interplay between students expectations, preconceptions of physics and the teaching activities is a rather complicated matter. The paper will discuss the causes and consequences of the results and give directions for future improvements in this course and in general.

Symposium
Writing

TEXT ANALYSIS IN WRITING RESEARCH: APPROACHES AND METHODOLOGICAL QUESTIONS

Chair: Pietro Boscolo, University of Padua, Italy
Organiser: Pietro Boscolo, University of Padua, Italy
                David Galbraith, University of Staffordshire, United Kingdom
Discussant: Gert Rijlaarsdam, University of Amsterdam, Netherlands

The theme of this symposium, text analysis, is central to writing research. In the 70s and 80s the cognitive approach to writing research made extensive use of text analysis to infer processes (particularly regarding planning and revising) on the basis of indexes such as cohesion and text organization. The mid 1980s saw a ìsocial turn in writing research as the field was influenced increasingly by social theories. Social perspectives were set in opposition to cognitive, and many researchers began emphasizing the social aspects of the process over the cognitive. Attention went to collaborative aspects of writing, and recordings were made of these kinds of social interactions. In the 1990s the emphasis shifted to larger social matters, and to writing that is embedded in complex community practices. Text analyses are used to understand such practices and the larger context that surrounds them. The aim of this symposium is to highlight some methodological problems implied by the use of text indexes, and to stimulate a discussion on the role of this analysis in writing instruction. Whereas the scientific relevance of this topic needs no emphasis, its educational relevance mostly regards writing assessment. Although teachers of language skills use holistic measures for evaluating writing, we think that increasing their knowledge of text analysis may help them apply more adequate assessment tools. Nelson presents major approaches to text analysis in writing research. Spelman Miller relates pausing activity to the topic content of the text, and presents a scheme for the identification of production units. Boscolo and De Marco compare the written syntheses of students of two communities of discourse through several indexes of text comprehension and production. Galbraith, Hallam and Torrance use content analysis to evaluate the effects of different drafting strategies on idea generation during writing.

Text analysis in writing research: different questions, different approaches
Nancy Nelson, Lousiana State University, United States

What is the nature of the text? What is the nature of the process? What is the nature of the social process? and What is the nature of the practices? Major developments in the field of writing research can be seen in the sorts of text analyses used to answer these questions. During the 1970s and 1980s one approach to understanding the cognitive aspects of the writing process focused on the textual product itself. Guided by propositional models of meaning-making, researchers parsed texts into ordered propositions, and they made inferences about mental products by studying written products. Another kind of cognitive process research, conducted concurrently by different researchers, focused on component subprocesses of writing, such as planning and revising. The tapes of their writing sessions were turned into typed protocols, which became texts for analysis by the researchers. The mid 1980s saw a ìsocial turn in writing research as the field was influenced increasingly by social theories. Social perspectives were set in opposition to cognitive, and many researchers began emphasizing the social aspects of the process over the cognitive. Attention went to collaborative aspects of writing, such as peer response, and recordings were made of these kinds of social interactions. Transcripts of the exchanges became the texts researchers analyzed to gain insights. In the 1990s the emphasis shifted to larger social matters that are historical, cultural, and ideological, and to writing that is embedded in complex community practices. Text analyses are used to understand such practices and the larger context that surrounds them. In conclusion, the point is made that questions and approaches do not have a simple unidirectional relationship. Sometimes the questions lead to particular research approaches, but it is also the case that questions can follow from the approaches available to the researcher.

Production units in writing: a discourse perspective
Kristyan Spelman Miller, University of Reading, United Kingdom

Within cognitive research on writing little attention is generally given to the nature of the text produced, and to how the language formulated relates to the processes of production. This paper argues for the need to focus attention in writing research on textual output, and in particular on aspects of the text's internal structure. My current research, presented in this paper, sets out to define units of production in writing from a discourse perspective. Working with data elicited through keystroke recording, I have developed a scheme for the identification of topic-related units of

production as a means of describing and measuring textual output. Complementing traditional (grammatical) characterisations, this approach focuses on the association between text structure and the processes involved in handling topic in written text. It establishes a number of units, so-called framing devices' (Spelman Miller, forthcoming), which reflect the potential discourse role of units of language in introducing, maintaining and developing topic in the discourse. These units appear to be useful in describing and explaining both planning and revision behaviour in a study of L1 and L2 writers. Significant pausing appears to coincide with the production of these topic-related units in a way which offers support for the notion of framing device as a means of interpreting the language produced on-line. Framing devices also prove useful in describing the writers' revising processes, especially where revisions occur at the point of inscription. Such revisions often coincide with critical points in the development of the discourse, which can be captured by the notion of the framing device. By illustrating the interactions between framing device, pausing and revising, this paper argues for the centrality of textual analysis, particularly addressing notions of topic and discourse development, in the discussion of written language production.

Text analysis in writing from sources: a comparison between Psychology and Architecture students' written syntheses
Pietro Boscolo, University of Padua, Italy
Barbara De Marco, University of Padua, Italy

When writing from sources readers have to take information from various sources on a same topic, and synthesize it in a new text (Spivey, 1984). From a socio-constructivist perspective, Spivey has called discourse synthesis the process writers are engaged in when they read multiple texts to produce a new and abridged one. In this task three main operations are involved: 1. selecting the information to be included in the synthesis; 2. organizing information in the text to be written; 3. connecting the information taken from various sources to obtain a cohesive text. Discourse synthesis is both comprehending and composing, as a writer uses cues from more than one text to construct meaning for the text being written (Nelson, 2001; Spivey, 1997). tudying written synthesis requires careful text analysis, since the basic synthesis operations have to be operationalized into indexes. In the present study, the written syntheses of Psychology and Architecture university students were analysed. The two faculties represent two different communities with different discourse practices, more discursive in the case of Psychology, more relying on graphic supports in the case of Architecture. Participants were 128 Archi-

tecture and 116 Psychology students. They were given three texts on the problem of old-aged housing, a relevant topic from both a psychological and architectural perspective. After reading the three texts, participants were asked to write a synthesis of the three texts. The written syntheses were analysed through indexes of text comprehension (informativeness, units of information, integration) and production (cohesion and text organization). From multivariate analyses of covariance (MANCOVA), a principal effect of the Faculty on all the comprehension indexes and on text organization emerged.

Effects of different drafting strategies on idea generation during writing
David Galbraith, University of Staffordshire, United Kingdom
Jenny Hallam, University of Staffordshire, United Kingdom
Mark Torrance, University of Staffordshire, United Kingdom

Surveys of writers' drafting strategies suggest a contrast between two different approaches to writing. On the one hand there is a planning approach, in which writers concentrate on working out what they want to say before writing, and only start to produce full text once they have worked out what they want to say. On the other hand there is an interactive approach, in which writers work out what they want to say in the course of writing and in which content evolves over a series of drafts. Previous research comparing the effectiveness of different drafting strategies has overwhelmingly favoured planning strategies over interactive strategies. This paper describes an experiment in which three variables were manipulated- degree of organisation required in initial draft, mode of writing in first draft, and form of rewriting employed in final draft - to create various forms of drafting strategy. The effects of these manipulations on idea generation and on the quality of the final text were assessed. Analysis of the texts produced in the initial and final drafts shows clear quantitative and qualitative differences in the amount and type of content generated in different conditions. In particular, the distinctive feature of outline planning is that it enables writers to formulate rhetorical goals for the text, rather than facilitating the generation of content. By contrast, unorganised initial drafts appear to enable writers to clarify their personal opinion of the topic. These initial differences are transformed into the final text in different ways depending on the form of rewriting employed and individual differences between writers (self-monitoring). The effect of these differences in the way ideas are generated on the quality of the final text will be assessed, and the results will be discussed in terms of different methods of reconciling dispositional and rhetorical goals in writing.

E 12   24 August 2005   14:30 - 16:30   Room A107

Symposium
Computer-supported Learning Environments

**TEACHING AND LEARNING IN DIFFERENT LEARNING COMPUTER
SUPPORT SCENARIOS**

Chair: Wim Jochems, Open University of the Netherlands, Netherlands
Organiser: Anna Espasa, Open University of Catalonia, Spain
               Elena Barbera, Open University of Catalonia, Spain
Discussant: Jan Elen, University of Leuven, Belgium

In the network society, in a range of educational situations that use ICT, there is
a trend more focused in technological approaches than in educational ones due
to the characteristics and qualities of the technology. From our point of view, the
ICT applied to the education field should enhance teaching and learning processes
instead of being considered only a technological tool. From these assumptions, the
symposium will go beyond the ICT as a medium and will be focus in knowledge
construction processes, making conclusions about similarities and differences in
various teaching and learning scenarios carried out with ICT support, in order to
have evidences about mechanism of progressively understanding of cultural mean-
ings. Our purpose is to analyse knowledge construction in four learning computer
support settings: a multimedia self learning environment; a case of blended learning
that combine face-to-face learning with on line learning; scenario carried out in a
virtual environment, and teaching-learning process supported with ICT.
The presentations that conforms the symposium are:
Knowledge construction in a multimedia self-learning environment: a methodo-
logical approach (Teresa Guasch, Anna Espasa, Antoni Badia and Elena Barbera.
Open University of Catalonia).
Elicitation support for knowledge construction in distributed learning. (Wim Jo-
chems and Bitter Rijkema. Educational Technology Expertise Center (OTEC).
Open University of Netherlands).
Knowledge construction in a university context of blended learning (Madelen Hold-
mund. Centre for Educational Technology. Umea University and Anna Nordstrom,
Centre for Regional Science).
Teachers and ICT as mediators of the students' knowledge construction in a face-to-
face environments (Maria Jose Rochera, Rosa Colomina and Teresa Mauri. Depart-

ment of Development and Educational Psychology. University of Barcelona).
The proposal has an important scientific and educational relevance because of the
methodological approaches that we will be discussed, and the conceptualization of
the technology as a learning tool.

Elicitation support for knowledge construction in distributed learning
Wim Jochems, Open University of the Netherlands, Netherlands
Marlies Bitter-Rijpkema, Open University of the Netherlands, Netherlands

Collaboration in multi-disciplinary, multi-expertise teams is considered nowadays
to be an important aspect of professional learning. However, effective knowledge
exchange in computer-mediated groups appears to be problematic, especially the
exchange of implicit knowledge. Tools to support knowledge elicitation are more
and more used in situations where employees or students collaborate using the com-
puter. Studies indicate that there exist differences between experts and novices re-
garding their methods of work and reasoning. The commonly preferred approach
deals with team members as a single system with ìcommon , shared preferences.
The question is to what extent this approach is optimal. From literature potential dif-
ficulties with uniform knowledge elicitation support for teamwork can be derived.
We carried out a study to investigate whether support tools for knowledge elicitation
should explicitly take into account the expertness of team members. In this study
we gathered qualitative insights into user-elicitation preferences, especially in rela-
tion to a user's proficiency in the field. Subjects of this study were graduate students
studying for a profession as social worker, who had to design in a distributed setting
a collective intervention plan to address school absenteeism in a metropolitan city.
Based on literature we assumed that experts would follow their own line of work
while novices would use the procedures and prescriptions available. With respect
to their preferred work style students with an expert-like or novice-like profile didnt
differ significantly. Further interpretation of the results seem to indicate that not so
much the proficiency of the team members as well as the attunement with the sur-
rounding context is critical for the effect of elicitation support.

Knowledge construction in a university context of blended learning
Madelen Holmlund, Centre for Educational Technology, Umea University,
Sweden
Anna Nordstrom, Centre for Regional Science University of Umea, Sweden

This is a case study of how knowledge is constructed in a university context when

students are using both virtual (online) and real (study centres) learning environments, blended learning. The study is based on a three-year study programme in pharmacy/pharmacology. The students are generally older than campus students and have a different social structure, living in small population centres with their own families. The students also generally lacked experience in university studies and especially in online studies. The learning methodology is based on a social constructivistic approach. Students combine online learning with physical meetings, bringing the socialization from the physical meetings into social structures in the virtual classroom. In order to make this approach successful, students need dedicated time and assignments for socialization. Assessments and exercises are designed in order to encourage and develop the use of different communication tools and help students to create their own knowledge using each other and interacting with each other. Due to the fact that most students have little experience in using computers and internet in university studies the need of a thorough introductory course is necessary in order to train the students in using tools and technology as well as introducing them into a constructivistic way of learning using communication and collaboration.

Teachers and ICT as mediators of the students' knowledge construction in a face-to-face environment
Maria Jose Rochera, University of Barcelona, Spain
Rosa Colomina, University of Barcelona, Spain
Teresa Mauri, University of Barcelona, Spain

The goal of this communication is to present the analysis of the educational guidance that the teacher provides in order to orient the students' learning process in a face-to-face (F2F) educational environment in which ICT are used. We depart from a socioconstructivist perspective of teaching and learning. The analysis focuses on the joint activity of teachers and students, in which both tasks with and without ICT are carried out (Derry et al. 2000; Twining, 2002). We have analysed the uses of ICT during one instructional process following a qualitative methodology.Several sessions of a primary 6th grade group of students (12-y-olds) and their female teacher working on the topic scientific method were analysed (see note below). Results show different types and levels of educational guidance related with the uses of ICT. These uses stand, at the same time, in relation (1) with the forms of organisation of the joint activity that teacher and students develop together, (2) with the changes in the social organisation of the class and (3) with the different contents that are dealt with thanks to ICT. Furthermore, results point out that this educational

guidance also depends on the instructional function of the teaching and learning activity itself. As a whole, this study contributes to an improved understanding of the processes through which the teachers might help the students learn with ICT. We underline the importance of looking at (1) the articulation of the forms of joint activity with and without ICT, and (2) the features of the joint activity in respect of by whom, how, for what purpose and with whom ICT shall be used or not, so that both ICT and the teachers' educational guidance contribute to the students' knowledge construction. Note: The project's site can be visited at www.edebedigital.com/proyectos/228/

Knowledge construction in a multimedia self-learning environment: a methodological approach
Teresa Guasch, Open University of Catalonia, Spain
Anna Espasa, Open University of Catalonia, Spain
Elena Barbera, Open University of Catalonia, Spain
Antoni Badia, Open University of Catalonia, Spain

The aim of this paper is to present a methodological proposal that allows for a closer look at the analysis of knowledge construction in a self-learning process in a multimedia learning environment that explains how transfer of control takes place and how students progressively understand the learning content. To be able to meet the objective set, we have based our studies on the analysis of the interactivity segments in various self-learning sessions in a multimedia environment. The results presented refer to the characterisation of the interactivity segments identified in a multimedia self-learning environment. These interactivity segments correspond to: interactivity segments for organisation and management of the activities, interactivity segments for carrying out exercises with the multimedia educational material, interactivity segments for reviewing and practice with the multimedia educational material and interactivity segments for practice with the material on paper. The interactivity segments described above have allowed us to elaborate a map of interactivity in which templates have been characterised for the various approaches to learning. A chain of interactivity segments can be seen in terms of these results, which are illustrated by the examples of three students who approached the studying of the multimedia material in two different ways: a) a sequential approach: careful following of the design of the multimedia self-learning material; b) a repetitive approach: repetition of the exercises, once completed.

E 13   24 August 2005   14:30 - 16:30   Room E104

Symposium
Emotion

ANALYZING EMOTIONS IN THE CLASSROOM

Chair: Michaela Glaeser-Zikuda, University of Ludwigsburg, Germany
                Tina Hascher, University of Bern, Switzerland
Organiser: Michaela Glaeser-Zikuda, University of Ludwigsburg, Germany
                Tina Hascher, University of Bern, Switzerland
Discussant: Sanna Jarvela, Univerity of Oulu, Finland
                Andreas Krapp, University of the Bundeswehr, Munich, Germany

Students' emotions in the school context have become an important topic in the view of educators and researchers. Several empirical studies point to the key-role emotional factors play as constituting elements of the learning process, next to and in close interaction with motivational and cognitive factors. Emotions have been found to correlate with the social context, teachers' didactical competencies, students' self-regulated learning, and their academic achievement. Despite the increasing amount of empirical studies on emotions, there is a lack of adequate research methods to show whether and how emotions interact with social and contextual factors in school and in the classroom. Multiple data sources and mixed, qualitative and quantitative, as well as process-oriented methods can be helpful in approaching this aim. The purpose of this symposium is to point out the importance of emotions for learning processes in school and to present different ways of analyzing emotions in the school context. The authors will describe different emotions related to students, teachers, instructional quality, and the school context. Furthermore, the presentations will focus on different instruments applied, such as questionnaires, semi-structured interviews, stimulated recall, diary logs, video-observation and event-sampling method. Especially, the aim of the symposium is to discuss the contribution of multiple research perspectives for the analysis and understanding of the structure of emotions as well as their relation to the learning environment in school.

Analyzing the relation between well-being and emotions in school
Tina Hascher, University of Bern, Switzerland

Emotions are like cognitive aspects a crucial part of learning and achievement situations in school. Most studies on students' emotions have to conclude that there is an overload of negative emotions (cf. Hascher, 2004; Pekrun et al., 2002). Longitudinal and cross-sectional research could show that positive emotions already decrease during the first years of school (Helmke, 1993) but may rise again at the end of the school career (Eder, 2004). School, however, is not only a context for the development of negative emotions. Asked explicitly for their well-being in school, students' answers are far more positive. Many students at least report not to feel bad in school (Fend & Sandmeier, 2004). How does well-being differ from the experienced emotions in school? How do students' daily emotions contribute to their well-being? What are the sources of well-being and emotions in school? The presentation will focus on results of a quantitative cross-sectional study using a well-being questionnaire for adolescent students and on results of a longitudinal study using emotion diaries for students. 391 students, grade 7-9, participated in the quantitative study; 62 students additionally wrote daily dairies over a period of six weeks. A differentiation between the valence of emotions was made and the subjective relevance of the situations was taken into account to highlight the relation between well-being and emotions in school. The dominance of negative, intense emotions was obvious. Students who reported more negative emotions in their school life did not differ in terms of their well-being from students who reported a dominance of positive emotions. In accordance with the sources of well-being on of the main causes for negative emotions lay in teachers' behaviour (like care for students vs. achievement pressure). Both, the quantitative and the qualitative approach, are introduced and discussed with respect to their power of explanation.

Emotions in learning situations - a mixed method approach
Michaela Glaeser-Zikuda, University of Ludwigsburg, Germany

A variety of studies demonstrate that students' emotions in classroom and school have become important topics in educational and psychological research. For a long time, a sharp distinction between emotional and cognitive dimensions of learning characterized research in this area. Nowadays, learning is considered to be an interactive and dynamic conceptualization of person-environment relationships and intra-personal functions including self-regulation of cognitive, motivational and emotional factors. Therefore, it is a specific challenge to conduct research in this

field. A study is presented focusing on students' emotions in varying learning situations in the classroom. The relation of students' positive and negative emotions to the learning environment in the classroom was analyzed, regarding social relations between students - students and students - teacher, teacher behavior, learning topic, perceived self-regulation and competence in learning. Based on a mixed methods design, questionnaires as well as semi-structured interviews, diary logs and video-observation were applied. In total, 968 students from 36 classrooms of secondary school level participated in this study, 68 of them were involved in the qualitative part of the study to analyze emotions in a holistic way. The presentation will focus on students' emotions in different school lessons, regarding different learning situations and subjects (German Language, Biology, and Physics). Examples will be given to illustrate the research potential of a combination of quantitative and qualitative instruments and data to understand students' emotions in classroom.

Humor as an emotional facilitator to learning processes
Leo Guertler, University of Tuebingen, Germany

Research in education strengthens its effort to understand social aspects of learning processes. Humor becomes an important aspect of the social climate in the classroom and touches terms like quality of teaching. But humor varies according to personality and sex. Already in elementary school, girls use different kinds of humor than boys (Bonsch-Kauke, 2003). On the other hand, teacher's burden is to establish a socially warmth atmosphere - a very difficult balance to keep. But humor can act as a catalyst in school. The study reconstructs student's subjective theories on humor within the methodological framework of Groeben & Scheele (1977). It aims to help to fill a gap in literature as student's thinking is lacking there. The study used nine open questions to explore the subjective definition of humor, action sequences, visions and various scenarios as well as negative experiences. The questionnaire was given to N = 363 German students in 4 different school-types of German Realschule (m = 203, f = 114) and Gymnasium (m = 18, f = 28). The analysis (qualitative, quantitative) searches for prototypical answers for the groups sex and school type. Results replicate sex * school differences not only in word production, but also within the answer structures. Of course, humor plays an important part. Most of all, humor is necessary to create an atmosphere free from stress, pressure, and anxiety. Humor fosters the emotional and social aspects of learning and instruction. Regarding sex differences, e.g. boys are more cool and girls are more empathically, but also more critically. On the institutional part, a lack of humor in daily life at school is predominant. But this must not be attributed solely to the teachers. It is a

general problem in which all participants (teachers, students, colleagues, politics, parents) play some part.

Stability and variability of emotional experiences in the classroom
Klaus-Peter Wild, University of Regensburg, Germany

The variability of emotions in short periods of time and the considerable difficulties to recall those emotional variations contribute to significant assessment problems. Other problems of assessing emotions in the classroom are connected to the potential of negative repercussions of our assessment procedures to the flow of actions and the flow of emotional experiences in an educational setting. In the last two decades numerous methods to deal with these difficulties were developed. In our study we worked on new ways to apply the Experience Sampling Method (ESM) to classroom research in vocational education. We used a programmable pocket calculator (like a PDA) as signalling and reception device. The calculator was programmed to give a signal at random intervals. When being signalled the students enter information about their momentary situation and psychological state according to the self-report questionnaire in the device. In our study the ESM was used to assess subjective experiences related to emotions, motivation to learn, effort and attention. The sample comprised 117 students from 13 classes from a vocational school (insurance business). Each student had to respond to a beeper five times a day for a period of a week. This procedure was performed twice a year over the complete period of vocational education (3 years). This presentation will focus on two topics: First, we discuss some important methodological issues which emerge with the analysis of time dependent data coming from field studies depending partly on random time sampling procedures. Especially, questions that deal with the influence of the learning environment on the emotional experiences of the students need specific statistical analyses (e.g. the use of time series analyses or hierarchical linear modelling). Second, we present results concerning the variability or stability of emotional experiences over different periods of time (minutes, hours, years).

Symposium
Social Aspects of Learning

INVESTIGATING CLASSROOM INTERACTION: METHODOLOGIES IN ACTION (PART II)

Chair: Agnieszka Eliasz, University of Oulu, Finland
Organiser: Paivi Kristiina Kumpulainen, University of Oulu, Finland
                    Margarida Cesar, Universidade de Lisboa, Portugal
Discussant: Judith Green, University of California Santa Barbara, United States

This symposium realized in two sessions (Part I and Part II) introduces strands of research on classroom interaction whose logic of inquiry produce different approaches, analyses and interpretations of social interactions and discourses in contemporary classroom settings. The methodological approaches which are introduced and discussed in the symposium within the context of empirical investigations of classroom interactions draw on studies of language and discourse, ethnography, as well as on sociological, psychological, and domain-specific analyses. In recognizing the complexity and challenges in mapping out the complex research territory focusing on classroom interactions, the prime goal of the symposium is to build a complimentary context for discussion of the ways in which different approaches to classroom interaction are realized and how they produce different analyses because of their purpose, conceptual framework, and methodological choice. The illumination of diverse approaches to classroom interaction and discourse is believed to demonstrate the potential and challenges each strand of research is likely to bring towards understanding the psychological, social and cultural life of the classroom and how these mediate the situated practice of teaching and learning in today's schooling.

The discursive practice of participation in an elementary classroom community
Minna Kovalainen, University of Oulu, Finland
Kristiina Kumpulainen, University of Oulu, Finland

This study examines the discursive practice of participation in an elementary classroom community aiming towards collective meaning making and joint creation of knowledge. The theoretical and methodological basis of the study is shaped by

the sociocultural and sociolinguistic approaches. Through examining the communicative practices and discursive roles of the students and the teacher, the study highlights the participation rights and responsibilities of classroom members and demonstrates how these shape the location and nature of knowledge constructed during a lesson. The empirical data for this study emerge from a Finnish third grade class consisting of seventeen students. Detailed, multi-level analyses were carried out on transcribed video-recordings of classroom interactions located within the contexts of Collective problem-solving in mathematics, Group investigation in science and Open-ended dialogue in philosophy. The results show that the cultural rules for communicative participation in this classroom provided the students with a space to take authority in cognitive work, whereas the teacher's responsibility was more directed to the management of interactional practices. The nature of knowledge negotiated during the lessons was by and large based upon view sharing and defining, as well as asking for and providing evidence, instead of mere information exchange. The study also shows that the communicative roles and responsibilities of the classroom members differed across the learning situations. Intentions of collective meaning-making did not always result in multilateral interactions that would invite all classroom members into active participation. Moreover, challenges were identified in the integration and application of the participants' personal histories and experiences as resources for joint meaning-making. In all, the study shows how the discursive norms of the classroom can be aligned with supporting active participation and collective creation of knowledge, but can also be counterproductive in these domains.

Two sides of the coin: Multiple perspectives on collaborative knowledge construction in online problem-based learning
Cindy Hmelo-Silver, Rutgers University, United States
Anandi Nagarajan, Rutgers University, United States
Ellina Chernobilsky, Rutgers University, United States
Sharon Derry, University of Wisconsin Madison, United States

This paper will present two sides of collaborative knowledge construction in an online problem-based learning environment, eSTEP. One side is a close analysis of collaborative knowledge construction and how that is related to the use of the online tools. The second perspective is from the facilitator in an effort to understand the nature of facilitation in an online environment. Problem-based learning (PBL) is an approach to instruction that situates learning in collaborative problem-solving situations. A facilitator helps support the students' learning and problem-solving

processes. In the eSTEP project, we have adapted PBL to specifically help pre-service teachers learn learning sciences in the context of instructional design. We accomplish this through the use of eSTEP, a suite of web-based tools that contains a library of video cases, an learning sciences hypermedia text, and a PBL-online activity structure. Within the PBL online activity structure, the students can collaborate online using a group whiteboard and a threaded discussion board. In this paper, we will present an analysis of one group of students as they worked through three problems. We use the technique of Chronologically-oriented representations of discourse and tool-related activity (CORDTRA) to construct parallel timelines of the tool-related actions and collaborative learning discourse. In addition, we include a reflective analysis of the evolution of facilitation in this group.

Investigating role distribution and metacognitive processes in children's computer-mediated collaboration
Karen Littleton, Open University, United Kingdom
Eva Vass, Southampton University, United Kingdom

Socio-cultural approaches to human cognition emphasise the mediational role of cultural tools and artefacts in human practices. "The mastery of mediational means is an essential aspect of the process of learning" (Saljo, 1999:152). However, new cultural tools do not simply represent new ways of resourcing an existing activity. As research on computer-mediated cognition suggests, they change the processes/ activities they are used for, thereby modifying our ways of thinking and creating new ways of constructing knowledge (Saljo, 1999). This paper discusses the ways in which one can investigate the mediational role of computers in structuring collaborative activities. In particular, it considers how, through facilitating role distribution, computers have the potential to open up new meta-cognitive spaces for reflection. Role differentiation is explored in two computer-supported contexts - collaborative problem solving and collaborative creative writing. The complementary roles of 'navigator' (Light & Littleton, 1999) and 'editor' (Vass, 2003) will be explored in these two different contexts and characterised as enabling reflection (new meta-cognitive processes). It will be argued that through navigating or monitoring the task, the children both acquire skills to jointly engage in the completion of the task and to reflect on the joint processes of knowledge construction.

Surviving within complexity: A meta-systemic approach to social interactions'
analysis

Gracinda Hamido, Universidade de Lisboa, Portugal
Margarida Cesar, Universidade de Lisboa, Portugal

Starting from a metatheoretical discussion around paradigmatic views of science, we stress the historical, cultural and scientific relevance of all those paradigms, assuming the need of a deep, transdisciplinar, epistemological debate on what can be considered as scientific knowledge. There is not a single most adequate or relevant methodology to the socially constructed nature of the data mobilised in these studies. The criteria for adequacy or relevance are the requisites of the investigation content and context, the internal coherence between the researcher's epistemological principles, methodological options, as well as the research procedures adopted. This theoretical discussion is illuminated by examples of the nature of problematic issues we study and the instruments used. The research outcomes are analysed in terms of the processual and conceptual aspects of conducting a research and its challenges (validity, objectivity and ethical issues). This chapter reflects the extended theoretical reflections of our research group over the last eleven years. Enriched by our multiple scientific backgrounds these reflections usually emerge from practical issues which are common to all: social interactions in teaching and learning. Using theories as mental tools which allow for illuminating the learning settings, the group has been doing a go between from theory into practice and vice-versa. In order to study the complexity of these phenomena, we implemented a project, Interaction and Knowledge, divided into two levels: 1) - quasi experimental level, studying dyads' characteristics; 2) - action-research level, in which teachers implement collaborative work in their classes during at least a whole school year.

Investigating variability in collaborative processes and outcomes

Brigid Barron, Stanford University, United States
Emma Mercier, Stanford University, United States

Research on cognitive mediators of collaborative learning makes the important point that it is not simply the act of asking children to work in groups that is essential but rather the possibility that certain kinds of learning processes can be activated (Cohen, 1994). In this presentation factors that influence the potential for productive work to occur will be articulated. It will be argued that collaboration might productively be thought of as involving a dual problem space, which participants must simultaneously attend to and develop: A "content space" (consisting of

the problem to be solved) and a "relational space" (consisting of the interactional challenges and opportunities). The content space and relational space are being negotiated simultaneously and can compete for limited attention. Data from two studies will be presented. The first study investigates links between features of group member's interaction to joint problem solving outcomes and individual learning outcomes. The second study examines links between college students' evaluation of the outcomes of their collaborative work with respect to interaction, relationships, learning, and the project grades they received on their work.

E 15   24 August 2005   14:30 - 16:30   Room A018

Expert Panel
Conceptual Change

EXPLORING THE LINKS BETWEEN SELF-REGULATION AND CON-CEPTUAL CHANGE

Chair: Lucia Mason, University of Padova, Italy
Organiser: Margarita Limon, Autonoma University of Madrid, Spain
                Gale M. Sinatra, University of Nevada, United States
Discussant: Philip Winne, Simon Fraser University, Canada
                Michel Ferrari, OISE. University of Toronto, Canada

Sinatra & Pintrich (2003) described intentional conceptual change as ìgoal-directed and conscious initiation and regulation of cognitive, metacognitive and motivational processes to bring about a change in knowledge (Sinatra & Pintrich, 2003, p.6). This suggests that self-regulatory processes could be important in promoting conceptual change learning. Though this issue needs further discussion, it has been suggested that when a deep knowledge restructuring is needed and/or when affects are tightly linked to concepts and beliefs, intentional conceptual change may be more likely to promote a change in knowledge. Some empirical evidence suggests that self-regulatory constructs, such as achievement goals can be influencial in promoting conceptual change (Linnenbrink & Pintrich, 2002; 2003). An educational implication of these research data and theoretical frameworks is that self-regulation should be promoted not only as a goal for knowledge acquisition, but a goal for knowledge change. This panel will address some key questions to be posed to the panelists:
1) What, if any, theoretical links do you see between self-regulation and conceptual

change?
2) What are the key research issues you consider important to move research forward in exploring the possible links?
3) To what extent do you think that promoting self-regulatory abilities as a learning goal may be a useful tool for promoting knowledge change?
4) How much of self-regulated learning is intentional, that is, ìgoal-directed and consciously initiated and how much occurs automatically, that is, without conscious control? Does the degree of awareness of self-regulatory abilities influence the likelihood of knowledge change?

Self-regulated learning and conceptual change are both key learning constructs that influence knowledge construction. From a theoretical point of view, finding links and connections between these areas may contribute to a better understanding of learning when the content is complex, unfamiliar, controversial, or in conflict with learners' background knowledge, beliefs, and experiences.

Conceptual change and the motivational aspects of self-regulated
Christopher Wolters, University of Houston, United States

My contribution to this expert panel will focus on the motivational aspects of self-regulated learning and their relation to conceptual change. Using a social cognitive perspective, I have investigated the motivational aspects of self-regulated learning through two lines of research. One line of research has focused on examining students' motivational beliefs and attitudes and using them to understand students' engagement and achievement within academic contexts (Wolters, 2003a; 2004; Wolters, Yu & Pintrich, 1996). This line of research addresses the importance of students' motivation and affective experience as unintentional influences on their engagement in learning and subsequently their conceptual change. In a second line of research, I have focused on investigating students' more purposeful control or self-regulation of their own motivation (Wolters, 1998; 1999; 2003b; Wolters & Rosenthal, 1999). In this research I have examined a number of different regulation of motivation strategies including the empirical and theoretical links between these strategies and students' motivation, strategy use, and achievement. This line of research has implications for how the more conscious and purposeful aspects of self-regulated learning may be related to conceptual change.

Self-regulation and intentional conceptual change
Gale M. Sinatra, University of Nevada, United States

Prior to Pintrich, Marx, and Boyle's (1993) influential article on conceptual change, there was little attempt to link motivation and cognition in the study of conceptual change learning. Sinatra and Pintrich (2003)defined intentional conceptual change as "goal-directed and conscious initiation and regulation of cognitive, metacognitive, and motivational process to bring about a change in knowledge" (Sinatra & Pintrich, 2003, p.6). This new view depicts conceptual change as a complex and dynamic interaction of affective, motivational, and contextual factors. Much work is needed to explicate this new view and extend the research agenda for conceptual change in general. Specifically, if intentional conceptual change is a viable construct, there should be demonstrable relationships between self-regulatory skill and conceptual change as seen by Linnenbrink and Pintrich (2002; 2003). The purpose of this session is to address questions posed by the organizers regarding the relationship between self-regulation and conceptual change. This presentation will outline the vision as articulated in Sinatra and Pintrich (2003) for how self-regulation could be a key aspect of the ability to contribute to one's own knowledge restructuring.

Expertise, self-regulation, and intentional conceptual change: some reflections
Margarita Limon, University Autonoma of Madrid, Spain

Research results on conceptual change has shown the high resistance individuals have toward changing their own concepts and beliefs. However, instructional goals often attempt to change them. From both a theoretical and an educational perspective it would be interesting to examine: 1) what factors influence individuals can change their prior knowledge, and hence what type of changes and processes are needed for individuals to achieve the desired knowledge change, and 2) what instructional strategies may be useful to promote the changes needed for individuals to achieve concepts and beliefs change as required by instructional goals. Research on conceptual change has traditionally focused on cognitive factors. However, more recently, it has begun to focus also on metacognitive, motivational and affective aspects, and on their interaction. The term intentional conceptual change (ICC) introduced by Sinatra and Pintrich (2003) is an example of this goal to take into consideration the interaction of all these factors. In my presentation I will argue that often instructional goals pursue deep knowledge changes that may require an ICC. If self-regulation abilities are involved in intentional conceptual change, then the development and training of self-regulation abilities may facilitate this type of

conceptual change, and therefore, it may contribute to achieve some instructional goals. Secondly, I will reflect on the possibility of using ICC tasks as an instructional tool that may contribute to develop self-regulation skills. Some research results suggest that expert learners are good self-regulators. Hence, training learners to achieve intentional conceptual changes might contribute to improve their self-regulation skills becoming a worthy instructional strategy. Thirdly, I will refer to another possible link between self-regulation and conceptual change: the interaction between learners' self regulation abilities and their level of domain-specific prior knowledge on achieving an intentional conceptual change.

Conceptual change, sensitivity and tolerance of ambiguity: a challenge for self-regulation
Erno Lehtinen, University of Turku, Finland

Conceptual change tasks demanding a deep restructuring of prior knowledge are complex coping situations in which learners have to regulate their attentional, motivational and emotional processes. It is suggested that motivational factors play an essential role in how learners experience the conflict between naive and scientific notions, and in how willing they are to change their notions. We are aimed at analysing the dynamics of the conceptual change processes by using a systemic model dealing with sensitivity and tolerance of ambiguity (Lehtinen & Merenluoto, 2004). When the learner meets tasks where new conceptual understanding is required, the perception of the task (task situation) seems to be influenced by students' cognitive, meta-cognitive, and motivational sensitivity to the task. By sensitivity we mean the extent to which the student is aware of and interested in the novel cognitive aspects of the phenomenon (De Corte, Greer & Verschaffel, 1996). If the learner's sensitivity is high, he or she has sufficient prior knowledge to understand the cognitive demands of the task. But they need to tolerate ambiguity (Stark, Mandl, Gruber & Renkl, 2002) caused by the conflict. Processes of sensitivity and of the tendency to pay attention to the novel features in the situation are necessary conditions for a productive experience of a cognitive conflict. This is, however, not enough. The learner also needs to be motivated to deal with ambiguity, and to trust that conflicts experienced are solvable. Our hypothesis is that this kind of learning approach (experience-of-conflict-path) is needed for conceptual change tasks. In the panel I will present the theoretical model and discuss our empirical findings in the field of learning advanced mathematics. Data show how students regulate the sensitivity to the novel aspects of the task as well as the motivational and cognitive aspects related to the tolerance of ambiguity.

Relations between intentional learning, self-regulation and conceptual change
Stella Vosniadou, National and Kapodistrian University of Athens, Greece

We argue that that intentional learning, self-regulation and conceptual change are highly interrelated and that the promotion of self-regulatory abilities can be also useful in promoting conceptual change. Conceptual change is defined as the outcome of a complex cognitive as well as social process whereby the initial knowledge structures of an individual are restructured. Studies of conceptual change have shown that this is a slow and gradual affair often accompanied by misconceptions, inert knowledge and internal inconsistencies. Intentional learning is defined as the pursuit of understanding over and above the requirements of school tasks. In order to achieve this kind of learning, students must be purposeful and able to monitor and regulate their learning in a metacognitive manner. It is assumed that intentional learning is something that can be cultivated by instruction. Cognitive-developmental research shows that the process of conceptual change usually proceeds through the incorporation of new information into existing knowledge structures and the creation of synthetic models. Although these processes may not be under the full control of the learner, they may nevertheless move students in the direction of the desired conceptual change. But, while some conceptual change can be achieved without intentional learning, the new conceptions are often unstable, marked by internal inconsistencies and not under the full conscious control of the learner. Furthermore, it is difficult to imagine how students can understand the most difficult and counterintuitive concepts of modern science and mathematics by simply assimilating new information into existing knowledge structures and without being intentional. Intentional learning can greatly facilitate conceptual change by making the monitoring of information more efficient, by making learners more metaconceptually aware of their underlying beliefs and presuppositions, and especially by giving them access to more efficient mechanisms for knowledge acquisition than the simple enrichment or replacement of existing beliefs.

Interactive Poster
Learning and Instructional Technology

DIGITAL TOOLS FOR WRITING

Chair: Henk Sligte, University of Amsterdam, Netherlands
Organiser: Ron Oostdam, University of Amsterdam, Netherlands
              Judith Schoonenboom, University of Amsterdam, Netherlands
Discussant: Gert Rijlaarsdam, University of Amsterdam, Netherlands

This symposium addresses contemporary research into the use of digital tools for writing education. Studies with both descriptive and experimental approaches are being considered. Subjects range from the elementary to the college level. An explicit objective of the symposium is to establish further research into the domain of digital tools for educational purposes. The tools as discussed in the paper presentations are linked to different aspects of the writing process. The presentation by Jerry Andriessen and Jos Jaspers of Utrecht University (The Netherlands) discusses three digital tools that can be used for collaborative writing. Ron Oostdam and Judith Schoonenboom of the University of Amsterdam (The Netherlands) report on a study into the application of digital concept maps for improving the planning process for writing. Eva Lindgren, Kirk Sullivan and Kristyan Spelman Miller of Ume? University (Sweden) present the results of a study into the effects of reflection by students upon their writing process by looking at a replay of key-stroke logging files. The presentation by Paul Thompson and Kristyan Spelman Miller of University of Reading (United Kingdom) addresses the online text-processing behaviour of students using a number of computer application and several online and offline resources for completing writing assignments.

A scenario for collaborative writing and argumentation-based comprehension of scientific information in higher education
Jerry Andriessen, Utrecht University, Netherlands
Jos Jaspers, Utrecht University, Netherlands

A scenario is a sequence of activities, fostered by combinations of different media and different task objectives, characterised by a gradual appropriation of tools for reaching the required objectives. During this process, the participants, advanced

students in educational sciences, discuss content (task 1), compare (task 2) and share (task 3) ideas, and design new criteria (task 4) with respect to using graphical tools for understanding and sharing scientific information. For each task, a different graphical tool was used. Task 1 employed an asynchronous discussion forum (Sitescape). Task 2 used VCRI, a multifunctional discussion environment developed at Utrecht University. In task 3 we used DREW, developed in the SCALE project. Finally, for task 4, we used Digalo, developed in a project called DUNES. The objective for the students was to write a collaborative essay about the affordances of (3 different) graphical tools to support collaborative learning, and to have this published in a popular scientific journal. The role of the instruction was to support reflection on these activities, by providing the scenario, scripting of activities, the environment, technical assistance, feedback, and criteria for progress. There were 6 student groups of 10 participants, providing a total of 6 essays. In this contribution, the focus is on the writing process, and the comparison of three graphical tools in the support they provide for the accomplishment of the task. While this is an extended writing task, none of the tools is supposed to be used synchronously with the actual writing of the text. The analyses focus on the relations between the collaboration within each of the 3 environments; the content discussed (i.e. argumentation), and related characteristics (concepts, coherence, type of knowledge transformation) of written products produced in tasks 2-4 of the scenario.

The use of digital concept maps for improving the planning process for writing
Ron Oostdam, University of Amsterdam, Netherlands
Judith Schoonenboom, University of Amsterdam, Netherlands

Insufficient planning of conceptual contents for writing is often a main problem for most students. Although a more process-oriented didactical approach for writing as well as the use of textual schemata in writing education may improve writing achievement, most students still have to comply with problems of an adequate planning on the meaning level of their text. A digital tool that can facilitate the planning of content elements and text structure is software for concept mapping. Concept mapping is a method for developing ideas and organizing those ideas. A concept map can be defined as a graphic representation of knowledge in the format of concept maps and their mutual relations. By means of concept maps the non-linear relations between concepts can be visualized and the assumption is that such a graphic representation of the conceptual contents of a text may improve the planning component of the writing process and eventually can result in a better text. In this presentation the results of three pilot studies will be presented in which digital

concept maps were used in different existing writing courses for college students. Seven hypotheses were set up in the cognitive and social domain and with respect to the learning context. In the presentation, the pilot settings are sketched first. The main part of the presentation will be devoted to the presentation of the outcomes of the three pilots. After that, the pilot studies will be compared, and an attempt will be made to relate the different outcomes to the differences in the setup of the pilots. Finally, the educational implication of the pilot results will be discussed.

Stimulating revision processes to improve composition skills
Eva Lindgren, Umea University, Sweden
Kirk Sullivan, Umea University, Sweden
Kristyan Spelman Miller, University of Reading, United Kingdom

While writing writers revise in order to improve or verify the external text or to improve or verify the internal representation of the text. The initial step in the revision process is when the writer detects a dissonance in the text, i.e. something (spelling, grammar, style or content) in the written text that does not concur with the mental representation the writer holds of the text. However, for various reasons, such as cognitive overload or insufficient linguistic and extra-linguistic knowledge, writers often fail to detect and revise mismatches. This study aims to provide writers with skills to notice dissonance in their writing and to decide whether to act on this dissonance or not. Ten Swedish 13-year-olds wrote texts in Swedish and English in a key-stroke logging environment. These recorded writing sessions were immediately followed by reflection sessions, in which discussion was stimulated by watching, in pairs, the replay of the writing sessions. This provided an opportunity for writers to enhance their awareness of linguistic as well as extra-linguistic features necessary for revision and to receive feed-back on revisions undertaken as well as potential revision points both from a peer and a teacher. All revisions were analysed according to their position in the text, their effect on the text and whether they were discussed in the reflection session. We considered whether the triggers for revision came from the discussion of their own or their peer's texts, and whether these elements were later revised during the second writing session. The analysis focused particularly on discussed revisions that occurred at points in the discourse where the topic was being elaborated on, Framing device locations'. The study showed that this approach stimulated the students' revision processes and warrants investigation in a longitudinal study.

Interacting with computer resources: A study of writers' on-line text processing
Paul Thomson, University of Reading, United Kingdom
Kristyan Spelman Miller, University of Reading, United Kingdom

This paper presents a study of online text-processing behaviour of university students as they use a number of computer applications to complete a set assignment. This study extends current work on writer uses of specific computer applications, such as word-processing programmes, or of internet browsers, by considering the complex interactions of movements between computer resources (Internet, word-processing packages, information management systems, data analysis tools) that student writers exploit in their completion of assignment tasks. Through the use of Morae, a programme designed to record and analyse computer user behaviour, the study aims to identify the behaviours of two case study student writers as they work under natural conditions to produce an assignment. Their actions as they navigate between online and offline resources include: changes between applications, scrolling, clicking, copying and pasting, revising, sorting of data, alternation between online resources and paper-based resources. Among the research questions posed in the study are: 1) How many resources does each writer draw on? For what purposes?, 2) Do writers exploit each resource in isolation, or do they work with different resources in parallel for periods of time?, and 3) How many of the features of each application do they use, and is there evidence of a lack of familiarity with certain features that could assist them in their work? The aim is to develop a detailed description, and an analytical framework. In highlighting the actions and strategies adopted by student writers in the completion of complex writing tasks, these descriptions also suggest skills and strategy areas in which students would benefit from further training, to augment their abilities to perform such tasks effectively. Preliminary findings from the study are presented and comments made on the evaluation of the tool as a means of tracking complex real-time activity as participant complete complex writing tasks.

E 17   24 August 2005   14:30 - 16:30   Room A111

SIG Invited Symposium
Educational Effectiveness

THE GROUP COMPOSITION EFFECT: HOW TO EXPLAIN IT?

Chair: Jan Van Damme, Catholic University of Leuven, Belgium
Organiser: Jan Van Damme, Catholic University of Leuven, Belgium
Discussant: John Ainley, Australian Council for Educational Research,
                  Australia

Schools are incredibly complex places, impacted by many forces: for example, social and cultural values, government ideologies and policies, communities, school organisations, student, teacher and staff characteristics. In many school effectiveness studies, achievement differences are found to be related to differences in the student body composition, even when controlled for individual student characteristics. This is known as the "compositional" effect. Such an effect is often reported when a school or a class level aggregate of an individual level variable (both of which are included in the model of analysis) makes an independent contribution to the explanation of outcome variance. The potential for compositional effects exists, in part, because students are not randomly assigned to schools and to classes within schools. Some schools, for example, have a predominance of students from under-resourced families, which may be associated with reduced levels of motivation toward achievement at school. Other schools may select for developed ability on entry and yet others may be segregated along the lines of sex, ethnicity or religion. The compositional effect is important in the sense that it is a potential arm of educational policy, and could be used or misused in support of particular policy initiatives. Trying to understand and explain the appearance of the compositional effect is therefore vital. The focus of the proposed symposium will be on understanding and explaining compositional effects in Germany, The Netherlands and Flanders (the Dutch speaking part of Belgium).

Are school structures and/or teaching processes responsible for the group composition effect?

Marie-Christine Opdenakker, Catholic University of Leuven, Belgium
Jan Van Damme, Catholic University of Leuven, Belgium

Research into the effectiveness of secondary schools (and classes) often reveals effects of group composition. These effects are found in a lot of countries, but the extent of the effects differs between countries. Differences in the educational system, the way in which schools and classes are composed and teaching processes might be an explanation. As most European countries, Belgium has a long tradition in offering different tracks in secondary education and in organizing different types of schools based on the tracks they offer. Despite the mostly common curriculum in the first two grades nowadays in Flanders (the Dutch speaking part of Belgium), classes are very often composed of students with the same optional subject. It is interesting to know whether the strong compositional effects of schools and classes found in Flanders might be explained by the existence of school and class types or by differences in teaching practices. To answer this question a representative sample of 1340 students, 117 mathematics classes and 44 secondary schools in Flanders was used in multilevel analyses. Our results indicate that, although a part of the composition effect of schools is intertwined with the school type effect, the intellectual composition of the student body remains important for mathematics achievement even after school type (and a diversity of student variables) is taken into account. The same holds with respect to the effect of the intellectual composition of classes: the intellectual composition of classes remains important even after class type (based on the optional subject students choose) is taken into account. We also found that teaching processes could partially explain composition effects of classes. However, evidence for the importance of the intellectual composition of classes remained even after controlling for teaching processes, class type and school composition.

Motivation and composition effects: student tracking and the powerful effects of opt-in courses on self-concept

Ulrich Trautwein, Max Planck Institute for Human Development, Germany
Oliver Luedtke, Max Planck Institute for Human Development, Germany

The composition of schools or classes has been shown to impact on achievement trajectories, but also on the motivational development of students. A well-known example of a composition effect on student motivation is the so-called Big-fish-little-pond effect (BFLPE; e.g., Marsh, 1987). According to the BFLPE, equally

able students have lower self-concepts when placed in a high-achieving rather than a low-achieving school environment. Recently, several researchers have proposed that high-achieving school environments might also give rise to a Basking-in-reflected-glory effect (BIRG; e.g., Marsh, Kong & Hau, 2000). In Germany, course selection (basic vs. advanced courses) is an integral part of the last two years (grades 11 and 12 or 12 and 13, depending on regional structures) of the Gymnasium, with students selecting two (and only two) advanced courses in addition to their core classes. We used data from the large-scale, longitudinal BIJU study to examine the effects of math advanced course selection on math self-concept (N > 2000). A set of multilevel regression analyses were performed. As the results show, a student's math self-concept in 12th grade was strongly predicted by his or her math self-concept two years ago. Moreover, the math achievement in Grade 10 positively impacted on Grade 12 math self-concept. Most importantly, however, we found a negative effect of school-average math achievement on math self-concept (the typical BFLPE), but also a positive effect of course level, indicating the existence of a BIRG effects. Overall, composition effects on motivation were of considerable size.

Marsh, H. W. (1987). The big-fish-little-pond effect on academic self-concept. Journal of Educational Psychology, 79, 280-295.
Marsh, H. W., Kong, C.-K., & Hau, K-T. (2000). Longitudinal multilevel models of the big-fish-little-pond effect on academic self-concept: Counterbalancing contrast and reflected-glory effects in Hong Kong schools. Journal of Personality and Social Psychology, 78, 337-349.

Contextual effects across or within classes?
M.P.C. van der Werf, University of Groningen, Netherlands
R.J. Bosker, University of Groningen, Netherlands
M.J. Lubbers, University of Groningen, Netherlands
H. Guldemond, University of Groningen, Netherlands
H. Kuyper, University of Groningen, Netherlands

Contextual effects, if present, are important in education, because by group composition teachers can actually then influence learning processes as induced in students. Social psychological explanations go into more detail about social comparison processes, in which significant other members of the group function as a standard for a student.. An explanation derived from rational choice theory considers standard setting practices of teachers in function of the group average achievement level as a key mechanism. In this paper we will consider peer group relations within classes

as a potential cause of contextual effects across as well as within classes. In the first case more tight relations may lead to the emergence of contextual effects, whereas in more loosely coupled groups this may be less the case. In the second case we may consider similar processes to occur for subgroups within classes. The present paper will focus on the following questions:

1) Are contextual effects, either in terms of cognitive or demographic factors, present in classes within secondary education, even within existing curricular tracks?

2) Are contextual effects present within classes within secondary education?

Data were collected as part of a longitudinal study in the Netherlands consisting of almost 20,000 students who enrolled into secondary education in 1999. A sociometric instrument was included in the student questionnaires, several achievement tests were administered in the first grade as well as in the third grade, and a questionnaire was taken to gather information on demographic factors (such as socio-economic and minority status). Contextual effects were studied by looking into within and between group relations for the various variables of interest, using multilevel models. For contextual subgroup effects the sociometric information was used and analyzing within and between subgroup relations. The results only partly support the existence of contextual effects both across and within classes.

Social and intellectual composition of schools' effects on student outcomes
Juergen Baumert, Max Planck Institute for Human Development, Germany
Petra Stanat, Max Planck Institute for Human Development, Germany
Rainer Watrmann, Max Planck Institute for Human Development, Germany

The study to be presented investigates the influence of the social and intellectual composition of schools on student performance in the domains of reading and mathematics and how the impact of composition is mediated by process variables as parents' support, peer culture, teacher expectations, and quality of mathematics instruction. Particular emphasis is placed on modeling composition effects in a theoretically and methodologically defensible way. In a first step findings from the OECD PISA 2000 study showing large effects of social composition of schools in tracked systems will be reexamined after controlling for selection bias and bias due to omitted context variables. Using multilevel multigroup structural equation modeling (Mplus) the OECD results concerning social composition cannot be replicated, but a substantial impact of the intellectual composition of the student body on performance can be shown. In a second step a mediation model is specified and fitted on the basis of the German longitudinal component of PISA 2003. The results indicate different developmental trajectories depending on ability grouping medi-

ated by peer interactions and instructional processes.

E 18   24 August 2005   14:30 - 16:30   Room A110

EARLI Invited Symposium
Learning and Instructional Technology

INTEGRATING ASSESSMENT AND INSTRUCTION IN EFFECTIVE LEARNING ENVIRONMENTS

Chair: Judy Dori, Technion, Israel
Organiser: Irit Sasson, Technion, Israel
                Zvia Kaberman, Technion, Israel
                Miri Barak, MIT, United States
                Nitza Barnea, Technion, Israel
                Relly Shore, Weizmann Institute of Science, Israel
                Mira Kipnis, Weizmann Institute of Science, Israel
                Rachel Mamlok-Naaman, Weizmann Institute of Science, Israel
                Avi Hofstein, Weizmann Institeu of Science, Israel
                Orit Herscovitz, Technion, Israel
Discussant: Jim Ridgway, University of Durham, United Kingdom

Educating pre- and in-service chemistry teachers to adopt new assessment modes as part of an inquiry-based laboratory environment is a complex and demanding task. This talk describes three related studies whose goal was to investigate the effect of exposing pre- and in-service high school chemistry teachers to innovative teaching and assessment approaches using inquiry laboratory activities, information technology, and (IT), molecular modeling. The first study investigated pre-service high school teachers, who learned how to use innovative chemistry teaching and assessment methods in technology-rich environments for their future classrooms while emphasizing embedded assessment. In the second study we followed the process of integrating an inquiry-based computerized laboratory into about 40 Israeli high schools. The curriculum was aimed at fostering 12th graders to pose questions, apply inquiry and critical thinking, construct and comprehend models, as elements of embedded assessment.

The main goal of the third study was to develop, implement, and assess the learning outcomes of inquiry-based laboratory experiments in high school chemistry in Israel. Students were asked to ask relevant questions regarding a presented scien-

tific phenomenon that they had observed. They were then required to formulate a hypothesis, choose a researchable question for further investigation, and plan an experiment in order to investigate this question. In the second and third study, the students' thinking skills were assessed using an experimental summative assessment as part of the Israeli matriculation examinations. In the second, the examination was in writing and was based on an adapted scientific article while in the third study the examination was oral and was based on a portfolio prepared by teams of students throughout the year. The objectives, settings, learning environments, population, embedded assessment methods, and findings of these three studies will be described and discussed.

Case-based computerized chemistry laboratory: Embedded assessment of students' inquiry and graphing skills
Irit Sasson, Technion, Israel
Zvia Kaberman, Technion, Israel
Orit Herscovitz, Technion, Israel
Judy Dori, Technion, Israel

A case-based computerized laboratory chemistry study unit that we developed at the Technion was designed for 11th or 12th honors chemistry students with embedded assessment in mind. We developed a year-long study unit for high school students that integrates computerized desktop experiments with emphasis on scientific inquiry, case-based problems and graphic applications. The new modes of assessment included students' laboratory portfolios and a national case-based test, targeted at assessing the students' thinking and graphing skills. The research results from the two classes showed correspondence between students' performance in the case-based test and both the teacher- and self-assessment of the open inquiry, although high achievers underestimated themselves and low achievers overestimated their performance.

Exposing pre-service science teachers to web-enhanced learning and embedded assessment
Miri Barak, MIT, United States

This research has investigated pre-service teachers' activities and learning processes while employing educational technology environments and embedded assessment in an attempt to find out whether they underwent a change in their attitudes towards using IT. The technology-based learning in this course generated an informal, re-

laxed learning environment which led to many interactions among the classmates. They helped each other in solving technical difficulties with the CMM programs as well as problems related to chemistry. Interactions between students occurred in various ways by sharing the use of the keyboard and mouse and by discussing the problems and pointing to interesting details shown on the computer screen. At the end of the CMM recitation sessions, after the students were dismissed, more than half stayed in the computer lab in order to finish the embedded assessment tasks and to observe computerized models that their peers constructed.

Embedded assessment in an inquiry-based laboratory
Relly Shore, Weizmann Institeu of Science, Israel
Mira Kipnis, Weizmann Institeu of Science, Israel
Rachel Mamlok-Naaman, Weizmann Institeu of Science, Israel
Avi Hofstein, Weizmann Institeu of Science, Israel

The main goal of this study was to develop, implement, and assess the learning outcomes of inquiry-based laboratory experiments in the context of high school chemistry in Israel. The study attempted to provide students with opportunities to learn and assume responsibility for their own learning as a result of conducting inquiry-type experiments. The students improved their ability to ask better and more relevant questions as a result of gaining more experience with this type of experiments.

Embedded assessment in chemistry inquiry-based laboratory in israeli high school
Nitza Barnea, Technion, Israel

Until 20 years ago the laboratory unit in advanced high-school chemistry in Israel was a central component in the curriculum. When the topic of industry became obligatory in the matriculation examination, participation in the laboratory hands-on examination was reduced to only a few schools. Consequently, it also affected students' motivation and enjoyment and it may be one of the reasons for the sharp drop in the number of chemistry students during those years. Specifically, the numbers decreased from about 8500 students to about 6600. In most schools the laboratories were neglected, and school principals did not provide resources for current maintenance or laboratory improvement. In 2000, the chemistry curriculum has been re-examined and revised. The process highlighted the laboratory unit as a central component in the new curriculum. The obligatory topic of industry was cancelled,

and was replaced by an optional the laboratory unit (about 90 hours). The laboratory unit will be obligatory in the near future. In the interim we begin with half laboratory unit. During the new laboratory session students get the opportunity to develop inquiry skills, computer skills, and high-order thinking skills while implementing theoretical topics learned in class. The recommended laboratory activity will include both closed and open experiments. The skills required for the closed experiments are as follows: following instructions, using instruments, collecting and analyzing data, and writing scientific reports. The open-ended experiments require posing questions, raising scientific hypotheses, planning the work, examining the assumptions, searching for scientific background references, and discussing the results. This work describes the background, motivation, and assessment planned for the re-introduction of chemistry laboratory and the embedded assessment that will be an integral part of this renewed activity.

E 19   24 August 2005   14:30 - 16:30   Room A019

SIG Invited Symposium
Learning and Professional Development

EARLY CAREER LEARNING IN PROFESSIONAL WORKPLACE

Chair: Henny Boshuizen, Educational Technology Expertise Centre,
                Netherlands
Organiser: Michael Eraut, Sussex School of Education, United Kingdom
Discussant: Karen Jensen, Institute for Educational Research, Norway

Early Career Learning in the Professional Workplace: Theories, methods and insights from a longitudinal, cross-professional, comparative study. The focus for this symposium is a three year, longitudinal study of learning at work during the first three years of post university employment. Its scope covers three professions - accountancy, engineering and nursing. Data collection involved four 1-2 day visits to each respondent over a three year period. These usually began with a long period of observation and ended with an interview. We have a full set of data on at least 60 participants. The presentation of findings will be based on six data sets, covering the first and third years of the study in all three professions. The study as a whole offers (1) considerable new insights into the affordances offered or denied by work environments and (2) analytic tools for elucidating what is being learned, how it is being learned and the factors that affect learning through creating or exploiting

affordances for learning. Three papers will be presented, followed by a discussant external to the project and a plenary discussion. The titles and presenters are:
1)Methodological Challenges in Studying Workplace Learning: strengths and limitations of the adopted approach. Stephen Steadman, University of Sussex, UK.
2)Typologies for Investigating and Reporting on What is Learned and How. Michael Eraut and Stephen Steadman, University of Sussex, UK.
3)An Analytical Tool for Characterising and Comparing Professional Workplace Learning Environments. Fred Maillardet, University of Brighton, UK and Michael Eraut, University of Sussex, UK.

Methodological challenges in studying workplace learning: strengths and limitations of the adopted approach.
Stephen Steadman, Sussex School of Education, United Kingdom

This paper addresses the methodological problems of data collection, data reduction and data analysis encountered in a three year, longitudinal study of learning at work. Three groups of professionals - accountants, engineers and nurses- were studied during their first three years of post university employment. Data collection, in particular, is hampered by the informal nature of most learning at work and the embedded quality of the knowledge thus acquired, which is unlikely to be readily acknowledged, or even remembered, without some pertinent prompting. Important components of what is learnt are often carried as tacit knowledge and skills, which are used to address problems without the user being conscious of their utility. The project's main data collection strategy comprised four 1-2 day visits to each respondent over a three year period to observe participants at work and then conduct a recorded interview. Opportunities were also taken to conduct short interviews with significant others in that workplace. The paper discusses context specific changes in procedure, possible researcher bias, the importance of observation, ethical issues arising from the methodology, and how the project tried to obtain adequate samples of what is learnt over the three year period of the research. The paper also attends to the issues that surround the handling of large volumes of qualitative data, and the problems of maintaining consistency of coding. There are inevitable tensions between having a system that provides valid comparisons between the three professions, while still allowing legitimate sector differences to emerge from the data. The final section of the paper concerns the linkages between theory, coding, the processes of inference from data and the interpretations that create the project's findings.

Typologies for investigating and reporting on what is learned and how
Michael Eraut, Sussex School of Education, United Kingdom
Stephen Steadman, Sussex School of Education, United Kingdom

The focus for this study was a three year, longitudinal study of learning at work during the first three years of post university employment. Its scope covered three professions - accountancy, engineering and nursing. Data collection involved four 1-2 day visits to each respondent over a three year period. These included a long period of observation and an interview. We now have a full set of data on at least 60 participants and first year data on at least 90. This paper is based on six data sets, covering the first and third years of the study in all three professions. This paper presents findings on two research questions: what was being learned, and how was it being learned? Our analysis of what was being learned focussed on a combination of (1) urgent profession-specific tasks required for meeting the immediate demands of one's allocated work, and (2) longer term progress along those learning trajectories for which learning opportunities were explicitly available or embedded in work activities and contexts. At any one time explicit progress is made on several trajectories, implicit progress can be inferred on other trajectories, and many trajectories remain static or even decline. Our analysis of how learning is taking place is based on two distinctions: one between working processes from which learning was a by-product and processes with learning as their object; the other between the processes themselves and activities such as asking questions, which can be observed within many different kinds of process. We found five types of work process that regularly gave rise to learning: participation in group activities, working alongside someone, tackling challenging tasks, problem solving and working with clients.

An analytical tool for characterising and comparing professional workplace learning environments
Fred Maillardet, University of Brighton, United Kingdom
Michael Eraut, Sussex School of Education, United Kingdom

The analytic framework developed for analysing the factors affecting learning and their modes of interaction is based on two triangles, one depicting contextual factors which determine the affordances for learning, the other the learning factors affecting the agency of learners and helpful others that determine the recognition and take up of these affordances. Both triangles have apexes for the nature of work, relationships at work and individual workers. The primary factors in individual learner agency are confidence in their ability to do the work and commitment to the

value of that work. Confidence depends on the successful completion of challenging work, and that in turn may depend on informal support from colleagues. Commitment was generated through participation in teams and by appreciating the value of the work for clients and for themselves as novice professionals. The allocation and structuring of work was central to our participants' progress, because it affected (1) the difficulty or challenge of the work, (2) the extent to which it was individual or collaborative, and (3) the opportunities for meeting, observing and working alongside people who had more or different expertise, and for forming relationships that might provide feedback and support. The paper will focus mainly on the use of this analytic tool for eliciting from each of the six data sets the key factors affecting learning, and for comparing these factors across professions and over time

E 20   24 August 2005   14:30 - 16:30   Room E010

EARLI Invited Symposium

MEETING OF JOURNAL EDITORS WITH THE AUDIENCE

Chair: Filip Dochy, University of Leuven, Belgium
Organiser: Filip Dochy, University of Leuven, Belgium
Discussants: Mark Newman, University of London, United Kingdom
                Diana Elbourne, Evidence for Policy and Practice Information and
                Coordinating Centre, University of London, United Kingdom
                Marilyn Leask, Teacher Training Agency, United Kingdom

Participanting Editors:
Lynn McAlpine, International Journal for Academic Development
Christa van Kraayenoord, Intl Journal of Disability, Development and Education
Peter Goodyear, Instructional Science
Wolfgang Schnotz, Learning & Instruction
Keith Trigwell, Higher Education
Felice Carugati, European Journal for Psychology of Education
Roger Saljo, International Journal of Educational Research
David Nevo, Studies in Educational Evaluation
Julie Dockrell, British Journal of Educational Psychology
Bea Ligorio, European Journal of School Psychology
Malcolm Tight, Studies in Higher Education
Jean Underwood, Computers & Education
Lesley Pugsley, Teaching and Teacher Education

There is considerable rhetoric about increasing the usefulness of educational research for a wide range of audiences including researchers, academics, practitioners, policymakers and users of educational services. This requires the development of new ways of working for both researchers and practitioners including efforts to make the details of research more accessible. For this reason, researchers have been working in collaboration with educators to develop ways of making research findings accessible to teachers, teacher educators, policy makers. The quality and comprehensiveness of systematic reviews are highly dependent on the quality and comprehensiveness of the reporting of, for example, the contexts, aims, and methods used in the primary studies. A common concern of those conducting reviews has been that fairly straightforward information necessary for understanding and synthesising individual studies such as sample sizes and characteristics, location and duration of studies is not reported in published articles. This presentation reports on the findings of a scoping project that set out to investigate this phenomenon and to produce a draft set of reporting guidelines which authors might use in reporting primary empirical studies so that readers of articles can more accurately assess the usefulness of the findings. This set of guidelines' is presented in the introduction and discussed with a panel of editors and the audience. In a second part, this panel discussion gives EARLI members the opportunity to discuss with journal editors about publishing and review procedures. Editors might give some data about rejection rates, the review process, and some do's and don'ts for authors. The goal is to make clear what happens behind, what the criteria are, that there is no mystery why some papers were rejected whereas others were accepted, and that it iis possible to meet the criteria.

Paper Presentation
Assessment and Evaluation

METHODOLOGICAL APPROACHES

Chair: Leonidas Kyriakides, University of Cyprus, Cyprus

Investigating multi-dimensional testing approaches. Structural relationships in language competence
Nina A. Jude, German Institute for International Educational Res, Germany
Eckhard Klieme, German Institute for International Educational Res, Germany

The assessment of language competence plays an important role in institutional learning and teaching processes, where participants get assigned to different levels of ability. Testing instruments normally integrate tasks and scales for multiple dimensions of language competence such as reading, writing, grammar or oral proficiency. Results then consist of ability profiles stating a proficiency score for each test dimension, sometimes summing up to an overall competence score. Besides this autonomous scores, language researchers are interested in the relationships between those sub-dimensions of competence. It is assumed that their coherence can be traced back to cognitive processes involved in language learning and understanding. For example, strong relationships between reading and listening competence could result out of similar processes of understanding, this should be regarded in classroom teaching of language. Moreover, interrelations between specific skills in the native and in the foreign language might indicating transfer of knowledge occurring during the learning process. To analyze this structural relationships in language competence, special methodological approaches have to be used. This presentation will present different methods of analysis including Structural Equation Modeling (SEM) and Multilevel Analysis (HLM) and compare their results. Using data of 11.000 students assessed with multidimensional tests for German and English, different theoretical models of competence were evaluated. Analyses show distinctions between first and foreign language structure as well as between students with high or low overall competence. Furthermore, structural relationships differ depending on the method of analysis and the additional factors included (e.g. institutional background of students). This presentation shows that differences in findings can depend on the statistical method of analysis. Language testing ap-

proaches should therefore clearly define their main points of interest, regard additional influencing factors besides mere test results and use appropriate methods to ensure the validity of findings and feedback.

Analyzing Structured Knowledge of a Test Sample with the Help of Network Techniques
Barbel Furstenau, Dresden University of Technology, Germany
Iris Trojahner, Dresden University of Technology, Germany

An important aspect of the ability to successfully meet complex demands in a particular context is a structured knowledge base. Still, what persons know cannot be directly assessed by an external observer. It is therefore required to apply adequate psychological data collecting and evaluation methods. Suitable methods for this purpose are networking techniques, because their form of data representation corresponds with the characterisation of knowledge as relational system and agrees with current models of the semantic memory. Networking Techniques are not new at all. They were and are used for multiple purposes, such as data gathering and data analysis. Concerning data analysis it is an obvious problem that results almost exclusively refer to individual test persons. It seems rather difficult to draw general conclusions for a test sample. This is especially true for qualitative statements. As a first answer to that problem, modal networks and prototypical networks as techniques for data analysis will be introduced. Modal networks contain those propositions that were named most frequently by a group of test persons. A critical point is that they have (in that special shape) not been developed by any of the test persons. Therefore, it might be more useful and coherent with the original data, to represent the structured knowledge of a sample by identifying a network for analysis which has been created by one of the test persons, a so-called prototypical network. A prototypical network is required to come closest to all individual networks regarding content and structure. Both, modal and prototypical networks will be assessed concerning their potential of qualitatively represent a test sample.

Assessment of Conceptualization and Transfer in Project Approach-Based STES Education
Uri Zoller, Haifa University - Oranim, Israel
Amos Cohn, Oranim College, Israel

A super-ordinate educational goal objective of contemporary science instruction is the development of students' higher - order cognitive skills (HOCS) in order to em-

power them to function rationally and effectively in our modern complex science- and technology-based democratic society, within its science-technology-environment-society (STES) interfaces context. The present study examines the effect of STES - oriented project-based science teaching on the development of the students' HOCS of conceptualization and transfer of the super-ordinate concept of periodicity in time and space and its transfer within these domains. Methodologically, the gains in both of these skills, followings the STES - oriented project approach treatment of 10 graders (N = 110) in 2 high-schools, have been assessed, quantitatively and qualitatively. Clearly, Teaching through the STES-project approach achieves considerable improvement in conceptualization and slight improvement in transfer abilities even within a short period (one semester) of time. Furthermore, most of the interviewed students supported the above by claming the project approach is enjoyable, interesting attractive and leaves the test of more in the sense that it motivates them to really make it. The results of both components of this study suggest, that (a) STES? project-based teaching generates an intellectual stimulus for the students, increases their involvement in the learning process and, consequently, contributes to their cognitive readiness which, in term, facilitates the realization of their HOCS; i.e., the conceptualization and within domain transfer of super-ordinate concepts.

Construct validation on measurement of relevant information objectivization processes during learning episodes
David Martin Santos Melgoza, Universidad Autonoma Chapingo, Mexico
Raquel Garcia Jurado, Universidad Nacional Autonoma De Mexico, Mexico

Argumentation promotes deep content processing and improves academic learning, as a result, researchers engaged on Self-regulation and learning have shown growing interest on this research; however, it is not yet understood which are the mechanisms that make knowledge building possible both, in the educational aspect as well as about the self, during varied learning episodes. Although research on the field has established the role of epistemological beliefs and the impact of argumentative capacity on deep processing; it is necessary to discover the transformations of the status of ideas in the respondents and their attained level of consciousness about the expected changes in such status. International literature characterizes argumentation as a deductive hypothetical methodology emerging from reasoning. Yet, testees' inferences do not necessarily correspond to the mechanisms of this type of logic. Literature on learning episodes shows that beliefs, expectations and appraisals assemble together with knowledge. Thus, students face a learning episode in diverse ways; hence, it is necessary to examine the interaction between these

two components. For that reason, a study of construct validation of the components underlying an instrument that measures objectivization of relevant information in learning episodes through argumentation is presented. Six experts on Self Regulation and Human Knowledge validated constructs' definitions and item fitting. Kendall agreement coefficient showed acceptable values for 13 of the 18 used constructs. From the judges' annotations, necessary adjustments were carried out and the modified instrument was applied to a random sample of 86 students attending the first year of high school. With the data, an exploratory factorial analysis containing 18 constructs in five factors, which explain 70.733% of the observed variance was carried out. The obtained indexes confirm the instrument shows validity to analyse objectivization processes of relevant information in learning episodes. Theoretical basis and results of construct validation are discussed.

F 2   24 August 2005   17:00 - 18:20   Room A108

Paper Presentation

NEW MODES OF ASSESSMENT

Chair: Doug Smith, Duke University, Canada

E-Assessment of students' competence in Germany - current state and future chances
Johannes Hartig, German Institute for International Educational Res, Germany
Nina A. Jude, German Institute for International Educational Res, Germany
Astrid Jurecka, German Institute for International Educational Res, Germany
Klieme Eckhard, German Institute for International Educational Res, Germany
Detlev Leutner, Universitaet Essen, Germany

As in many other European countries, the movement towards educational reforms has recently become quite strong in Germany. By monitoring the level of competencies which students actually achieve, policy makers want to identify strengths and weaknesses of the educational system, to increase the overall outcome level and to reduce inequalities. Recent large-scale studies on students' competencies reveal the need of state-of-the-art concepts and instruments for diagnosis and evaluation to support those educational reforms. While newly developed performance standards are currently implemented in the German educational system, their evaluation is still pending. Appropriate assessment methods need to be developed and

implemented. One very promising developing area in the field of educational assessment is the use of electronic assessment in various forms. Recently, the German Federal Ministry of Education and Research has commissioned an expertise on the state and possibilities of using different techniques of electronic assessment to test students' competencies. Within this expertise, currently available techniques and methods, likely developments to come, as well as problems regarding practical limitations within school and acceptance on the part of students and teachers will be will be explored and summarized. The acceptance of electronic assessment methods and teachers' computer literacy are among the most important things that must be considered in the preliminary stages of the development and research of new technology- based systems. Those variables were assessed with an online-survey for German teachers. The outcome of this survey and the implications of the results for the German educational system will be discussed. A specific focus of this paper will be the chances and problems to implement various forms of electronic assessment within schools, the possible uses of e-assessment for standard-testing within an educational system, and the reflection of the current state and future chances for electronic assessment in Germany.

Effective Learning Environment in electricity and electronics laboratory: Developing an innovative model for evaluation of work

Naftaly Dov, Hebrew University of Jerusalem, Israel
Tzachi Milgrom, Hebrew University of Jerusalem, Israel
Moti Frank, Technion - Israel Institute of Technology, Israel

Teachers' assessment of students in the laboratory is the main focus of this research especially as there are no uniform clear criteria by which the teacher can assess a student's activities. The research goal focused on developing a model for the assessment of a student in electricity and electronics laboratories in Israeli high schools. Qualitative and quantitative methods of research were combined in this study. First experimental model for use in a small group was piloted. Two study units and a test were developed in the area of electronic systems. The construct validity of the model was checked in a number of 12th grade lab classes (4 in all - 2 for each method, conventional and simulation, in each study unit and test) with the help of five experienced electronics lab teachers. The reliability was checked by the same two assessors who evaluated the achievements of these same students with the help of the model. The assessment model was developed in this study as a tool for the formative and summative assessment of the processes in the laboratory and as a further way of improving scholastic achievements. In our presentation we

will detail the construct and criteria of an innovative model for evaluation of work and the contribution of the model that constructed to the assessment of a student's achievements in all levels to the student, the teacher, and the educational framework according to our findings.

Dynamic Assessment and Interactive Examination
Nikos Mattheos, Malmoe University, Sweden
Anders Jonsson, Malmoe University, Sweden
Gunilla Svingby, Malmoe University, Sweden
Rolf Attstrom, Malmoe University, Sweden

Learning is acknowledged to be a dynamic process of a series of interactions. However, the assessment of learning, especially within academic profession directed education has been usually treated as a non-interactive procedure, often limited to a one-shot control of knowledge comprehension and psychomotor skills. Adaptation to modern professional environments and life long learning, requires a wider spectrum of meta-cognitive skills from students, such as the ability to assess ourselves and identify consequent learning objectives that will steer our learning. The Interactive Examination is a structured evaluation scheme, which aims to evaluate student's skills and competencies while expanding and supplementing the learning process. The methodology utilises students' own reflections and self-assessment as a starting point, followed by an individual assignment and a task of comparing their suggestions to that of peers or professionals. The differences, prioritising, reasoning and arguments pointed by students in their comparison documents are analysed and categorised. Finally, students receive individual feedback on their performance and learning needs. The students are expected to come out of the process having not only tested their current competence and understanding, but also having identified individual learning objectives for the future. This paper will present and discuss results from a multi-centre evaluation study on the Interactive Examination methodology, as conducted through a specially designed Internet page during Autumn 2004. The study involved undergraduate students in the faculties of Odontology and Teachers' Education, Malmo University, Sweden. The aim of the study is to investigate student's perceptions of the methodology through standardised questionnaires and interview, as well as identify factors of importance for interdisciplinary applicability of assessment methodologies.

The electronic Construction and Quality Control in Standardized Testing platform project (e-C&QCST)
Jean-Luc Gilles, University of Liege, Belgium
Sylvie-Anne Piette, HEC-Liege, Belgium
Pascal Detroz, University of Liege, Belgium
Salvatore Tinnirello, HEC-Liege, Belgium
Marc Pirson, University of Liege, Belgium
Mbassa Dabo, University of Liege, Belgium
Hung Le, University of Liege, Belgium

The docimology research showed the standardized testing is an efficient evaluation form of the learners' competencies provided to meet qualities of validity, reliability, sensitivity, diagnosticity, equity, practicability, communicability and authenticity. When it meet these qualities standardized tests are appreciated by trainers, learners and by leaders of training institutions. Currently the construction and the quality management of standardized qualifying evaluations worries the higher/university education - which have to face a still growing number of students – but also the training professionals and the human resources often constrain to draw up staff competencies statement acquired outside the school. Moreover these concerns concerning the tests quality are also in relation with a worldwide movement of the quality management introduction in education and training activities. Our research aims at facilitating the creation of standardized tests to make them more reliable, more efficient, quickly set up, in order to satisfy at best the actual requirements of the education/training/human resources world. Our objective is to succeed in creating an electronic platform of construction and quality control in standardized testing entitled e-C&QCST (electronic Construction & Quality Control in Standardized Testing) build in an Open Source policy for a web based utilisation.

F 3   24 August 2005   17:00 - 18:20   Room A109

Paper Presentation

MORALITY, RELIGION AND EDUCATION

Chair: Kirsi Tirri, University of Helsinki, Finland

Motivational approaches to studying theology in relation to spirituality
Laura Hirsto, University of Helsinki, Finland
Kirsi Tirri, University of Helsinki, Finland

In this paper we try to explore the relationship between motivational approaches to studying theology and spirituality among Finnish theology students. The motivational approaches students express are approached here in terms of reasons for choosing theology as a field of study. These factors are compared to measures of spirituality. In this study, 137 first year students of theology completed a questionnaire in which motives for starting to study in the Faculty of Theology, motivational approaches to studying and the spirituality were surveyed. The questionnaire was developed on the basis of earlier Finnish studies on motives to study theology (Niemel? 1999, Vermasvuori 1997) and spirituality (Tirri 2004, Hay 1998, Bradford 1995). According to the data, there are some interesting significant relations between spirituality and motives to start to study theology. On one hand, community-sensing spirituality was related to motives of spiritual calling and helping orientation. On the other hand, the motive of spiritual calling was related to value-sensing spirituality.

Religious education curricula in comprehensive schools in Scandinavia and Finland in the 1990's
Arto Kallioniemi, University Of Helsinki, Finland

The main focus of my paper is an investigation of the curricula of religious education in comprehensive schools in Scandinavia and Finland. The main purpose is to study which kinds of elements make up the present religious education curricula in Denmark, Finland, Sweden and Norway. The research method is content analysis. There is a lack of comparative research in religious education research. There are only a few studies in which different national systems of religious education have been compared by their contents. Although the Scandinavian countries and Finland

have a lot of common features, e.g. the religious landscapes are similar in these countries. However, their systems of religious education and the history of the subject are a little bit different. In addition the approach to religious education is different in these countries. For example, in Norway a non-confessional subject was established in 1997, in Denmark religious education became a non-confessional subject in 1975 and in Sweden religious education has been non-confessional since 1962. In Finland religious education is a denominational subject. The main idea is to investigate how the three elements (1. living faith systems, 2. shared human experience and 3 ultimate questions) which Schreiner has shown are represented in the curricula of these countries. Furthermore an investigation is also made of how the definitions 'learning religion', 'learning about religion' and 'learning from religion' are constructed in these curricula. As the results it was found that all Scandinavian countries have their own approaches to the content of religious education. Common features are cultural heritage, knowledge of different religion and ethical understanding.

What is the meaning of life? An empirical study on Finnish gifted pre-adolescents
Martin Ubani, University of Helsinki, Finland

The aim of this paper is to report the empirical results on the study on gifted pre-adolescents' perceptions on the meaning of life. The participants of the study are Finnish 6th grade elementary school students. From the total of 102 students twenty-six were chosen to be interviewed according to their scores in the self-evaluation test of spiritual sensitivity. Seventeen participants were girls and boys who got high scores in the test. Nine of the participants were girls and boys with a low score. The interviews took place in November 2003. The interviews followed the outline of the test. The aims of this study can be summed up as follows. Firstly, the goal of this paper is to describe the differences in the perceptions of meaning of life between high and low-score students. Meaning of life seems to have elements of given and personal choice. While the low-score pupils seemed to deny the given quality of the meaning of life, the high-score students included it in their understanding of the meaning of life. The second goal of this study is to describe the nature of the meanings given to life. The qualities of the life meanings can be described as 'referential', 'relational' and 'realisational'. Firstly, life meanings referred to things such as symbol, a story, or even a previous experience which are used as a narration for understanding different aspects of life. Secondly, life constituted a whole where different actors relate to each other. The third quality of the life meanings was realisational. It signifies not just the progress towards the fulfilment of things but also the 'becoming' of events

from potential to actual that is realised in life. The approach of the study is narrative phenomenological. The analysis of the data has been modified from Giorgi's (1985) descriptive phenomenological analysis.

Teacher educators and moral education
Hanke Leeuw, Vrije Universiteit, Netherlands
Martijn Willemse, Vrije Universiteit, Netherlands
Mieke Lunenberg, Vrije Universiteit, Netherlands
Jos Beishuizen, Vrije Universiteit, Netherlands
Fred Korthagen, Utrecht University, Netherlands

This paper will present two studies on teacher educators and moral education. Teacher educators are responsible for the moral education of their student teachers and – albeit indirectly – for the moral education of the student teachers' future pupils. Thus, moral education in teacher education consists of two layers. A powerful method for both layers to support the learning process of student teachers with regard to moral education is the example teacher educators set in their teaching. Student teachers' learning from this modeling will be most effective if teacher educators make the values that underlie their teaching explicit. Research shows that this is often not the case. The first study we report on focuses on supporting teacher educators in one teacher education institute in their efforts to make their values explicit. The study concluded that the values of the participating teacher educators are diverse and that moral education is a largely unplanned process among individual teacher educators. The second study focuses on a group of teacher educators, also working in one teacher education institute, who receive support in reaching consensus about shared values. This could provide an explicit and shared base for moral education in their teacher education practices. This approach is expected to improve the learning process of student teachers with regard to moral education.

Paper Presentation
Mathematics Education

TOOLS AND APPROACHES FOR MATHEMATICS LEARNING

Chair: Karl-Heinz Pogner, Copenhagen Business School, Denmark

Active engagement in mathematical learning in the context of new technology
Mary Coupland, University of Technology, Sydney, Australia
Kate Crawford, Australian Technology Park, Australia

In the context of a study of first year university students using computer algebra systems (CAS) for the first time we investigated students' responses to their experience with CAS as part of their mathematics subjects. We identified four components of initial experiences with CAS and we found that there were interesting interactions between these components and approaches to study as assessed by existing questionnaires, especially when levels of computer experience were included. Implications for learning in with new tools are illuminated when an Activity Theory perspective is taken. The importance of purpose in forming goals for activity is highlighted.

Mathematics in my Fingertips
Nuno Santos, University of Lisbon, Research Centre of Education, Portugal
Margarida Cesar, university of Lisbon, Research Centre of Education, Portugal

Changes in SEN students' instruction influenced the teacher's role and his/her practices (Freire & Cesar, 2002). The demand is based on these pupils' inclusion in regular classes, reflecting that learning is also a social process (Ainscow, 1991, 1999). New challenges emerged. Without the connection between SEN pupils and their peers, the inclusion process wouldn't be possible (Corbett & Slee, 2000). This connection is teachers' responsibility. Teachers need to develop new strategies, allowing SEN pupils to experience real opportunities of academic achievement and creating relationships based upon collaboration (Cesar, 2003). This research integrates a project, Interaction and Knowledge, which main goal is studying and implementing collaborative work in classrooms to promote inclusion (Cesar, 2003). The project has two levels: (1) quasi experimental level where different types of dy-

ads are studied; (2) action-research level, in which teachers implement dyad work in their classes. This work belongs to the action-research level. It uses a qualitative approach based on ethnographic methods. The participants are two 7th graders classes working collaboratively since the beginning of the school year. Participant observation, questionnaires, interviews, students' protocols and several materials were used as data collection instruments. The analyses of the data collected illuminated that all pupils were engaged and persistent while solving the mathematical tasks, developing with their peers a relationship based upon collaboration. This contributed for a better inclusion process of SEN pupils as they were sharing the same activities with their peers, actively participating in the classroom. Their mathematical performances also improved when we compare the school year' beginning with its end. They showed a better understanding in subjects such as symmetries, fractions and data organization and representation. Teachers and researchers also realised that students can learn Mathematics using their eyes or their fingertips.

How to create a new tension between in school mathematics and everyday-life knowledge with its incorporated mathematics
Cinzia Bonotto, University Of Padova, Italy

In common teaching practice the habit of connecting mathematics classroom activities with everyday-life experience is still substantially delegated to word problems. However, besides representing the interplay between in- and out-of-school contexts, word problems are often the only example providing students with a basic sense experience in mathematization, especially mathematical modeling. During the past decades, a growing body of empirical research has documented that the practice of word problem solving in school mathematics promotes in students the exclusion of realistic considerations and a suspension of sense-making, and rarely reaches the idea of mathematical modeling and mathematization. If we wish to establish situations of realistic mathematical modeling changes must be made. In particular, the type of activity used to create an interplay between mathematics classroom activities must be replaced with more realistic and less stereotyped problem situations. This can be implemented in the classroom, for example, by encouraging children to analyze some 'mathematical facts' embedded in appropriate 'cultural artifacts'; in this way we can create a new tension between school mathematics and everyday-life knowledge with its incorporated mathematics. The quasi-experimental study presented in this paper involves a teaching experiment based on a sequence of classroom activities in upper elementary school in order i) to extend students' capacity to calculate from base 10 to base 12, 24 or 60, ii) to develop the

concept of equivalence between time intervals expressed in different ways (days, hours, minutes), iii) to introduce informally the concept of fractions. In this case the cultural artifact used is a weekly TV guide issued as a supplement of a well-known magazine. The classroom activities are also based on the use of interactive teaching methods and the introduction of new socio-mathematical norms in an attempt to create a teaching/learning environment focused on fostering a mindful approach toward realistic mathematical modeling.

Effective schools and effective teaching in mathematics
Constantinos Papanastasiou, University of Cyprus, Cyprus

The TIMSS study is the largest and most ambitious study undertaken to date by the International Association for the Evaluation of Educational Achievement. The TIMSS provides a tool for investigating students' achievement and school effectiveness, taking into account the varying influences of instructional contexts and practices and home environment. Schools vary in terms of average student mathematics achievement. Thus it is of great interest for policy makers worldwide to identify factors that distinguish higher performing schools from lower performing schools. The aim of the analysis was to find indicators related to school that differentiate between these two groups of schools. For this study a more effective school is one where the school achievement score is higher than the score that would be predicted from the student characteristics. Data were obtained from 3116 students, which represented about 31.8% of the entire population (9786) were included in the analysis. Analysis of the differences between the predicted and achieved scores led to an identification of schools that perform better than would be expected given the home circumstances of their students. From this analysis five factors were found to be the reasons for school differences in mathematics achievement. The first factor which gives the greatest differences between the more effective and less effective is that of passive or not passive learning. The second one is related to self-feelings. The third factor that distinguishes the more from the less effective schools is the paper and pencil activities. Finally, the last two factors are those of student attitudes toward mathematics and the family climate-incentive.

Paper Presentation
Science Education

TECHNOLOGY BASED APPROACHES

Chair: Theodora Kyratsi, University of Cyprus, Cyprus

Promoting Argumentative Discourse: A Design-Based Implementation and Refinement of an Astronomy Multimedia Curriculum, Assessment Model, and Learning Environment
Gita Taasoobshirazi, University of Georgia, United States

Astronomy Village®: Investigating the Universe™ is a software program developed by NASA's Classroom of the Future (COTF). It is designed to engage students in inquiry-based learning and scientific argumentation through authentic investigations and simulations. In this regard, the software is representative of quite a few multimedia science programs developed in the last decade. To supplement the already existing software package, a curriculum and three levels of assessment (quizzes, exam, and test) were designed and administered to students during a 20 hour/four-week implementation. Students worked in groups during two levels of the assessments (quizzes and exam) to engage in argumentative discourse. Due to the difficulties in engaging students in quality argumentation, the implementation was examined for ways to improve the curriculum, assessments, and learning environment to further support argumentative discourse. Three main questions guided this study: 1) What is argumentation? 2) Why is it important? and 3) How can students' argumentation skills be developed? This paper first considers the prior research on the value of scientific argumentation and the challenges involved in supporting it. Furthermore, a description of the design-based methods guiding this study, the Astronomy Village learning environment, and the curriculum and assessment materials are provided. Then, an analysis of the argumentation of two groups of students in the classroom, as well as a description of the overall classroom learning gains on the exam and test are provided. Finally, the lessons learned indicate that the support for further teacher facilitation, detailed argumentation review routine steps that help structure students' arguments and introduce the terms of argumentation, the development of video rubric examples, adjustment of the quizzes and exam to the students' academic level, formation of groups of optimal size, as well as a cur-

riculum that can help students gain the needed background knowledge would help students improve their argumentative discourse.

Science on the Internet. Are websites supporting communication as a way to learn science?

Isabel Chagas, Centre for Educational Research and Department of, Portugal
Maria Joao Horta, General Board for Vocational Training, Ministry of, Portugal
Santos Luis, General Board for Innovation and Curriculum Develo, Portugal
Mauricia Oliveira, Centre for Educational Research and Department of, Portugal
Adelaide Teixeira, Polytechnic Institute of Portalegre, Portugal, Portugal
Alice Rodrigues, Centre for Educational Research and Department of, Portugal
Carolina Carvalho, Centre for Educational Research and Department of, Portugal,
Fernando Rebola, Polytechnic Institute of Portalegre, Portugal, Portugal
Paula Serra, General Board for Innovation and Curriculum Develo, Portugal

This study is part of a wider research project underdevelopment on communication as a way to teach science critically and integrates a set of parallel studies aiming at defining the state of the art about how communication is perceived and implemented as a vehicle to teach and learn science in Portuguese classrooms. Centred on the website as a tool that generates learning environments where communication plays both relevant and innovative roles with implications in teaching and learning, the purposes of the study were: i) to describe how communication is approached as a science teaching tool; ii) to elucidate about how Internet communication tools are explored in order to promote science learning. Thirty websites with science content were analysed from a pool of 45 presently available that have been published by both teachers and pupils in 1-12 schools. A specific checklist was developed as a guide for the analysis. Two researchers individually analysed the websites followed by confirmation and discussion by the entire research team. The websites usually outline a school science project and display some of the activities developed under each project. In general attention is given to science content, and many are wealthy in factual descriptions about a certain topic, however few indications are given about who created the contents and how these were produced. Few sites enable interactivity with the visitor, presenting the email as the only tool available. The data show an almost absence of concern about communication as one of the processes inherent to science and as a facilitator to learning science. A discussion of the study's results leads to a definition of future studies and a set of recommendations about using the Internet as a generator of interaction rich learning environments promoting communication as an essential element to teach an learn science.

The effects of real and virtual laboratory experimentation on students' conceptual understanding of electric circuits

Zacharias Zacharia, University of Cyprus, Cyprus
Maria Evagorou, University of Cyprus, Cyprus

The purpose of this study was to investigate the effect of Virtual Laboratory Experimentation (VLE) - use of virtual apparatus and material to conduct an experiment on a computer - and Real Laboratory Experimentation (RLE) - use of real apparatus and material to conduct an experiment in a laboratory - on undergraduate student teachers' understanding of electric circuits. A pre-post comparison study design was used for this purpose that involved an experimental (45 students) and a control group (43 students). Both groups used the same instructional method (inquiry) and instructional material (Physics by Inquiry: McDermott, 1996). However, participants in the control group used RLE to conduct the study's experiments in a physics laboratory, whereas, participants in the experimental group used VLE to conduct the same experiments on a computer. Conceptual tests were administered to assess students' understanding of electric circuits both before and after the study. Results indicated that both the use of VLE and the use of RLE improved students' conceptual understanding. However, the use of VLE appeared to enhance students' conceptual understanding more than the use of RLE.

Science via Technology: Middle School Students' Conceptual Change Processes of Physics Concepts relating to Flight

Haim Eshach, Ben Gurion University, Israel
Mushiev David, Ben Gurion University, Israel

The current research aims at evaluating how pupils learn physics concepts through technology. More specifically, through designing, building, and evaluating simple aircraft models. We investigated an innovative teaching method, which comprises two teaching sequences: an investigate-and-redesign (I&R) and a design-and-technology (D&T) sequences. The Flying Towards Physics - a 6-day course, which lasted about overall 30 hours, was developed. The course contains the following phases: a) relating to an aircraft by either D&T or I&R sequences; b) conducting experiments relating to the physics principal relevant to the aircraft; c) redesigning and rebuilding the aircraft by applying the knowledge gained in previous phases; and d) discussing in a group about the connections between the aircrafts and their physics. Particularly, our aim was to examine how pupils use physics concepts to explain the underlying physics principle of aircraft models before and after the

course. Seventeen 9th grade students participated in the course. Three question-
naires were developed. It was found that a) in the pretest students provided Aircraft
Fact-Based explanation – these are explanations of how the aircraft works based on
facts about, shape and structure, and physical characteristics only with no further
explanations. In addition, in the pretest students' knowledge was not coherent but
rather in pieces. In the posttest, however, most students showed a deeper level of
understanding. The students gained deep and coherent understanding of the aircraft
they learned about. They employed well the physics principles they learned in their
explanations of the different aircrafts. Many students described or pointed out, in
their posttest, that their experiences with the aircrafts they built helped them un-
derstand how they worked. Thus, the technological devices indeed assisted them to
understand and communicate their ideas. In summary, the results of this study lend
support to the idea that learning science via technology is efficient.

F 6   24 August 2005   17:00 - 18:20   Room A112

Paper Presentation

LEARNING AND COGNITIVE SCIENCE

Chair: Andreas Demetriou, University of Cyprus, Cyprus

*Measuring cognitive and metacognitive learning strategies:can the results of glo-
bal self-report questionnaires be trusted?*
Marit Samuelstuen, Norwegian University of Science and Technology, Norway
Ivar Braten, University of Oslo, Norway

We examined the criterion-related validity of the Cross-Curricular Competence
Scale (CCC) by investigating how well the obtained global strategy scores in a
sample of 271 Norwegian tenth-graders predicted strategies measured with a con-
text-specific self-report questionnaire. Additionally, as an indication of construct
validity, we examined the strength of the relationships between global and context-
specific strategy measures, respectively, and reading comprehension. Both strategy
questionnaires included items representing the strategy categories of memorization,
elaboration, transformation, and control. The participants were first administered the
CCC. Then, they read a social science text for one of three purposes: (a) prepare for
a test, (b) write a summary of the main ideas, or (c) discuss text content with peers.
Immediately after reading, all participants reported on the strategies they had used

by means of a context-related questionnaire. Additionally, the students who read in preparation for a test, were administered a test of reading comprehension. The participants' reading literacy had previously been assessed with the PISA reading tests. Criterion-related validity of the CCC strategy scale scores was examined by conducting multi-group analyses on structural equation models. The results showed modest criterion-related validity for global strategy scores based on the CCC in two of the reading purpose conditions (test purpose and discussion purpose), and a somewhat higher validity in the third condition (summary purpose). The correlations between the CCC strategy scale scores and both reading comprehension measures were weak and not statistically significant, whereas those between the context-specific strategy scores and both reading comprehension measures were positive and significant. Thus, no evidence of construct validity was obtained for the CCC scale scores, whereas good construct validity was demonstrated for the context-specific strategy scores. The modest criterion-related and construct validity of the global CCC measure question the relevance and utility of such measurements in research on students' learning strategies.

Learning about human memory by integrating theory descriptions and practice in a simulation environment.
Herman Jonker, Free University, Netherlands
Jos Beishuizen, Free University, Netherlands

A computerized learning environment (Flexible Inquiry Learning Environment; FILE) is used to allow students to conduct experiments. Students differ in the extent to which they spontaneously generate examples when they encounter concepts and principles presented in a study text. Vermunt (1992) called this habit concrete elaboration. Is it the case that more clear-cut differences emerge between high and low concretisers when students study expository texts in order to prepare for conducting experiments rather than for preparing for a comprehension text? According to the adaptation versus accumulation explanation, students high on concrete elaboration are expected to focus on the theory paragraphs of the hypertext, and are expected to quickly engage in conducting experiments. Feedback will be used to further explore the theory paragraphs of the text. Students will primarily seek evidence confirming their initial ideas about the relationships between independent and dependent variables, as collected in the initial theory interview. According to the adaptation versus accumulation explanation, students low on concrete elaboration will focus on the examples paragraphs of the expository text, and will study the text extensively, before engaging into the experimenting part of the task. According to the deductive

versus inductive learning explanation, students low on concrete elaboration will quickly start to experiment and will use feedback to further explore the examples in the text. Data collection will be carried out in February.

An intelligent tutor uses LSA for modeling ZDP
Virginie Zampa, Laco CNRS Poitiers, France
Benoit Lemaire, Leibniz-IMAG Grenoble, France

This paper presents the design and experimentation of an interactive learning schoolbook called RAFALES (Recueil Automatique Favorisant l'Acquisition d'une Langue Etrangere de Specialite). RAFALES is a digital schoolbook that autonomously chooses a sequence of texts in order to optimize the learning rate of a student in a domain-specific foreign language. Texts are chosen from a large knowledge database according to a model of the student. RAFALES, like most intelligent tutors, is composed of 3 modules: the student model, the knowledge database and the pedagogical module. The 3 modules rely on Latent Semantic Analysis (LSA). LSA can be seen as a tool for representing the meaning of words from automatic analysis of larges corpus, but LSA can also represent a cognitive model of learning. The student model and the knowledge database are 300-dimensional spaces derived from texts. The pedagogical module selects and sorts the texts that are provided to the student according to the semantic distances between the student model and the knowledge database ; thus creating a personalised and evolutive book. We consider that there exists a semantic distance that optimizes acquisition, we call it OPA (Optimal Proximity for Acquisition). Experimentations with 42 human students, 25 experts and 4 virtual students allowed us to reinforce some hypotheses. In particular, the semantic distance for which the texts are selected seems to have an impact on learning.

Supplantation of Mental Operations on Graphs
Markus Vogel, University of Education Ludwigsburg, Germany
Raimund Girwidz, University of Education Ludwigsburg, Germany
Joachim Engel, University of Education Ludwigsburg, Germany
Franz Bogner, University of Bayreuth, Germany

Research findings show difficulties younger students have in working with graphs. Higher mental operations are necessary to interpret abstract representations in an adequate way. We propose to connect a concrete representation of the modeled problem with the associated graph. The idea is to illustrate essential mental opera-

tions externally. This is called supplantation. Based on an informa-tion processing model we identify two different types of supplantation of mental operations on graphs. In an empirical study both types have been investigated. The results indicate that supplan-tation of mental operations on graphs is a useful tool to support adequate graph-interpretation.

F 7   24 August 2005   17:00 - 18:20   Room E002

Paper Presentation
Motivational, Social and Affective Processes

CHEATING AND DISRUPTIVE BEHAVIOUR

Chair: Efthymia Syngollitou, Aristotle University of Thessaloniki, Greece

The phenomenon of copying on matriculation exams among arab and jewish high school students in israel
Sliman Khawalde, Achva Academic College of Education, Israel

This comparative research deals with the attitudes of Arab and Jewish high school students in Israel towards the phenomenon of copying on the matriculation exams. It deals with the causes, ramifications and strategies for coping with the phenomenon. The study was based on quantitative analysis. The research tool was a questionnaire. The sample was randomly chosen. The sample population was 400 teachers college students from different geographical areas of the country. Half of the students were Jews and half were Arabs; 75 percent were female and 25 percent were male. The findings support the impression that the phenomenon of copying on matriculation exams exists in the Arab and the Jewish education systems, accompanied by leniency. Other findings include:
a. Approximately 25% of the participants admitted to copying on the matriculation exams themselves.
b. The factors considered to effect copying the most were fear of failure among the Jews and psycho-social pressure of parents among the Arabs.
c. Changing the assessment system to the giving of grades is the preferred way of coping with the phenomenon according to the participants.
d. 60% of the participants put the blame on the Ministry of Education.
The educational and social significance of this research is its contribution to the recommendation of measures to be taken against this phenomenon:

1. The study will investigate the parameters of the problem, its causes and ramifications and stimulate the taking of measures to eradicate the phenomenon from the source.

2. The study will investigate answers to the questions concerning the connection between cheating and plagiarism and social values, such as decency and honesty, in Israeli society.

Cheating and effort as two opposing achievement-related behaviors:
Nicole Husemann, Max-Planck-Institute for Human Development, Germany
Ulrich Trautwein, Max-Planck-Institute for Human Development, Germany
Oliver Luedtke, Max-Planck-Institute for Human Development, Germany

Cheating and effort are both achievement-related, but opposing behaviors of high everyday relevance for teaching and learning in schools. Research shows that both variables are affected by characteristics of the person as well as features of the classroom. Whereas the former are relatively stable across situations, classroom characteristics can be very different across school subjects. The focus of the present study was therefore to investigate the distinct effects of both levels within a comprehensive, multilevel framework. We collected responses from 591 high school students (grade 8 and 10) concerning six school subjects (mathematics, English, German, biology, history, and physics). For each of these subjects, cheating, effort, achievement, and characteristics of the learning environment (classroom goal structures; teaching style) were assessed. Additionally, at the student level, measures for conscientiousness, cognitive ability, parent behavior, and peers were administered. Multilevel analyses were conducted with students as the second-level units and the six subjects as the first-level units. Cheating was a more stable behavior across school subjects than effort, and cheating and effort were reversely related to most predictor variables. Regarding predictors that vary between school subjects, students who perceived a particular classroom as mastery oriented reported cheating less and working harder. Conversely, perceiving a classroom as performance oriented or excessively demanding was associated with more cheating and less effort. Student-level factors also showed opposing effects on effort and cheating: conscientious individuals reported working harder and cheating less. Peer acceptance of cheating facilitated students' own cheating, and supportive parent behavior was related to enhanced effort. In the discussion, we emphasize the value of a multilevel framework in research on the effects of different learning environments on student motivation.

Power and control in the classroom: understanding students' disruptive behaviours
Isabel Neves, University of Lisbon, Portugal
Preciosa Silva, University of Lisbon, Portugal

The study is part of a broader research focused on students' disruptive behaviours and which uses a sociological approach to understand the relation between those behaviours and teachers' pedagogic practices and to find out reasons underlying that relation. Bernstein's theory of pedagogic discourse gave the concepts of classification (power) and framing (control) to characterise the instructional and the regulative contexts of the pedagogic practice and the concepts of specific coding orientation and socio-affective dispositions to interpret the meaning of disruptive behaviours. The paper centres on the following objectives: (1) analyse students' behaviours in terms of the interaction between their socio-affective dispositions and their specific coding orientation for power and control relations that characterise the regulative context of teachers' pedagogic practices; (2) analyse the extent to which specificities of the interaction may explain different levels of disruptive behaviours. The sample was made up of two classes of the 6th year of schooling (ages 11-12) and respective science teachers. This study centres on five students who had showed different behaviours (three from one class and two from the other). Observation of science lessons of the two school classes and questionnaires and interviews made to the students provided the data for the analyses. These analyses followed a comprehensive/interpretative methodological approach. The study suggests that disruptive behaviours in the classroom are the result of the interaction between students' specific coding orientation to control relations, that characterise the teacher's regulative practice, and their socio-affective dispositions to that practice. It also suggests that distinct specific coding orientations to power relations between teacher and students may explain distinct levels of disruptive behaviours. The study may contribute to improve effective learning environments for it suggests a sociological model for analysing the relation between teachers' pedagogic practice and students' disruptive behaviours that may help teachers to prevent these behaviours.

Perceived cognitive competence, perceived relevance of schoolwork and the normative belief that going against school norms increases peer status as predictors of disruptive behaviour in the classroom.
Edvin Bru, University of Stavanger, Norway

This paper examines the relationships of pupils' on-task-orientation at school and

their opposition to teachers with perceived cognitive competence, perceived relevance of schoolwork, and the belief that going against school norms increases peer status. The study was conducted as a survey among a national representative sample of 3834 pupils in years 6 and 9 who were attending Norwegian schools. This investigation is conducted within a motivational psychological theoretical framework. The results indicate that low perceived cognitive competence, perceived low relevance of schoolwork and the belief that norm-breaking behaviour elicits peer approval all increase the likelihood and incidence of off-task-behaviour and opposition towards teachers. Results also suggest a tendency for perceived cognitive competence and perceived relevance of schoolwork to be more important predictors of on-task orientation than of opposition to teachers, whereas the belief that breaking school norms increases peer status seems to be a more important risk factor for opposition to teachers than for off-task-orientation. Although the present study is a cross sectional study, and, thus conclusions that imply causal premises must be made with caution, it may be relevant to point to some practical implications. Results suggest that in order to increase on-task orientation as well as to reduce opposition to teachers, it is, as emphasized within motivational psychology, important to focus on stimulating the anticipation of success among all pupil. Moreover, in secondary schools, at least in Norway, efforts to help pupils discover the relevance of school subject may be of key importance. Finally, especially to prevent oppositional behaviour among pupils more attention should directed towards preventing negative peer influence and building pro school norms among pupils. This would probably require an increased focus on the social dimension of the learning environment.

F 8   24 August 2005   17:00 - 18:20   Room A008

Paper Presentation
Motivation

MOTIVATIONAL ASPECTS IN HIGHER EDUCATION

Chair: Elbers E.P.J.M, University of Utrecht, Netherlands

The philosophical foundations of educational psychology: Correcting misunderstandings about learning and motivation
Richard Walker, University of Sydney, Australia
Graham Hendry, University of Sydney, Australia

This paper takes as its starting point epistemological classifications of theories of learning and motivation by Greeno, Collins and Resnick (1996) and McCaslin and Hickey (2001) respectively. These classifications are found to be wanting in two main respects. Firstly, it is argued that Greeno et al's classification of constructivist theories of learning as rationalist is incorrect. Secondly, it is likewise argued that McCaslin and Hickey's claim that contemporary theories of motivation can be classified as rationalist is also incorrect. In this paper we refine an understanding of the rationalist epistemology by elaborating on Kantian philosophy, and we discuss possibilities for an alternate classification of learning and motivation theories capable of including constructivist, sociocultural and cognitive-motivational perspectives.

An action research approach to identify motivational factors in shaping teacher identity
Maria Cardelle Elawar, Arizona State University West, United States
Maria Luisa Sanz de Acedo Lizarraga, Universidad Publica de Navarra, Spain
Leslie Irwin, Arizona State University West, United States

This cross-cultural study explores motivational factors that influence teachers' identity. We posed three research questions: (1) How did the participants construct their views of themselves to become teachers? (2) How did their constructed views reflect historical, social-cultural, political, and educational contexts? (3) How did teachers create awareness of their motivation in shaping their identity to continue to teach? The sample included 530 teachers (from three cultures) engaged in action research following a dialogic retrospection approach based on metacognitive-self-regulated narrative-inquiry process. This process can lead to the experience of teacher praxis, a cycle of action-reflection-new action that may transform the teachers' experience of their educational world. Participants followed an interview protocol in pairs where they asked each other a series of questions related to their choice of teaching as a profession. Meaningful descriptive narratives summarizing the interview results were analyzed for generative themes. A comparison of the outcomes of the theme analyses indicates the important role of teachers to elicit the voices of their partners. During a debriefing, the majority of participants agreed that eliciting voices helped them to create deepen understanding of their past experiences in becoming teachers and in continuing to teach. Participants value the importance of listening to one another's thoughts and it assisted them in solidifying their own beliefs about becoming teachers. Implications for teaching and research are discussed with reference to metacognitive self-regulatory practices.

Tracking changes in academic motivation over the college years
Bodil Stokke Olaussen, University of Oslo, Norway
Ivar Braten, University of Oslo, Norway

We examined the motivational development of 78 student nurses over the college years, using a longitudinal cluster-analytic approach to discover patterns of motivational beliefs as well as changes in those patterns over time. As clustering measures, we used self-reports of personal interest, mastery goals, task value, and self-efficacy. We used strategy measures of rehearsal, elaboration, and metacognition, respectively, as external criterion variables to validate differences among resulting profiles. A three-cluster solution was appropriate for the first-year motivation data, as well as for the second- and third-year data. We labelled the clusters the positive motivation, moderate motivation, and low profile clusters. The strategy measures validated this cluster solution. To examine the changes that occurred in individual students across two years of nursing education, we tracked the movement of all the students from the first to the second year, and then from the second to the third year, in terms of their cluster membership. Many students who started out with much enthusiasm and engagement decreased in adaptive motivation over the college years, with only 10 of the 39 students described as positively motivated at the outset still positively motivated after two years. This negative trend was most pronounced during the first year, when quite a few moderately motivated students also lost some of their motivation. However, from the second to the third year positive trends were also detected, with many students belonging to either the moderate motivation or the low profile cluster developing more adaptive motivation. This suggests that it may be especially important to take instructional measures that can counteract decline in adaptive motivation during the first year of students' college career.

Motivational structure and implicit motives of future teachers
Iva Stuchlikova, University of South Bohemia, Czech Republic

The aim of the study is to compare motivational peculiarities of prospective elementary and secondary school teachers. As the differences can be both implicit and explicit, the study combines two approaches to motivation – the implicit motives and goal orientation. The implicit motives of achievement, afiliation and power were measured by short version of Multi Motive Grid – MMG (Sokolowski, Schmalt, Langens, & Puca, 2000). The goal-triggered motivation is operationalized by Personal Concerns Inventory (Cox, 2002) which is simpler version of Motivational Structure Questionnaire (MSQ). The questionnaire provides indices

describing the typical goal striving pattern of the subject. Subjects were teacher training college students - 82 prospective elementary school teachers, 94 prospective secondary school teachers, the age range was 17-34. Differences in stylistic aspects of goal striving patterns and in achievement, affiliation and power motives were assessed by MANOVA, where prospective type of school served as between subjects factor. The results indicate that there are some differences in motivational structure of elementary and secondary school prospective teachers. Elementarists described generally more interpersonal goals, paid greater attention to health living style goals (e.g. like mental and physical health, spiritual matters, home matters, free time activities, etc.). They differ from secondary school prospective teachers also in their greater positive emotional satisfaction when reaching the goals, and also in their greater commitments to their personal goals in the given lifetime. The findings could indicate, among other things, that these subjects feel more adhered to their professional perspective. The implicit motives did not differ for the two groups of subjects except of the strength of affiliation motive, which is stronger for elementary school future teachers. The results support the idea that the prospective elementarist and secondary teachers differ in their (at least) starting professional motivations.

F 9   24 August 2005   17:00 - 18:20   Room A107

Paper Presentation

PARENTAL INVOLVEMENT IN LEARNING

Chair: Marold Wosnitza, University of Koblenz-Landau & PH Heidelberg, Germany

Teacher perceptions of complaints from parents
Elsa Westergard, Stavanger University College,, Norway

The Norwegian government places a strong emphasis on teachers establishing a constructive partnership with their pupils' parents. It was therefore disappointing that our previous research showed at least ten per cent of parents reporting a significant level of disillusionment with their child's school (Westergard and Galloway, 2004). The present paper addresses two questions arising from the earlier research: 1) Are teachers likely to recognise parents' feelings of disillusionment with the relationship? 2) Are classroom level variables and teachers' general feelings of job

satisfaction linked to their perceptions of parental disillusionment? The research is based on a national survey in Norway in which data were collected from a representative sample of 124 teachers in 20 schools in nine municipalities. In the previous research, mentioned above, an instrument was produced to obtain information about parents' disillusionment with school. In the present study this instrument was adapted to obtain information about teachers' perceptions of complaints from parents. We found significant differences between teachers' perceptions of parental disillusionment and the level actually reported by parents. The overall picture is that teachers thought that fewer parents were disillusioned than was actually the case. Multiple regression analysis revealed that twenty per cent of the variance in teachers' perceptions of parental disillusionment was explained by class level or job satisfaction variables.

There are several reasons why teachers may regard fewer parents as disillusioned than is actually the case. Parents' anxiety and stress when talking to the teachers and teachers' lack of training for dealing with potentially difficult interviews with parents are possible reasons to consider. Future research could usefully focus on case studies of interactions between parents and teachers in potentially difficult situations. It is also possible that future research should investigate the contribution of school level variables.

What do parents learn with and through their children's schooling?
Alex Pomson, Hebrew University, Israel

This paper examines if and how parents are changed by direct and indirect interactions with their Children's schools. It takes up an emerging strain of research that has begun to examine parent involvement in schools not only in terms of the consequences for Children's learning but also in relation to benefits in parents' own lives. The paper draws on data from a study of the interactions between a sample of thirty families and four different Jewish elementary schools in Centreville, a pseudonymous mid-west American city. It examines the data collected in relation to the conceptual frames employed by Bolman and Deal to analyze organizational life: the structural, human-resource, political and symbolic. The paper finds that schools influence parents in three primary ways: through fellowship, information and inspiration, and enculturation. Each of these affects, it is found, can disturb the equilibrium of parents' lives in ways that they choose to embrace or avoid. The paper's final section explores the implications and relevance of these outcomes for parents with children in public and non-sectarian schools. These implications are examined in terms of (small) schools as possible havens for the members of minor-

ity communities, and as places of second chance for adults with previously disappointing experiences of schooling.

Parents' Questions and Children's Ideas: An explanatory link?
Jill Hohenstein, King's College London, United Kingdom
Maureen Callanan, University of California, Santa Cruz, United States
Doris Ash, University of California, Santa Cruz, United States

This study aims to test whether there is any relationship between questioning behaviour in parent-child interaction and Children's conceptual and motivational development. Though previous research has shown interesting patterns in parent-child conversation in informal learning situations (e.g., Crowley et al., 2001) and Children's cognitive development has been studied in myriad ways, relatively few studies have sought to identify direct connections between child learning and likely learning environments. In this investigation, family conversation was videotaped at four marine science centre exhibits. Immediately following the family's science centre visit, 6- to 12-year-old child participants were interviewed to assess self-identified learning, interest in learning more, and ideas about science. Coding of family conversation questioning involved two factors: Content and Function. Content refers to the type of information requested (e.g., fact, cause) whereas function refers to amount of response required (e.g., right-answer, open-ended). There was little difference among families with regard to the type of questions they used. However, children who were exposed to a higher percentage of open-ended questions displayed more complex understandings of science, and higher amounts of learning than did children exposed to relatively fewer open-ended questions. In addition, children who showed relatively high amounts of learning and who showed interest in causal phenomena were likely to hear fact-type questions more often than other children. The results do not show a causal link between child-directed adult speech and child cognitive development. However, further research should help to illuminate the nature of the relationship between Children's thinking and their linguistic environment.

Effects of parents' education on reading achievement among third graders in Sweden-
Eva Myrberg, Gothenburg University, Sweden
Monica Rosen, Gothenburg University, Sweden

The aim of the study is to conceptualise and concretise the influence of parents' edu-

cational level on students' reading achievement scores. Data comes from the Swedish participation in PIRLS 2001 conducted by the IEA and comprises some 10 000 students in grade three. The effects of parents' education on reading achievement are estimated with path analysis. The results reveal that the total effect of parents' education is substantial but that almost half of this effect is mediated through other variables i.e., the number of books at home, early literacy activities and emergent literacy at the time for school start.

F 10   24 August 2005   17:00 - 18:20   Room E003

Paper Presentation

QUALITATIVE AND QUANTITATIVE APPROACHES TO LEARNING AND INSTRUCTION

Chair: Panicos Stravrinides, University of Cyprus, Cyprus

Processing and storage functions in young Children's language comprehension: comments on the factorial validity and sensitivity of an assessment battery
Elisavet Chrysochoou, Aristotle University of Thessaloniki, Greece
Zoe Bablekou, Aristotle University of Thessaloniki, Greece

Children's language comprehension abilities have been thoroughly investigated in relation to vocabulary, reading, grammar and meaning construction processes. Positive relationships have also been found between comprehension performance and short-term or working memory (WM) tasks. A significant amount of research has been carried out in the frame of Baddeley and Hitch's WM model (1974). With regard to language comprehension, the central executive (CE) of the model is assumed to be involved in syntactic and semantic processing and in storing the products. The contribution of the phonological loop (PL) component limits itself in maintaining a phonological record that can be consulted during off-line processing. One hundred and eighty children, divided into three groups (C.A. 5:7, 7:7 and 9:7 yrs respectively), participated in the present study. Our aim was to shed some further light on the storage and processing functions considered to be involved in young Children's listening comprehension. A relevant assessment battery was devised by translating from English to Greek and adapting tasks that tap storage and processing functions attributed to the PL and the CE. The functions in question are considered to be involved in language comprehension. Oral and/ or visual presentation of ma-

terials allowed the assessment of the two youngest age groups and eliminated the interference deriving from reading-related processes. Principal component analysis extracted three factors, which explained a significant amount of the total variance. The functions reflected in the scores were investigated to allow factors' identification. They seemed to differ on the demands placed for concurrent storage and processing. Findings are consistent with theoretical suggestions and research findings concerning PL and CE functions and their contribution to language comprehension. They also strongly indicate the construct validity and the sensitivity of the assessment battery in relation to age-related differences. Further research is suggested and educational implications are indicated.

The analysis of semantic networks on humor
Leo Guertler, School for Education, University of Tubingen, Germany

This study aims to show methods of investigation and analysis to reconstruct semantic networks withing the research program of subjective theories (RPST, Groeben & Scheele 1977). Additionally to many studies on teacher's thinking, the research tries to work with students within a group inquiry setting. The sample consists of N = 208 German students in Realschule (m = 123, f = 85). The analysis tries to evaluate the structural data on deviation from random (OMNIBUS test) to legitimate further content specific analyses. Power set count is used to identify core structures within the subjective structures on humor. This nomothetic approach results in more global semantic networks called modal structures. Humor in the classroom was chosen as an topic with increasing relevance in teaching processes. An altered version of the Heidelberger Struktur-Lege Technik (= H-SLT, group inquiry, using context relevant language, finite item pool, paper-and-pencil solution) was chosen as research instrument. Results show a high significance against random (31 s difference). The modal-structure consists mostly of two-digit semantic propositions. It can be shown that less than 5% of all propositions can describe over 50% of all empirical frequencies of propositions. A detailed exploration demonstrates the importance of humor in the classroom. The structure differentiates (e.g. teacher and power, humor leads to joy) various parts from each other. The discussion evaluates the advantages of (1) the altered version of the H-SLT, (2) the OMNIBUS-test, and (3) the power set count to investigate structural as well as content aspects. It will be argued that for research in learning and instruction, this is an effective approach to investigate student's as well as teacher's thinking on educational topics.

A first-grade mediational intervention program
Schiff Rachel, Bar-Ilan University, Israel
Varda Rosental, Bar-Ilan University, Israel

First grader teacher-pupil interactions are formative in the pupils' acquisition of both school learning behaviors and the acquisition of reading skills. The current research focuses on a first grade reading intervention program. The intervention program analyzes and mediates both how reading is taught and the cognitive, emotional and behavioral factors which affect first graders' successful mastery of reading. The study investigated the differential effects of three intervention programs for first grade teachers on their pupils' achievement on language and reading tasks. The study also examined the relative contribution of intelligence, language ability, type of intervention, and differences in beginning and end of year language ability on reading achievement results. Results showed that whereas phonological task results were highest for the methods and metacognition intervention program, the mediational approach group showed higher scores in the morphological task, showed fewer mistakes when reading both meaningful and nonce words; they had better reader fluency and higher reading comprehension scores. The results of the first hierarchical regression analysis showed the relative contribution of the mediational intervention on reading tasks. The study also analyzed the differential qualitative effects of the various intervention programs on the teacher's classroom behavior. These results show marked changes in the teacher performance and attitude. This study demonstrates the significant educational contribution of the mediational approach. Mediational instruction, not only facilitates classroom management practices, changes teacher attitudes, and improves achievement, mediational instruction, but also helps pupils transfer and apply content material knowledge and learning strategies to other domains.

Predicting achievement in a research methods course
Elena Papanastasiou, Intercollege, Cyprus, Cyprus
Emily Kosta, University of Cyprus, Cyprus
Savvas Trichas, University of Cyprus, Cyprus
Savvas Nicolaou, University of Cyprus, Cyprus
Themis Panagiotou, University of Cyprus, Cyprus

Although numerous studies have examined issues related to statistics attitudes and anxiety very little research has specifically examined where students stand in relation to research methods courses, and what are the factors that can predict the

student's achievement in such courses. Therefore, the purpose of this study is to try to predict the achievement levels of students who are taking a research methods course based on their background variables, their prior achievement, as well as their attitudes towards such a course. Such knowledge can help guide instructors with their teaching practices so that they can help their students overcome possible obstacles to their learning. The results of this study have found that prior achievement and various types of anxiety are the types of variables that have an effect on student achievement. However, the student's attitudes as well as their background variables were not significant in predicting their final course achievement.

F 11   24 August 2005   17:00 - 18:20   Room E004

Paper Presentation

SPECIAL EDUCATION

Chair: Nave Maslovaty, Bar Ilan University, Israel

Is the failure to subitize an index of dyscalculia in young children?
Robert Reeve, University of Melbourne, Australia
Fiona Reynolds, University of Melbourne, Australia
Brian Butterworth, University College London, United Kingdom

When adults and children count the dots in a visual array, they enumerate small arrays (up to n < 4 dots) quickly and accurately but are slower and more error prone in enumerating larger arrays. The automaticity in enumerating small arrays has been termed subitizing. Clinical studies show that children (and adults) who are unable to subitize small numbers of dots, but count them instead, suffer from quantitative processing deficits. We assessed the subitizing, general cognitive (spatial memory, digit span, and reading comprehension) and mathematical abilities (transcoding, mental addition and estimation skills) of 230 6-year-olds to investigate the relationship between the failure to subitize, subitizing speed, and general cognitive and mathematical competencies. We expected that subitizing speed would be related to performance on the mathematical tasks, and that non-subitizers would exhibit poor unitizing knowledge on the three mathematics tasks. A mixture modelling techniques was used to classify Children's reaction times for 1 to 6 dots in the subitizing task and revealed evidence for two distinct reaction time distributions (fast subitizers and slow subitizers). Video-tape analysis revealed that 8% of the slow subitiz-

ing group never subitized but counted dots instead (non-subitizing group). Subsequent analyses explored the relationship between subitizing group membership and performance on the general cognitive and the mathematical tasks. On average children in the three subitizing group performed equally well on the general cognitive measures, but differed substantially on the three mathematical tasks. The slow subitizers performed less well on the three tasks than the fast subitizers; however, their patterns of strategy-use were similar, implying a developmental delay for the slow subitizers. The non-subitizers, in contrast, exhibited performance patterns on the mathematics tasks consistent with poor unitizing skills, implying a development deficit. The findings suggest that mathematical difficulties can be identified in children earlier than previously thought possible

Teaching reading comprehension strategies to students with learning disabilities
Faye Fotini Antoniou, University of Frankfurt, Germany
Elmar Souvignier, University of Frankfurt, Germany

In order to find out, if a reading-strategy training program can advance learning competence of students with learning disabilities we assessed students in German special classrooms. An instructional program was designed and students were assessed before and after its implementation to observe if reading comprehension can be promoted and if through the maintenance of teaching reading-strategies, comprehension is enhanced in the long term. Methodology/research design: A 29-lesson program was evaluated in the half of the sample of 253 5th to 7th graders with learning disabilities from five German reinforcement schools (Lernhilfesschulen). Eleven classrooms (n=138) served as experimental groups and eight comparable classrooms (n=115) served as control groups receiving only traditional comprehension instruction. A pre-post and follow up design was used and in an academic year period all students were assessed in reading comprehension, reading-strategy knowledge, self-efficacy, reading motivation and concept of good reading. The program was taught by the special education teacher. Each was organised around a story and aimed at enhancing skilled strategy use in learning disabled students when reading a text. Four text comprehension strategies (activating prior knowledge by title observation, clarifying difficult words, making the summary of a narrative text and summarising an expository passage) and a metacognitive strategy (regulating one's own reading process) were taught through a variety of highly interactive instructional techniques. Outcome: Significant gains in favour of the experimental group were observed on the reading comprehension and reading strategies knowledge tests. Results demonstrated not only immediate positive effects but also gains in the

long term. Theoretical and educational significance of research: Reading comprehension depends on variables such as decoding skills, prior knowledge, motivation and self-perception but recent literature shows that mastery and use of good strategies is a major component that helps children with reading difficulties.

To what degree are associations between perceived learning environment and emotional and behavioural problems (EPB) influenced by students' coping styles.
Elin Thuen, University College, Norway
Edvin Bru, University College, Norway
Terje Ogden, University College, Norway

The main aim of the study was to explore to what degree associations between learning environment factors and emotional and behavioural problems (EBP) could be accounted for by individual students' coping styles. Results showed moderate associations between students' coping styles and learning environment factors, indicating that associations between learning environment factors and EBP to some degree could be reflections of students' coping styles. However, the main conclusion was that the learning environment factors accounted for a substantial amount of variance in EBP, after controlling for students' coping styles. The unique effect of these factors on variances in off-task-orientation, externalising problems and emotional problems was 22%, 13% and 4%, respectively. Off-task-orientation was most strongly associated with the meaningfulness of schoolwork and emotional support from teacher, with weaker associations to academic support from teacher and teacher monitoring. Externalising problems were most strongly related to emotional support from teacher, academic support from teacher and the meaningfulness of schoolwork. Finally, relationships between classmates were the main predictor of emotional problems.

F 12   24 August 2005   17:00 - 18:20   Room A019

Paper Presentation
Teacher Education

LEARNING TO TEACH

Chair: Jean McNiff, University of Limerick/St Mary's University College,
        Israel

Conceptions of mentoring and learning to teach in Dutch secondary student teaching
Gisbert V.M. van Ginkel, Leiden University, Netherlands
Jan Vermunt, Utrecht University, Netherlands
Nico Verloop, Leiden University, Netherlands
Douwe Beijaard, Leiden University, Netherlands

Despite 1) the influential role of school teachers as mentors in teacher education and debate about the way they approach their roles as prime supporters of student teacher learning, and 2) a growing body of literature on conceptions of educational practitioners in other domains of education, research attention for the variation in conceptions of mentoring and learning to teach amongst cooperating teachers has been scant. This paper focuses on a questionnaire study of the conceptions of mentoring and learning to teach held by cooperating teachers mentoring student teachers in Dutch secondary education student teaching. It discusses the design and results of a pilot study (N=500) in relation to the small body of research on mentoring conceptions, and in relation to research on beliefs and conceptions of teachers. The questionnaire study is part of a PhD research project aimed at describing the interrelations of beliefs, goals and actions in different conceptions of mentoring and learning to teach. The paper will also discuss the consequences of the findings in the questionnaire study for the design of a follow-up in-depth study of cooperating teachers representative of typical conceptions of mentoring and learning to teach.

Contextual zooming(s) on Learning to Teach
Loucia Constantinou, Michigan State University, United States

In this paper I bring together two lines of literature (teaching for understanding and learning to teach) to examine the nature of learning that takes place during the

internship year among three elementary teacher candidates. I focus on and analyze factors that help and/or hinder teacher candidates' learning to pay attention to students' thinking and reasoning, a teaching for understanding feature that I use to conceptually bridge the two literatures. To examine the contextual influences on learning to teach for understanding during the internship year, I present the case of one teacher candidate in more detail, by analyzing ethnographic data in which extensive videotaping was used. I end with lessons learned regarding learning to teach, as well as implications for teacher education, afforded by the conceptual bridging and the research methodology I employed.

Adaptive teaching competency – A new approach to teacher education
Matthias Baer, School of Teacher Education Zurich, Switzerland
Christian Bruehwiler, School of Teacher Education St. Gallen, Switzerland
Marion Rogalla, School of Teacher Education St. Gallen, Switzerland
Franziska Vogt, School of Teacher Education St. Gallen, Switzerland

In this quasi-experimental study the Adaptive Teaching Competency of 50 primary and secondary school teachers is examined. Adaptive Teaching Competency is defined as a teacher's ability to adapt his or her planning and performance of instruction towards the individual learning processes of students. It is the ability to constantly adjust instruction to conditions and changes in the teaching/learning situation in such a way, that student learning and understanding are deepened. At the heart of Adaptive Teaching Competency is the students' learning for understanding. To enhance Adaptive Teaching Competency the 32 experimental group teachers participated in an intervention of teacher education, which consisted of a seminar and an individual content-focused coaching in their classrooms while implementing a science unit. Control group participants followed traditional requirements of teacher in-service training. Vignettes were developed to measure the effects of the intervention on teachers' adaptive instruction planning and a video test for teachers' adaptive instruction performance. Further data was collected from students and teachers with questionnaires and knowledge tests. Results comparing the experimental group and the control group on different measurements, which were taken before and after the intervention, are presented and implications for the development of teacher education are drawn.

Student teachers' conceptions of learning to teach as revealed in the context of implementing a didactical innovation.
Vassilis Kollias, University of Thessaly, Greece
Nektarios Mamalougos, University of Athens, Greece
Panagiotis Politis, University of Thessaly, Greece

Teaching innovations often get trivialized when in the hands of unprepared teachers. On the other hand they can be revealing of the way that student teachers reflect the challenges of their profession. In this research, 24 final year students of a primary education department participated in a one-semester course on CSCL and implemented short (two hour) CSCL learning environments in 6th grade classes. The student teachers wrote accounts of their interventions based on scaffolding provided by the teacher and participated in semi-structured interviews after the completion of the interventions. The analysis of the written accounts and the final interviews reveal that students do not have an understanding of learning to teach that fits a profession but rather the development of layperson expertise. As a result student teachers do not search for lack of professional abstract knowledge that may compromise their designs and implementations, have difficulty to perceive the classroom as a place where responsibilities can be negotiated, have difficulty to perceive an abstract pedagogical knowledge that can be enriched by implementing a new didactic method. Therefore understanding learning to teach as a professional kind of expertise development may be one of those pivotal concepts (Entwistle, 2004) that are crucial in the professional development of student teachers

F 13   24 August 2005   17:00 - 18:20   Room E010

Paper Presentation
Teacher Education

WEB-ENHANCED ENVIRONMENTS

Chair: Niki Tsaggaridou, University of Cyprus, Cyprus

Developing reflective learning environments for teachers: re-thinking Schon's framework within the context of networked learning
Maria Zenios, Lancaster University, United Kingdom

This paper discusses the innovative ways in which forms of teacher professional

development such as reflective practice can be stimulated through the development of communities of practice within computer-conferences. Within the socio-cultural perspective, the paper examines Schon's framework for reflective practice which emphasises that mastery of knowledge on its own is insufficient for successful professional practice especially when various judgements and decisions in situations of ambiguity and uncertainty are required in every-day practice from professionals (Schon, 1987). These ideas are pertinent to teacher thinking as learning to teach is a complex and multi-faceted process which places demands of a cognitive and affective nature upon the learner. However, criticisms expressed on the notion of reflection in the context of initial teacher education indicate that the actual processes of professional reflection are far more complex than those proposed by Schon (Eraut, 1994). In the case of teachers, the rapid decision making of most classrooms gives no time for reflection-in-action. These ideas are explored through qualitative analyses of computer-conferencing discussions and interview transcripts. Evidence suggests that uses of computer conferencing stimulates high levels of reflection before action, after action and away from action, where action refers to time spent in the classroom during school placements. Reflection before action refers to discussing alternative ways on teaching a particular topic as part of the preparation for one's lesson. Reflection after action, in particular, refers to thinking collectively after a lesson and it helps to understand the processes of their actions. In both occasions reflection enables student teachers to construct meaning through focusing on and analysing aspects of their teaching and considering alternative ways of action.

What discourse- characteristics advance professional thinking, in a novice teachers' support forum, on the internet?
Sara Shimoni, Levinsky School of Education, Israel
Zvia Lotan, Levinsky School of Education, Israel

The study focused on identifying the discourse- characteristics that advance professional thinking in an internet, first year teachers, A-Synchronic Support- Forum (A.S.S.F). Novice teachers manifest a vast array of problems: Problems in their relationships with colleagues, parents and pupils; Anxieties about their own adjustment to the new system; Pedagogical, and logistic concerns (Regev and Sagi, 2001). A.S.S.F is known to be suited for problem solving processes in complex, ever-changing settings. It enables the participants to re-read their parts, reflect upon their words and others', plan their reactions etc. (Jonassen, 2001). The particular A.S.S.F researched, included 19 (all female) first year teachers, guided by a pedagogical instructor. Members Individual logs (I.L.) that included the problems one

presented to the group, colleagues answers and one's reaction to their answers, were isolated and compared, in order to study whether the participant showed a development in her professional thinking? And what conditions brought it about? The study showed that the nature of the problem presented by the participant, and the mode of presentation, determined whether the process of dealing with the problem in the forum would result in an advanced professional thinking. Presenting one-dimensional or ambiguous, ego oriented problems, resulted in less professional growth than presentation of multidimensional, less ambiguous and more task-oriented problems. It was surmised that once the forum is established as a safe place where one can raise real problems, members would be gradually encouraged to do in depth presentations of their problems and to clarify the problem orientation (ego vs. task), so others would be able to come out with richer modes of guiding them deal with their difficulties.

Promoting buds of professional self with questions in an internet discourse of preservice students
Michla Shahar, Levinsky College of Education, Israel

The study focused on how questions, asked by colleagues in a professional on-line, promote buds of professional self of first year pre-service students. Researches on a-synchronic textual forums on the internet indicate textual interactions in the forum can promote self expression and self-awareness (Suler, 2002; Anderson and Garrison, 2000; Hara et al, 1998). First year pre-service students, first exposed to actual school life, are extremely concentrated in themselves (Fuller, 1969). The uniqueness of this research is using questions as interactions on a-synchronic textual forum to arouse self awareness, to improve understanding relations in the environment and consciousness to different components in the field. Glaubman and Kula (1992) indicate situations of un-equilibrium as developing learner's sensitivity and his critical thinking. The current study took place in a teacher-training college experiencing a novice teacher education program, and included three stages: 1. Each week three different first year student-teachers were asked to write parts of their observation at school to the forum. 2. Their colleagues responded with questions. 3. Two weeks latter the senders rewrote their observations according to the questions. Members Individual logs (I.L.) including the personal observation presented to the group, colleagues' questions and the writer's reactions to questions, were analyzed. The researchers studied each I.L asking whether rewriting the observations showed professional growth; a better feeling concerning their status as future teachers, a wider perspective of the field, etc. The study showed that the questions asked by the

colleagues prompt the nature of the observations from ego oriented to task oriented and to a better professional identity: feelings of ambiguous identity, irrelevance in the field and little confidence turned to feelings of identity (either as a student-teacher or as a teacher), feelings of belonging and self confidence.

Co-operative learning with digital video in a hypermedia environment: a design-based research approach in teacher education

Ellen van den Berg, University of Twente, Netherlands
Anouke Bakx, Fontys University of professional education, Netherlands
Annette Thijs, University of Twente the, Netherlands
Kemmeren Christine, Edith Stein University of professional education, Netherlands
Johan Van der Sanden, Fontys University of professional education, Netherlands

This study is about the design and evaluation of new learning environment for student teachers, for the development of their social-communicative competencies. Two perspectives were taken: co-operative learning and video based learning in a hypermedia environment. Based on a literature review, design criteria for the co-operative, video based learning environment were formulated. Three video functions: (1) trigger video, (2) exemplary video, and, (3) action video. With regard to co-operative assignments, it was stated that these should be (1) conceptually complex, (2) triggering divergent thinking, (3) inviting students to interact and to discuss (getting to) their solutions, and (4) asking for the consideration of mutual perspectives. Next, educational designers developed ten prototypes based on these principles, followed by a quality expert meeting. Twelve experts critically reviewed the prototypes. All experts' suggestions and comments were analysed by two researchers, resulting in a large number of adaptations. All ten prototypes were improved. Next, the improved prototypes were integrated in a hypermedia learning environment. In the next phase, students start working with all these materials. A large-scale tryout will be arranged with 50 student teachers. The results and conclusions will be incorporated in our paper. Our presentation will contain two aspects: (1) the research, as described above, including the results and the interpretation of the results, and, (2) a demonstration will be given of the video based learning tasks in a hypermedia environment as developed in this project.

Paper Presentation

COLLABORATIVE LEARNING

Chair: Neville Bennett, University of Exeter, United Kingdom

Improving the effectiveness of pupil group work in English schools. Results from the SPRinG project
Ed Baines, Institute of Education, University of London, United Kingdom
Peter Blatchford, Institute of Education, University of London, United Kingdom
Peter Kutnick, University of Brighton, United Kingdom

The main impetus for the SPRinG (Social Pedagogic Research into Grouping) project was to address the wide gap between the potential of group work to influence learning, motivation and attitudes to learning, and behavioural interaction in the classroom, on the one hand, and the limited use of group work in schools, on the other. Pupils rarely receive training in group working, and teachers are often unsure of its benefits and place in the curriculum. The SPRinG project aimed to develop, implement and evaluate an approach to group work that could be used in primary and secondary schools. Approaches and materials were co-developed by teachers and researchers at three sites - KS1 (5-7 years) at the University of Brighton, KS2 (7-11 years) at the Institute of Education in London, and KS3 (11 – 14 years) at the University of Cambridge. This presentation will focus on analyses from KS1 and 2. The heart of the project was a year long longitudinal comparison of pupils in SPRinG and control classrooms. KS1 involved 475 pupils from 17 SPRinG and 505 pupils from 21 control classrooms and KS2 involved 849 and 1027 pupils from 32 and 40 classes in the experimental and control groups respectively. Attainment, attitudinal and motivation data were collected at the start and end of the year and interactive, behavioural and dialogic data via systematic classroom observations were collected over the year. Findings indicate differences in favour of SPRinG pupils on general and focused science attainment and behavioural interaction in the classroom most notably in terms of greater engagement, sustained interactions and higher level talk. Findings are discussed in relation to psychological theory and the potential of group work for classroom practice in terms of a new theory of social pedagogy.

Extending the cultural horizons of future teachers: The possibilities of collaborative investigation of digital case-material
Paivi Kristiina Kumpulainen, University of Oulu, Finland
Mari Puroila, University of Oulu, Finland
Merja Vanhatalo, University of Oulu, Finland
Agnieszka Eliasz, University of Oulu, Finland

The study discussed in this paper examines the potential of collaborative investigation of digital case-material to help pre-service teachers in elaborating and developing their cultural awareness of elementary mathematics education in European classrooms. Specifically, the study illuminates future teachers' construction and display of social positions towards the teaching and learning of elementary mathematics whilst they examine and reflect upon culturally rich digital case-material. In this study, the social positions constructed by the student teachers in their oral and written discourses are concieved as multiple and shifting, being shaped by the local and historical contexts of their activities (Castanheira, Dixon, Yeager & Green, 2001; Bakhtin, 1981; Hall, 1995, 1996; Wertsch, 1991; Wortham, 2000). The empirical data of the study draws on two mathematics teacher education courses that were part of a Finnish International Master of Education Programme. Altogether 37 students participated in the study. The courses, each based over nine weeks, focused upon learning and teaching of mathematics in European classrooms. The empirical data consist of video-records of students' collaborative inquiry activities with digital case material as well as of students' personal learning portfolios. The preliminary results of the study suggest that digital case material of educational practices embedded in collaborative investigations and reflections can serve as potential vehicles for revealing and elaborating future teachers' cultural horizons towards culturally and contextually responsive mathematics education. The results illuminate the ways in which the student teachers individually and collectively positioned themselves in different roles whilst discussing pedagogical practices, choices and challenges during their joint inquiry with digital cases.

Monitoring students' psychological needs and interest over time in a collaborative learning environment
Thomas Martens, University of Bremen, Germany

Previous studies revealed that learning success in collaborative learning settings at University especially in the field of teaching statistics and research methodology could be accompanied by a loss of interest and intrinsic motivation. Besides

students' traits like learning style and uncertainty tolerance that are supposed to interact with students' interest it is necessary to analyse the situational characteristics that affect students interest and how this interest is influenced by their psychological needs over time. A field experiment at the University of Bremen was conducted in four parallel courses teaching research methods in psychology in the third semester (n=104). At the beginning of the courses Learning Styles, Uncertainty Tolerance and Computer Literacy were measured. In the run of the course the Qualitiy of working in Groups Instrument (Qwigi) from Boekaerts and Minnaert (2003) was used to assess the three psychological needs sensu Deci & Ryan (perceived autonomy, perceived competency and perceived social relatedness) and interest on a weekly base. Personal feedback on the collected Qwigi-Data was given biweekly and included also a short guided group discussion of the data. The group members had the chance to reflect the learning process of the group. One course served as a control group without the application of the Qwigi (n=19). Interviews at the middle and the end of the term revealed that most group members think of the Qwigi as a useful instrument. First results of the longitudinal data show that the measurement of the perceived competency reacted most sensitive to changes of situational learning characteristics and resulted also in a delayed corresponding reaction of the other indicators. It is expected that successful group discussion about the balance of the psychological needs can enhance the self regulation of the students' motivation and result in adaptive learning behaviour preventing a substantial loss of interest.

Collaborative Learning as constructive conflict: Building shared mental models.
Piet Van den Bossche, Maastricht University, Netherlands
Nanine Van Gennip, Leiden University, Netherlands
Wim Gijselaers, Maastricht University, Netherlands
Mien Segers, Leiden University, Netherlands

This study investigates how learning processes in collaborative groups, conceptualised as conflict, give rise to shared mental models and consequently influence the performance of these groups. Hereby group composition and the interpersonal context are taken into account to determine the influence of these factors on the occurrence of learning behaviour in groups. Data were collected from 14 groups of third-year educational science students. The results of the present research indicate that conflict is an important facilitator for learning in groups if dealt with in a constructive way. The interpersonal context is an important determinant for dealing constructively with learning opportunities that arise in group-work. Conclusions for both students and professionals working and learning in groups can be drawn.

Paper Presentation

INSTRUCTIONAL STRATEGIES

Chair: Leena Laurinen, University of Jyvaskyla, Finland

Concept mapping for effective learning from texts: A study on individual differences
Tatjana S. Hilbert, University of Freiburg, Germany
Alexander Renkl, University of Freiburg, Germany

Concept maps consist of nodes representing concepts and links representing the relationships between the concepts. Various studies showed that concept mapping is an effective learning tool that fosters meaningful learning. The purpose of this study was to investigate the factors that influence the learning success of concept mapping as a follow-up activity when learning from texts. A thinking-aloud study was conducted that analyses the relations between cognitive processes during concept mapping and learning outcomes. It is assumed that especially those learners who refer to organizing and planning processes while constructing their maps and those who address their comprehension problems (negative monitoring) achieve better in a subsequent test about the learning texts (6 newspaper articles about stem cells). Data regarding to the learners' prior knowledge, perceived usefulness of the concept mapping-method, motivation and the concept map characteristics were also included. The study is planned to be accomplished with 40 university students of all faculties. Preliminary results concerning the first 24 test persons (mean age: 23.79; 12 female, 12 male) show significant correlations between the concept map characteristics and the learning outcomes. The higher the number of correctly labelled links and the less unlabeled links were included in the concept maps the better was the result the participants reached in the post-test. These first results and the further results from the analysis of the thinking-aloud protocols are used in order to develop a training method for beginners in concept mapping.

Using narrative in the learner centred classroom
Hamilton Wesley, Stranmillis College, Ireland

Students in the 21st Century need to be equipped with the skills that enable them

to think for themselves, be self-initiating, self-modifying and self-directing (Costa, 2003). Of central importance is a grasp or understanding of that which gives sense to the construction and co-construction of knowledge in the classroom: a creative spirit of enquiry. Pupils need to be actively involved in their learning, inquiring and building understanding, within discourse communities that use dialogue to scaffold thinking and connect learning minds. An approach to motivating and involving students in their own learning is the use of narrative, as stories, which is at the heart of the account of the study reported here.

Control transfer management between teacher and student and shared reference maintenance and reconstruction: some strategies
Rosa Mayordomo Saiz, University of Barcelona, Spain
Teresa Segues Morral, University of Barcelona, Spain

Based on a socioconstructivist approach several studies have identified two mechanisms of educational influence that take place between teacher and student along the instructional process: the control transfer management and the progressive construction of shared meanings (Coll, 1997, 2001; Colomina, Onrubia & Rochera, 2001; Edwards & Mercer, 1988 and Mercer, 1997, 2000). This study intends to illustrate the narrow relationship between both educational mechanisms. We present a strategy for the analysis of the discursive activity of the participants, located within the broader frame of their joint activity. This strategy allowed us to obtain certain empirical indicators for some likely relationships between the control transfer management and the progressive construction of shared meanings. A didactic sequence, in which a speech therapist and a severely hearing impaired (SHI) student at 6th grade are working together on a topic of Prehistory in the subject of Social Sciences, was videotaped. The video data were later transcribed and analysed following a qualitative methodology.

Paradigm shifts through cases?
Hugo Lotriet, University of Pretoria, South Africa
Marena Lotriet, University of Pretoria, South Africa

This paper examines the extent to which a case study can be used to facilitate discovery of a different thinking paradigm within a specific discipline.
Case studies are often used tools in teaching business subjects. A problem encountered in developing countries is that most cases available are based on large organizations in the developed world to the detriment of important social and de-

velopmental issues. This paper examines the extent to which a specific case study highlighting the social and developmental issues of e-business strategy in South Africa impacted on the students' embedded business way of thinking and brought about a social and developmental awareness. Aspects of the problem that were investigated included the students' concepts of e-business strategy prior to doing the case study, how these changed by doing the case study and possible factors that impacted on the observed results. A literature survey indicated that cases are useful for the acquisition of various skills and for contextualizing problems. Moving from the particulars of a case to general lessons would seem to be potentially problematic. Although the case describes a current and realistic problem within a relevant South African context, the researchers found limited evidence of changes in students' thinking and conception of social and developmental issues as part of e-business strategy. These findings compelled the researchers to reflect on the characteristics of the case that was used, the way it was implemented and the suitability of the case method to achieve the intended outcomes. The full paper reports on these reflections and make recommendations for the practice of teaching with cases in order to facilitate the discovery of alternative thinking paradigms.

F 16   24 August 2005   17:00 - 18:20   Room E113

Paper Presentation

HIGHER EDUCATION

Chair: Carmen Vizcarro, Universidad Autonoma de Madrid, Spain

Supporting student success through Personal Development Planning: An integration of multiple perspectives at the institutional level
Elizabeth Gayton, Liverpool Hope University College, United Kingdom
Bill (J.C.W.) Norton, Liverpool Hope University College, United Kingdom
Lin Norton, Liverpool Hope University College, United Kingdom
David Walters, Liverpool Hope University College, United Kingdom

Aim: Personal Development Planning (PDP) is currently being introduced in all UK universities but systematic empirical research on its effectiveness is falling behind (Gough et al, 2003). This paper reports on a two year institutional study at a University College in the North West of England. to evaluate the effectiveness of a credit bearing PDP module delivered to all undergraduates in the first year of their

degree programme. Method: Students taking PDP were asked to complete the Reflections on Learning Inventory (Meyer, 2000) which measures their conceptions of learning, approaches to studying and epistemological beliefs, a Student Information Questionnaire which records demographic data, and an open-ended constructivist inventory which captures their perceptions of what characterises a good learner in higher education (Walters and Norton 2004). Measures of success include retention and progression data as well as evaluations of the PDP module from both students and staff involved in its delivery. Outcomes: A quantitative and qualitative analysis of the data is currently underway and will be reported in relation to academic performance and retention statistics. Significance: The findings of this study will be reported in the context of an institutional perspective where the aim is to ensure educational management decisions regarding the development of PDP are based on sound pedagogical research evidence

Academic and Career Development of Young Cypriot Females: Alternative Paths
Chrystalla Maouri, Council of Educational Evaluation & Accreditation, Cyprus
Maria Meletiou-Mavrotheri, Cyprus College, Cyprus

Although women internationally have made great strides in educational attainment, persistent gender-role stereotyping continues to limit young women's choices of fields of study and occupation. The study presented in this paper explores gender differences regarding enrolment rates and performance, decisions about major, and aspirations about further schooling and employment among Cypriot youth attending college. It utilizes population data collected using a survey administered at the first stage of a longitudinal study investigating the transition into the labor market of graduates of Cypriot higher education institutions. Participants were all 2188 Cypriot students enrolled in all types of postsecondary programs (from 1- or 2-year programs providing vocational training to 4-year academic programs) who were in their final year of enrolment and were expected to graduate by the end of the academic year 2002/2003. The students were asked to complete an extensive questionnaire about demographic characteristics, socioeconomic background, academic achievement, higher education experience, the attributes of the particular institution and program attended and employment and educational expectations after graduation. A total of 1388 students completed the survey (a response rate of 64 percent). Findings indicate that female students differed from males on a number of characteristics. Despite their higher academic achievement in both secondary school and college, women tended to enroll in female-dominated programs that often had a short duration, and had lower academic and career expectations. Also, women were

more likely to be influenced by their social environment when choosing institution or program of study. In discussing the implications of the study, the paper makes specific suggestions regarding the development by schools, agencies, and higher education institutions, of career guidance services that can assist Cypriot adolescent girls and young females in making more informed educational and occupational decisions.

Honours programmes: A perspective from the Netherlands
P.J. van Eijl, University Utrecht, Netherlands
Marca Wolfensberger, University Utrecht, Netherlands
Andre Schram, University of Amsterdam, Netherlands
Albert Pilot, University Utrecht, Netherlands

In Dutch Universities, honours programmes are a recent and fast growing development. The first such programmes started in 1993 as tracks for students who want to do more and can do more than the regular programme asks them to do. Ten years later 25 programmes have been developed at nearly all twelve Dutch research-based universities. Characteristic are the diversity in the type of programmes, the aims and contents, the length and the positioning in the curriculum. In this study we describe the types of programmes, the certificates involved and the procedures for selection of the students. We also present a typology of honours programmes in The Netherlands and describe their spin-off effects in the regular programmes. Many of the programmes do indeed have the function of a living laboratory for educational innovations in the regular programmes. Our main question, whether honours programmes have innovative capacities for the normal curriculum, is answered positively. After proven success, many innovations of the honours programmes are indeed implemented in the regular curriculum. Recent developments of the honours programmes are aiming at adaptation into the Bachelor-Master system that is now constructed in line with the Bologna agreements as the new system for Higher Education in Europe. The development of honours programmes is considered in the perspective of Bachelor-Master system. A plea for a European Council of Honours Programmes to further the development and quality of these programmes is described, and compared with the National Collegiate Honours Council in the United States.

Success and Failure Factors in ICT Innovations in Higher Education
Iwan Wopereis, Open University of the Netherlands, Netherlands
Paul Kirschner, Open University of the Netherlands, Netherlands
Fred Paas, Open University of the Netherlands, Netherlands
Maaike Hendriks, Open University of the Netherlands, Netherlands
Bas Cordewener, SURF-Education, Netherlands

This paper describes an investigation of success and failure factors for large-scale educational ICT innovation-projects in Dutch higher education, particularly those projects funded by 'SURF-Education'- a government-funded organization of higher education institutes in the Netherlands with the goal of increasing the pace of educational ICT innovation. The need to clarify success and failure factors for such innovations is imperative since many highly funded projects often result in either short-lived, local successes or outright failures. To determine success and failure factors three phases of data collection were defined. In phase 1, literature research resulted in a list of 42 success and failure factors. Phase 2 was directed at the analysis of educational innovation projects funded by SURF-Education where existing project documentation and evaluations were reviewed to identify new factors and to validate the factors found in Phase 1. This phase, though validating the factors found, did not reveal any new success or failure factors. In Phase 3, experts were 'consulted' in two ways. First, a group of eight (educational) project management experts was interviewed and the protocols were analyzed. Further, a different group of 13 experts participated in an experts' concept mapping procedure for generating, sorting and rating success and failure factors. These experts generated 231 success and failure factors. Most of these were related (and occasionally even identical) to those found in the previous phases, though a large number of new factors was also identified. The results form the input for checklists for assessing project plans, diagnosing project health and evaluating sustainability. They have also led to revised procedures for project tendering, planning, segmenting and financing.

F 17   24 August 2005   17:00 - 18:20   Room A110

Paper Presentation

STUDENT LEARNING IN HIGHER EDUCATION

Chair: Vermunt Jan, University Utrecht, Netherlands

Are well-designed Web sites efficient for learning mathematics at the undergraduate level?
Muriel Ney, University of Lyon 1, France
Monica Macedo-Rouet, University of Poitiers, France
Sandrine Charles, University of Lyon 1, France
Genevieve Lallich-Boidin, University of Lyon 1, France

We conducted an experiment in order to examine the effectiveness of an educational Web site, which provides resources to undergraduate students in mathematics. The participants' task was to solve 18 questions about differential equations. Students in the paper condition outperformed those in Web site conditions. There was no difference between the original and an improved Web site version. Moreover, students in all conditions preferred working with the paper resource. Practical and theoretical implications are discussed.

Undergraduate students' proof conceptions
Despina Stylianou, CCNY-CUNY, United States
Ourania Rotou, Educational Testing Services, United States
Maria Blanton, University of Massachusetts, United States

The research discussed in this article comes from an ongoing multifaceted program for the teaching and learning of proof at the undergraduate level. In our presentation we will focus on one aspect of the project – a large scale study on students' proof conceptions. An instrument was carefully designed to measure students' understanding of proof and to examine students' beliefs and attitudes on proof and was administered to a sample of 500 students. Our results show that, despite reform efforts at the high school level that call for emphasis on proof, undergraduate students have difficulty in evaluating mathematical proof. Students showed a preference for empirical rather than deductive arguments both as arguments they would construct on their own and as arguments they would use to convince others. As part

of the study, we conducted correlation analyses between students' overall responses to the multiple-choice mathematics tasks and the survey questions suggested that students' ability to distinguish between valid and invalid mathematical proofs is influence by other factors, such as their previous experiences with mathematics and specifically their experiences with how proofs are constructed during classroom instruction and their own role in this process. The presentation will discuss insights gained from the study regarding students' conceptions and attitudes on proof and how this might impact student learning.

Self-assessment and consequential validity in Higher Education
Anders Jonsson, Malmoe University, Sweden
Claes Malmberg, Malmoe University, Sweden
Gunilla Svingby, Malmoe University, Sweden

Higher education today acknowledges that students need to develop abilities for life long learning, which includes both the ability of continuous self-assessment and the ability to assess collaboration in groups. An important skill for students as well as for professionals is the ability to assess your own level of competence and your need to improve. Self-assessment thus is a way for a person to identify individual learning needs, a meta-cognitive skill that is a requirement for self-adjustment and professional development. Self-assessment can be seen as a vital part of meta- cognition. It involves recognition of your own strengths and weaknesses, and of the motives that guides your efforts. It calls for reflection on the strategies you usually adopt and of possible alternatives. It involves the questioning of knowledge that you take for granted and openness to alternative meanings. The process of self-assessment is cognitively demanding and requires practice and feedback in order to improve. The research reported here explores consequential validity, where students` perceptions of their learning and their learning strategies are studied in relation to assessment procedures designed for improving skills in self-assessment. We have used communication technology as a way to meet the needs of feedback and practice. In their first semester 200 undergraduate students in teacher education took a course on education for sustainable development. The course was net-based with opportunities for face-to-face meetings. A blend of various individual and group-based self-assessment procedures was used in the course. The assessment procedures were developed as research instruments during two previous courses and then transformed into self-assessment devices used by the students themselves. Three distinctive types of self-assessment were used: Self-descriptions, Social Network Analysis, and Quality of contributions.

Virtual learning community - The concept of origin in higher education context
Johanna Poysa, University of Jyvaskyla & University of Leuven, Finland
Paivi Hakkinen, University of Jyvaskyla, Finland
Joost Lowyck, University of Leuven, Belgium

This paper examines the concept of learning community in virtual environments. It is argued that a concept of place that covers both spatial and symbolic meanings of community as counterparts could provide a conceptual vantage point also to better understand development of learning communities in virtual environments. Yet, it is underlined that the definition of virtual community in educational setting should draw on the accurate purposes and the contextual resources surrounding collaborative activities. While simultaneously being aware of the special conditions educational settings are facing, to examine how a sense of place is created might help educational designers to create attractive and rich learning infrastructures that can facilitate successful collaborative activities in learning communities to emerge. Through three empirical studies, this paper aims to unveil the concept of origin of community in higher education context. In the studies, the focus was predominantly on participants' perspectives on various activities and resources surrounding collaborative learning. The data was collected through online diaries and was complemented with observations in online and F-2-F-settings and with group interviews. In the studies, resources surrounding collaborative activities were varied, and thus belonging to a community was crystallized differently around shared professional discussions, visible history of the joint work or was acquired through strong sense of presence of the other participants, for example. Throughout the studies, the preliminary results fostered the impression of changing and subjective nature of what being-in-place may represent to different individuals within the same situation. Thus, a basis of understanding how a sense of place is created could only be acquired by means of equally acknowledging and valuing the experiences of different individual actors. In turn, these aspects could provide educational designers tools to cultivate and provide supporting infrastructure for communities to arise.

F 18   24 August 2005   17:00 - 18:20   Room A010

Paper Presentation

TEACHER PROFESSIONAL DEVELOPMENT

Chair: Astrid Pettersson, Stockholm Institute of Education, Sweden

Understanding reflection in teaching: An examination of critiques in the literature
Catherine Beauchamp, Bishop's University, Canada, Canada

Reflection in teaching is a concept frequently discussed in the literature in education; however, its exact meaning and nature are not clearly understood. The study presented in this paper represents one part of an extensive meta-study of the literature on reflection. Earlier parts of the study examined the differing ideas about reflection across three communities of practice and analyzed individual definitions of reflection to show similarities and differences in understandings of the concept, particularly with respect to cognitive processes and rationales for reflection. This third part of the study tracked the themes that are contained in critiques of reflection with a view to better understanding the variety of ways reflection is perceived. This meta-synthesis of these critiques, in conjunction with the results of the two earlier parts of the study, leads to a way of interpreting an individual work on reflection within the larger context of the literature on the subject. Results of the study suggest that four significant themes inform the discussions of reflection in individual works. These themes of epistemological focus, cognitive processes of reflection, rationales for reflection and the link between reflection and action are discussed. A framework and set of questions for placing individual works about reflection within the vast literature on the subject are proposed.

Staff development: Perceived effects by teachers in higher education
Catherine De Rijdt, Maastricht University, Netherlands
Filip Dochy, University of Leuven, Belgium
Sofie Bamelis, University of Leuven, Belgium

Qualitative good staff development programmes are a central component in most of the propositions for improving educational practices. Educational institutions offer a divers training programme for the staff members in order to keep up with educational innovations and in order to guarantee a certain educational quality regarding

new quality labels for schools. In this empirical study we investigate, by means of a survey (N=97), which effects of staff development programmes are perceived by teachers in higher education. In order to find answers on 8 more specific research questions we used a questionnaire and semi structured interviews. For the analysis of the quantitative data we used descriptive statistics, T-tests, ANOVA's and the Bonferroni method. The answers to the open questions were analysed in a qualitative way. The results show that the highest level of change for students can be found when the shopfloor staff development model is used and teachers are consequently applying the newly gained knowledge and skills into practices.

The Impact of Teaching Approach on Learning Within a Community of Practice
Colette Gervais, Universite de Montreal, Canada
Enrique Correa, Universite de Sherbrooke, Canada

Communication is aimed at providing an understanding of the impact of a teaching method on a community of practice, that is, of a teacher-student teacher dyad during a teacher training internship. In our study, we modified the normal architecture of this community by using video recordings to explain teaching practices. This is similar to amplifying the reification process of the Wenger model (1998) which allows the professional to give shape to his experience by clarifying it. The difficulty encountered in verbalizing the skills of practitioners may be attributed primarily to the fact that their teaching practice clashes with what they learned. Three elements must be present for a community of practice to become a reality: a mutual commitment, a joint enterprise and a shared repertoire. Eight secondary school teachers together with their student teachers in their last year of studies, participated in the study by recording activities in class and by participating, in dyads, in joint discussion sessions on the teaching practices. The Wenger learning infrastructure model was used to analyze the thoughts collected during the discussions in dyads and during the final wrap-up. Our method fosters learning among student teachers and contributes to the development of their professional identities. It encourages their participation in the community by legitimizing their analyses of these teaching practices. The shared repertoire thus actually corresponds to both practical and theoretical aspects, to the meaning ascribed to the teaching practices by both sets of actors. Among supervising teachers, the approach emphasizes their identities as teacher trainers. Our study highlights the pertinence of the model developed by Wenger in teaching aid design as well as the potential for the use of technological methods such as videoscopy. Further, practical argument contributes in the professional development of participants and in the enrichment of the community.

F 19   24 August 2005   17:00 - 18:20   Room E102

Paper Presentation

PROBLEM SOLVING

Chair: Lucia Lumbelli, University of Trieste, Italy

The process of Knowledge Redescription as underlying mechanism for the development of Children's problem solving strategies: an example from arithmetic.
Chronoula Voutsina, University of Southampton, United Kingdom
Keith Jones, University of Southampton, United Kingdom

The aim of this study was to explore ways by which 5-6 year-old children organise different pieces of knowledge to develop strategies for solving a specific arithmetical task and furthermore, ways by which children move beyond their successful problem solving approaches to the acquisition of increased control over the procedural and conceptual knowledge that supports their problem solving success. The paper considers the emerging theory of Representational-Redescription which supports the idea of 'success-based' cognitive change and argues that new knowledge can be constructed by a process of internal exploitation of knowledge that already exists in the cognitive system of the problem solver. In problem solving, the notion of Representational-Redescription has been studied in spatial, physics, linguistic and notational tasks but currently, it is under-researched in mathematics. The paper presents outcomes from a study which focused on ten cases. The microgenetic method was used for the study of changes in Children's problem solving. This entailed the design of a sequence of sessions during which children were individually involved in solving a specific form of additive task, more than once, and after they had been successful in solving it. The microgenetic method was combined with the clinical method of interviewing. The paper presents a specific path of after-success strategy change. This path of change indicated Children's movement from initial success-oriented behaviour to an organisation-oriented phase during which new strategies were introduced or known strategies were evolved procedurally and conceptually. The paper explains the general analytical direction which was followed to reveal different levels of knowledge accessibility and explicitness which supported Children's main strategy during the after-success change process. These findings support the idea that learning follows not only from failure but also from success, and that the Representational-Redescription theory can offer an additional

insight to the complex nature of learning processes.

Effect of literal and numerical irrelevant information on problem solving in children with Special Educational Needs

Maria Chiara Passolunghi, University of Milano-Bicocca, Italy
Chiara Passolunghi, Faculty of Psychology, Italy

The present study investigated reasons why children with special educational needs have difficulties in solving arithmetic word problems. In particular, the aim of this study was to verify whether these difficulties are due to a working memory deficit and defective inhibition of irrelevant information included in the problem wording. Furthermore, the study was also geared to test whether children with Attention Deficit/Hyperactivity Disorder (ADHD) or Arithmetic Learning Disorder (ALD) have a specific disability in recalling and handling numerical or literal information. In an attempt at providing an answer to these questions three groups of children were tested: children with ADHD, children with ALD and a group of children achieving at normal levels. They were presented with a battery of arithmetic word problems containing irrelevant information (using either numerical or literal information). Children were asked to recall relevant information within the texts and then solve the problems. Children with ADHD recalled significantly more irrelevant literal information. Both children with ADHD and ALD recalled significantly more irrelevant numerical information. On the other hand, in the phase of problem-solving, children with ADHD were more impaired by irrelevant literal information (which overloads memory), while children with ALD were more impaired by irrelevant numerical information (that may elicit the execution of wrong arithmetic procedures). Strategies to improve the ability of children with special educational needs to identify and inhibit irrelevant information are discussed.

Supporting self-regulated learning and problem solving in class

Silke Hertel, TU Darmstadt, Germany
Franziska Perels, TU Darmstadt, Germany
Bernhard Schmitz, TU Dramstadt, Germany

The aim of this study is the development, implementation and evaluation of a training program for elementary-school teachers in order to improve teachers` instructions and supporting behaviour regarding students` self-regulated learning and problem-solving. Models of self-regulation (Bandura, 1991; Zimmermann, 2000; Schmitz & Wiese, 1999) compose the theoretical framework of the training. In particular it is

based on Schmitz's process model of self-regulation (Schmitz, 2001). Participating in the training should sensitise teachers for difficulties in acquiring self-regulation and problem-solving competences. Srategies, which help to establish and support these competences, are introduced. The participants keep a diary to support the self-reflection and the self-evaluation and to survey the teaching behaviour (teacher diary) and the learning behaviour (student diary). The study is based on a 2 (teacher training yes/no) x 2 (student diary yes/no) design with 12 teachers and 221 students assigned to the training conditions. For the evaluation of the training program questionnaires are applied before and after the training (teacher and student questionnaire, student mathematical-problem-solving-test). After the pretest the training is implemented in three 120 to 180 minute training sessions. The results regarding the teachers show significant effects for self-regulatory skills supporting instruction. Regarding the students the results show significant effects for the teacher training group for the application of preparative problem solving strategies and in particular for the problem solving strategy selection. Best effects are shown for the students who filled out a diary additionally. The evaluation of the mathematical-problem-solving-test confirms these findings. Students who fill out a diary improve significant on particular self-regulation scales. Our findings indicate that it is possible to support students` self-regulative and problem-solving competences by instructing their teachers. Further research should investigate communication and cooperation between teachers and parents.

F 20   24 August 2005   17:00 - 18:20   Room E104

Paper Presentation

REASONING

Chair: Athanasios Raftopoulos, University of Cyprus, Cyprus

Learning to reason in a community of philosophical inquiry: a study on Elementary School children
Marina Santi, University of Padova, Italy
Rossella Giolo, Elementary School G. Pascoli, Rovigo, Italy

This study deals with an empirical research carried out in an Italian Elementary School involved in a two-year Philosophy for Children Project. The aim of the study was to investigate the effects of philosophical discussions on children reason-

ing skills. To this aim two groups were created: an experimental group (40 subjects) and a control group (37 subjects) of 9 year old children. The setting of the experimental group was characterised by the use of Philosophy for Children Program (Lipman, Sharp & Oscanyan, 1982) transforming the classroom into a community of inquiry. The teacher involved in the study was already trained in Philosophy for Children. The children were involved in philosophical discussions one time a week during the period of two school years. The hypothesis is that the Philosophy for Children Program affects the positive development of informal reasoning skills, argumentative competencies, and collaborative inquiry styles of discourse in children. Three kinds of pre-tests and post-tests were administered to the groups: 1. a test composed by everyday problems tasks to evaluate individual argumentative competencies; 2. a test on ill-structured problems tasks to evaluate informal reasoning skills; 3. the above tests (points 1. and 2.) were administered as pre- and post-test to small-groups of students (3 or 4 children) to recognize changes in collaborative inquiry styles of discourse. Data were analysed by statistical procedures (frequencies analysis, variance analysis - ANOVA) and by qualitative procedures (kind, level, and quality categorization of arguments). The data analysis are still in progress, but the first outcomes suggest a confirmation of the research hypothesis as regard argumentative skills and collaborative inquiry styles of discourse in children involved in Philosophy for Children Project.

What does one mean when saying that learning mathematics improves deductive reasoning?
Michal Ayalon, Weizmann Institute of Science, Israel
Ruhama Even, Weizmann Institute of Science, Israel

Abstract: This research aims at examining conceptions of school, college and university teachers about the influence of mathematics learning on the development of deductive reasoning. Participants in this study were a heterogeneous group of 21 teachers of junior-high school pupils, of university students, and/or of pre-service teachers. The school-teachers were mathematics teachers. The university teachers and the teacher educators included mathematics education researchers, mathematicians, logicians, and mathematics curriculum developers. Data sources include individual interviews. Data analysis is based on the Grounded Theory method. Most participants in this study argue that learning mathematics has an influence on the development of deductive reasoning, and also pointed out that the development of deductive reasoning is one of the objectives of mathematics education. Most participants also emphasized that learning mathematics contributes to the development

of deductive reasoning by developing appropriate habits of mind and motivation. However, careful analysis of the data identifies three distinct groups of participants, regarding their conceptions of four aspects: 1) deductive reasoning 2) the relationships between the nature of logical rules inside mathematics and outside mathematics 3) what exactly mathematics learning develops in deductive reasoning, and 4) in what ways learning mathematics develop deductive reasoning. Each group includes people from different sub-populations. The findings show the need for teachers, curriculum developers and policy makers to discuss explicitly the meaning of deductive reasoning and the role of mathematics in its development, and the need for empirical research on the role of mathematics in the development of deductive reasoning.

Young children's expressions for probabilistic ideas
Efi Paparistodemou, Department of Education, University of Cyprus, Cyprus

My point of departure in the current study is that young students implicitly understand probabilistic ideas and given appropriate tools, they will express these intuitions. The aim of the broader research of the present paper is to design such tools and evaluate their efficacy. An open computer game was designed for children to express understandings of randomness as formal conjectures, so that they were able to examine the consequences of their understandings. The game was designed simultaneously to afford children the opportunity to explore and express their intuitions and ideas, and to give the researcher the opportunity to study how probabilistic ideas evolved during the activity. Particularly, this paper focuses on how young children express ideas for achieving a fair result by using a computer game, in respect with the law of large numbers. The computer game offered children the opportunity to make their own constructions of sample space and distribution. The children used spontaneously four distinct strategies to express the idea that their construction could only be judged with respect to a large number of trials. It is apparent that the game provided children the opportunity to express the idea that stability can come from increasing outcomes with different strategies. It can be said that young Children's expressions is evidence of several 'situated abstractions' for the law of large numbers.

The children's categorization of plants. Is there an effect of the causal status of features?

Francoise Cordier, Universite de Poitiers, France
Benjamin Meunier, Universite de Poitiers, France

In categorization tasks, participants would be more influenced by features that cause other features than by features that are effects. This causal status effects was highlighted in 7-9 year-old children (Ahn et al., 2000), and evaluated in artefacts and animal categories. The two purposes of this study was to extend the results to plants, and to 4-6 year-old children. 32 children aged 5-to-6 and 38 aged 4-to-5 participated in this experiment. They learned descriptions of novel living things (3 animals and 3 plants), in which one feature (internal) caused two other features (superficial). In the control condition, the children saw the features uniquely, without the causal relations. Then, we presented two other items who had two features, one had the two effect features, the other had one effect feature and the cause feature. We wanted to determine which transfer item was more likely to be an example of the living thing they had learned. Our results showed that 5-6 year-old children preferred a living thing with the cause feature rather than other ($F(1,66) = 16,19$, $P<0.0002$), but 4-5 year-old children failed to show any preferences ($F(1,66) = 1,02$, NS). No differences were found according to the type of category for 5-6 year old children ($F(1,66) = 1,26$, NS). So, our investigation showed causal status effect for older children and not for younger children. We hypothesized that a wrong understanding of the word because used in the task might explain the younger Children's results.

F 21   24 August 2005   17:00 - 18:20   Room E112

Paper Presentation
Computer-supported Learning Environments

COMPUTER SUPPORTED COLLABORATIVE LEARNING

Chair: Richard Joiner, University of Bath, United Kingdom

Design principles for a CSCL environment in teacher training
Ditte Lockhorst, IVLOS/Institute of Education, Utrecht University, Netherlands
Wilfried Admiraal, IVLOS/Institute of Education, Utrecht University, Netherlands
Albert Pilot, IVLOS/Institue of Education, Utrecht University, Netherlands
Wim Veen, EduTec, Delft University of Technology, Netherlands

In this contribution, we report on a design research on the identification and description of design principles for a CSCL environment in which student teachers learn collaboratively. Collaborative learning and learning by interaction are important ways in supporting the learning process of student teachers. Computer supported collaborative learning (CSCL) may enhance such learning by interaction. In this research we concentrated on design features and their relation with the interaction process of the collaborating student teachers, as we consider this interaction process a precondition of the process of knowledge construction. From the literature on collaborative learning and CSCL we extracted three clusters of design elements: task instruction, online environment and teachers' guidance. We also identified the design context, including factors not or barely under the control of the designer. To explore the relation between design elements and student teachers' collaboration in a CSCL environment, three designs of CSCL environments were implemented in different courses of the teacher training programme of the Utrecht university in the Netherlands. We varied these designs in task instruction, online environment and teachers' guidance. BSCW and WebCT have been used as online learning environments.
This research involved 36 student teachers and five teacher educators. Data on the students' and teachers' evaluation of the students' collaborative process and the design elements have been gathered with the help of a questionnaire for all students and individual interviews with students and teachers. The electronic communication is used to analyse the students' collaboration. Information on the design elements, forthcoming from the questionnaires, interviews, literature, and peer debriefing, is

related to the information from the analysis of the collaboration. The results of this research will be presented in terms of a set of design principles related to the three design clusters.

Learning together in an asynchronous CSCL environment: The effect of reflection on group processes in distance education

Saskia Brand-Gruwel, Open University of the Netherlands, Netherlands
Silvia Dewiyanti, Open University of the Netherlands, Netherlands
Wim Jochems, Open University of the Netherlands, Netherlands

Learning together in a Computer-Supported Collaborative Learning (CSCL) environment is not always so productive as expected. In order to collaborate well students need not only collaborative skills but also the ability to regulate group processes. Research that is mainly done in face-to-face settings shows that reflection can foster positive interactions. This study examined the effect of reflection on the regulation of group processes, knowledge co-construction, affective learning activities, and students' experiences with collaborative learning in an asynchronous CSCL environment. Participants were 44 distance learners who enrolled in the Law course at the Open University of the Netherlands. They worked in small groups of four students to complete their assignments. In the experimental condition, participants were asked to write a short individual reflection report and to discuss their group processes. Data were gained from students' messages as well as taken from questionnaires administered before, during and after the course. Findings indicated that reflection influenced both students' regulatory activities, such as planning group activities and monitoring working procedure, as well as students' experiences with collaborative learning in team development and monitoring the participation.

Effects of visualizing participation in Computer-Supported Collaborative Learning

Jeroen Janssen, Dept. of Educational Sciences, Utrecht University, Netherlands
Gijsbert Erkens, Dept. of Educational Sciences, Utrecht University, Netherlands
Jos Jaspers, Dept. of Educational Sciences, Utrecht University, Netherlands
Marcel Broeken, Dept. of Educational Sciences, Utrecht University, Netherlands

Collaboration and interaction are complex processes. To collaborate successfully, students have to engage in several types of activities: task-related, meta-cognitive, and socio-communicative. Successful collaboration requires coordination of all these types of activities. Awareness can play an important role in facilitating coor-

dination during computer-supported collaborative learning (CSCL). When students are collaborating, they have to be aware of the activities of their group members, and the state of affairs in the shared workspace. When students have awareness information, students know what is happening in the shared workspace, and it enables them to anticipate group members' actions. Visualization of group activities and processes can help students gain a clearer sense of the CSCL-environment, and the group processes that are taking place. By providing students with tools that visualize group activities, coordination in CSCL-environments may be facilitated, which in turn may enhance group processes, and ultimately group products and group members' satisfaction with collaboration. The overall goal of this paper is to investigate the effects of visualization of participation during CSCL, since participation is an important aspect of collaboration. More specifically, the effects of visualization on, a) communication of social aspects of collaboration, b) students' awareness of social aspects of communication, c) coordination of students' collaboration processes, d) teachers' abilities to facilitate students' collaboration processes, and e) group products.

Computer support for collaborative storytelling: Evaluating the benefits of hyper-linking and animation in KidPad
Claire O'Malley, University of Nottingham, United Kingdom
Giulia Gelmini, University of Nottingham, United Kingdom

KidPad is a shared drawing tool that enables children to collaborate synchronously with multiple mice, to draw images and connect them by creating hyperlinks from one to another. In this study we wished to test the hypotheses that the additional functionality in KidPad (i.e., the use of hyperlinks, zooming and animation) would result in more effective collaborative storytelling than a comparable software environment which did not have such features. Small groups of 6-7 year old children were asked to create a story in KidPad together and then tell it to their classmates. They were given feedback on the effectiveness of their storytelling then asked to use KidPad, either with the additional features or without these features (control condition), to improve upon their story. Results showed that the stories told in the experimental condition were longer and richer in complexity than those in the control condition in a number of respects. There was a significant difference between the improvement in mean ratings of structural elements for the stories in the experimental condition but not in the control condition. The stories were also coded in terms of the number of words referring to the main protagonists' emotional and psychological states, and the manner in which children told their stories was coded in

terms of gestures and other non-verbal elaborations. Again, there was a significant difference in both of these measures for the experimental condition, but not for the control condition. Finally, the extent to which groups showed reciprocal turn-taking behaviour (e.g., offering a turn to another member of the group) and the extent to which they supported each other when telling the story (e.g., by prompting) were also measured. For both of these measures there was a significant difference between the stories told in the experimental, but not in the control condition.

F 22   24 August 2005   17:00 - 18:20   Room E103

Paper Presentation
Multimedia and Hypermedia Learning

ISSUES OF COGNITIVE LOAD

Chair: Jose Antonio Leon, Universidad Autonoma de Madrid, Spain

Measuring cognitive load in multimedia learning
Jan Plass, New York University, United States
Robert Richard Whelan, New York University, United States

This paper examines the role of cognitive load theory in multimedia instruction, and compares approaches to the measurement of cognitive load experienced by learners. The paper describes a cognitive science framework for multimedia instructional design based on evidence of the functioning of working memory and attention, and compare a variety of approaches to cognitive load measurement in instructional settings. The findings of a research study are described which compared the effectiveness of two different approaches to cognitive load measurement: subjective assessment, and secondary-task measures, in terms their utility, and predictive validity with respect to learning performance. The findings will help to shed light on the use and value of the load measurement instruments in question, and will serve to inform the control of cognitive load in the design of multimedia and Web-based instruction. This research was conducted as part of the author's doctoral dissertation, for which data are currently being analyzed.

Extending the cognitive theory of multimedia learning: the need for additional design principles?

Martin M. A. Valcke, Ghent University, Belgium
Katrien De Westelinck, Ghent University, Belgium

Mayer's cognitive theory of multimedia learning is supported by empirical evidence. But recent research is not able to replicate the research findings. This is the case when research is set up in knowledge domains that differ from the work of Mayer. Research of the authors suggests that this is related to the formal iconic sign system underlying the external graphical representations. Three studies are reported that test additional design principles: activation and collaboration in the use of external graphical representations and a study about the additional impact of training. The results show that the activitation principle has a significant impact.

Cognitive load theory and learner strategies: the impact of instructional design properties on knowledge acquisition processes in hypermedia learning environments

Mattias Steinke, Research Center L3S, Germany
Thomas Huk, Research Center L3S, Germany
Christian Floto, Institute of Social Sciences, TU-Braunschweig, Germany

The cognitive load theory (CLT) describes cognitive processes in learning with multimedia and has many implications for the design and evaluation of the respective material. However, Gerjets & Scheiter (2003) claim that the relation between instructional design and cognitive load is less deterministic than most of the CLT research might suggest. They present an augmented CLT model for self-controlled hypermedia learning that takes the moderating role of learners' processing strategies between instructional design and cognitive load into account. Not much is known about the impact of instructional design properties on these learning processes in hypermedia environments. Against this background we investigated the impact of the design of audiovisual content on the knowledge acquisition processes of students when learning with hypermedia. In this context four evaluation variants of a CD-ROM on cell biology offering different didactical and graphical designs but the same content were produced. One part of the CD, an animation that deals with the enzyme ATP synthase, was modified in a 2x2 factorial design pattern:- One factor represents the graphical representation format (two-dimensional vs. three-dimensional) - The other factor represents the presence or absence of visual cues. The logfiles of 267 students, each working with one of the four different hyperme-

dia learning variants were tracked and analyzed. The results indicate that content design properties can have quite different impacts on the processing strategies of the learners. The presence of visual cues seems to directly stimulate a more intensive use of content. The 2D/3D representation format seems to have a more indirect stimulating influence leading to different processing strategies with respect to the use of learning support tools and information search strategies. Especially for expensive 3D representation formats it is therefore necessary to adjust them effectively to the features of the surrounding hypermedia learning environment.

Metacognition as germane cognitive load in web-based learning
Brianna Scott, Indiana University, United States
Neil Schwartz, California State University, Chico, United States
Tiffany Lee, University of Washington, United States

106 undergraduates searched a hypermedia environment under three navigational conditions, wrote an essay measuring their comprehension, and completed a test of metacognition. The map conditions were: spatial/semantic, spatial only, and none. Analyses revealed that a navigational map capable of incurring an integrative cognitive model of the meaningful relationships underlying website content incurs significantly more metacognitive load and higher levels of comprehension. When the map was incapable of revealing these relationships, metacognitive skills were of no value and compromised learning performance. The results demonstrate that a navigational map can create significantly more cognitive load; however, the nature of the load—whether germane or extraneous—is based on the degree to which the map permits integrative model construction during processing.

F 23   24 August 2005   17:00 - 18:20   Room E005

Paper Presentation
Web-based learning

METACOGNITIVE SUPPORT

Chair: David Wray, University of Warwick, United Kingdom

Scaffolding through the network: analysing the promotion of improved online scaffolds among university students.
Manoli Pifarre, University of Lleida, Spain

The aim of this study is to explore how to enrich the scaffolding processes among university students using a specific computer supported collaborative learning –CSCL- software called KnowCat. Twenty-three students participated in a two semester study. During this period the students followed an instructional process which used the widgets of the CSCL software to support and improve the students' interaction processes, specially, the give and receive help processes. Our research has analysed the students' learning results and the evolution of the quality of students' interaction processes. The results of our research show that the students that have used the CSCL called KnowCat as a tool to share and to learn together the contents of the university subjects obtained better results than the students that have not used this collaborative software. Also, the use of this CSCL software has a positive impact in the interaction processes among the students, concretely, we have studied the type and the evolution of the notes –scaffolds- that the students have written to help their companions to improve their documents. During the study, the scaffolds changed and improved in two characteristics: a) the type of the scaffolds, at the ending of the study the scaffolds wrote by the students had more metacognitive features that the ones wrote at the beginning of the study; and b) the quality of the notes, at the ending of the study the notes are more explicit; the students argue their ideas and give more reasons for their statements. Besides, at the ending of the study, there are more notes which are referred to procedural knowledge, the students help to their companions how to improve the document, for example, how to use tools to organise the information –as conceptual maps, tables, key words…

Exploring how to scaffold online dialogue in higher education: who chooses to use an in-line labelling feature and does it help?

Eva Bures, Bishop's University, Canada
Philip Abrami, Concordia University, Canada
Richard Schmid, Concordia University, Canada

Despite its potential, online dialogue (OD) can be superficial. Following Vygotskian (1978) and design experiment approaches (Brown, A.,1992), this study explores a labelling feature that allows students to tag parts of their messages. Data comes from 4 sessions of a graduate-level education course (n=53 individuals, n=17 groups). Students engaged in 2-3 graded online activities in groups of 3-4. Students contributed labels for subsequent sessions. Students (n=53) contributed from 0 to 56 labels, M=12.42, SD=13.50, and 18 to 114 messages, M=39.70, SD=18.04. Groups (n=17) contributed from 0 to 109 labels, and 57 to 227 messages. Field-notes and descriptive statistics suggested there were 7 labelling groups, 7 non-labelling groups, and 3 groups more difficult to categorize. Types of labelling usage emerged: interactive labelling, elaboration labelling, and interactive elaboration labelling. Were students satisfied with labelling? The mean was 18.35, SD=3.88 (6 items on 5-point Likert scale). Labelling correlated to quality OD (r=0.410). A model including the Nelson-Denny text comprehension measure, task-specific motivation, and labelling predicted approximately 25% of the variance in quality OD, $F(3,38)=5.149$, $p<0.05$; adding in labelling was significant. Narrative analyses suggested that some types of labelling were more beneficial for OD. Content analyses (n=696 coded 'paragraphs') were conducted. The interactive elaborate labelling group contributed proportionately more segments coded as including some form of CT (M=0.96) in contrast to the elaborate labelling group (M=0.50), especially more analysis and inference. Labelling was correlated to performance on test r=0.283. A model including test marks, the Nelson-Denny, task-specific motivation, OD marks, and labelling was significant, $F(4, 37)=8.257$, $R=0.672$, R^2adj. $=0.415$, but the addition of labelling was not. Three categories of users emerged: Organized strategic users; Trusters; and Techies. Four categories of non-users emerged: Fringe participants; Not profoundly engaged online; Techie-shy; and Fluid writers/thinkers. Nonetheless, labelling was largely a family affair: MANOVA gives: $F(16, 36)= 2.697$.

How does metacognitive support for navigation influence science understanding while reading from online science texts?
Agni Stylianou Georgiou, Intercollege, Cyprus
Sadhana Puntambekar, University of Wisconsin, Madison, United States

While navigating online information sources which are based on hypertext and hypermedia technologies, readers constantly make decisions about where to go next, about what links might be relevant to their current goals. It is therefore important for readers to be aware and regulate both their comprehension and navigation strategies. Hypertext readers need to make thoughtful decisions about what paths to follow and be able to integrate the knowledge acquired from the different text fragments. They therefore need metacognitive strategies for navigation. In this study we designed and implemented support for navigation in the form of prompts to compel readers to think about the processes they employ while navigating through online sources and help them monitor and regulate these processes in order to accomplish their learning goals. Our goal was to investigate whether supporting sixth grade students to monitor and regulate their navigation behavior would lead to a rich understanding of domain knowledge. The results suggested that after adjusting for prior knowledge differences students who received metanavigation support provided better explanations of the concepts they included in their maps and richer explanations of the connections they made among them.

Uncovering the impact of self-assessment on freshmen's social construction of knowledge in online discussion groups
Hilde Van Keer, Ghent University, Belgium
Bram De Wever, Ghent University, Belgium
Martin Valcke, Ghent University, Belgium

Computer supported collaborative learning (CSCL) is frequently recognised as a promising learning environment fostering knowledge building and understanding. Positive effects, however, only arise when students engage in the productive processes of collaborative knowledge construction. The present study focuses on promoting the processes underlying effective activities in asynchronous discussion groups. More specifically, we focus on self-assessment, which is considered as an important tool to support students to improve their learning by monitoring and reflecting on the group's discourse. Two research questions are dealt with. The first question focuses on the ability of freshmen to evaluate one's own contributions and the group processes in an accurate and critical way. The second research question

explores whether engaging students in self-assessment procedures with regard to the ongoing processes in the discussion groups can elicit social knowledge construction and readjustment of discourse in forthcoming discussions. The study was conducted in a naturalistic higher education setting, with 143 freshmen, all taking the course 'Instructional sciences', grouped in 14 asynchronous discussion groups. The study was constructed according to a repeated-measures design with the 14 groups, assigned randomly to two conditions: one involving students in self-assessment and a control condition without self-assessment. To analyse the transcripts of the interaction in the asynchronous discussion groups, content analysis was used. More specifically, the model for examining social construction of knowledge in computer conferencing of Gunawardena and colleagues (1997) was applied. To analyse the content analysis data en to explore the hypotheses, repeated-measures multilevel modelling was used. As to the first research question, preliminary results indicate a gradual convergence between students' self-assessment and the coded levels of knowledge construction in their messages. As to the second research question, initial findings reveal a positive effect of engaging students in self-assessment procedures on the social construction of knowledge in the discussion groups.

F 24   24 August 2005   17:00 - 18:20   Room A111

Paper Presentation

PROFESSIONAL DEVELOPMENT

Chair: Oser Fritz, Universitat Fribourg Schweiz, Switzerland

Five metaphors of work-related learning of professionals
P. Robert-Jan Simons, Utrecht University: IVLOS, Netherlands
Manon C.P. Ruijters, Twynstra Gudde, Netherlands

Until now approaches to conceptualise differences in learning preferences had a limited scope. They focused either on individual explicit learning only, or on individual implicit learning only. Collective learning was neglected altogether. This paper presents a conceptual system of five metaphors of learning, including explicit, implicit and social learning. It encompasses the metaphors of learning as previously defined by Sfard: the Acquisition and Participation metaphors. The system consists of three new metaphors: the Discovery metaphor, the Apperception metaphor and the Exercising metaphor. These three stem from three psychological theories

of learning: knowledge building / productive learning, observational learning and learning organisation/ deliberate practice theories . In a survey a revised questionnaire was tested with 250 professionals out of 11 different organisations. The five learning metaphors could be distinguished and proved to be reliable. The alpha-coefficients were acceptable and the scales were distinguishable. With one exception the inter correlations between the scales were not too high and not too low. The expected differences between organisations, professions and groups appeared and could be interpreted meaningfully. And there was coherence within groups (communities of learning or communities of practice) in terms of learningpreferences. CoP's shared learningpreferences

Role of variation in pedagogical practices in four professional training programmes.
Pilar Reyes, University of Concepcion, Chile
Beatriz Figueroa, University of Concepcion, Chile

Introduction. The University of Concepcion is one of the most important universities in Chile. The phenomenon observed that generated the present study, indicates that some students at the university in similar socio-cultural context develop professional competence at a high level. The need that guides this action is to observe and describe the pedagogical practices in four different Faculties, Medicine, Education, Engineering and Law. The aims are, describe pedagogical practices from lectures point of view, describe the student's perception of their lectures pedagogical practices and the impact over their perception of their learning experiences and identify which role plays the pedagogical practices in producing changes in student's view of their education. Methodology: A phenomenographic approach is applied. The research interview was utilized to collect data from 24 students, and 14 lectures. The interviews were transcribed. The Theory of variation was used, as a conceptual method, to analyze and categorized the qualitative differences of lecturers' pedagogical practices and students' perception of their lecturer pedagogical practices as well their perception of their learning experiences. The outcomes were the characterization of the pedagogical practices from lectures and students perspective. Also we could determine levels of variation among 4 different pedagogical practices and its impact over the levels of variation founded on students learning experiences. The theoretical implications. Pedagogical practices is an element that provide guidance about the role of lecturer, which is to open spaces of variation orientated towards students, so they can experience a great number of critical aspects simultaneously. Other relevant issue is that was able to identify patterns of pedagogical

practices, which are considered as a strategy coming from the faculty. The opposite is to get individualized pedagogical practices, with a sense of a single tactic, trying to get something with terrible consequences for the system.

Professional learning as epistemic trajectories
Leif Christian Lahn, University Of Oslo, Norway
Karen Jensen, University of Oslo, Norway
Kirsti Klette, University of Oslo, Norway
Monika Nerland, university of Oslo, Norway
Monica Rudberg, university of Oslo, Norway

The following paper will review and critically examine the concept of learning trajectory in the literature on professional learning and communities of practice. These theoretical frameworks tend to focus on embedded and tacit formats of knowledge and do not account for the commitment of expert groups to a domain of knowledge and for the expansion of object-centered environments in modern working life (Knorr Cetina, 1999). Our discussion of conceptual issues will be supported by casuistic evidence and survey data from studies of engineers, nurses, teachers and accountants. By using the concept of epistemic trajectories in professional learning we emphasize its object-related aspects rather than the social and life-related (Nespor, 1994). Thus we also propose a decentered understanding of the motivational bases for professional performance. The framework outlined here has been guiding our development of research instruments that is sensitive to both time-space compression and distanciation of learning processes (documentary data, survey data, trajectory analysis and qualitative interviewing). Our research design is longitudinal, and we follow students in nursing, teaching, engineering and accounting in their time of graduation and in their first years at work. The results reported in this paper are taken from documentary data and survey data of student contexts and trajectories in their educational setting.

Symposium
Mathematics Education

ROUTINE VERSUS ADAPTIVE USE OF REPRESENTATIONS AND MODELS IN MATHEMATICAL PROBLEM SOLVING

Chair: Athanasios Gagatsis, Dept. of Education, University of Cyprus, Cyprus
               Wim Van Dooren, CIP&T, University of Leuven, Belgium
Organiser: Wim Van Dooren, CIP&T, University of Leuven, Belgium
               Athanasios Gagatsis, Dept. of Education, University of Cyprus, Cyprus
Discussant: Athanasios Raftopoulos, Dept. of Education, University of Cyprus, Cyprus

An important issue in research in mathematics education is how students can develop adaptive expertise. This runs parallel with a worldwide recognition in the curricular documents of the educational value of adaptive expertise. Whereas Hatano (2003, p. xi) describes adaptive expertise as the ability to apply meaningfully learned procedures flexibly and creatively and routine expertise as simply being able to complete school mathematics exercises quickly and accurately without (much) understanding, we argue that the opposition between routine and adaptive expertise also can be applied to other aspects of mathematical expertise besides strategies/procedures, such as mathematical representations and models. Because different representations emphasize (and de-emphasize) different aspects of the systems they intend to describe, representational flexibility – i.e., the ability to switch quickly and fluently between multiple representations and to select the most appropriate representation – underlies some of the most important abilities associated with what it means to be a good mathematical thinker and problem solver. Mathematical thinking and problem solving also requires the ability to apply or construct mathematical models to analyse and solve problem situations in the real world. This also implies an important amount of adaptivity, namely in selecting the appropriate model for a particular problem situation and in refining, revising or rejecting this mathematical model through several modelling cycles. The four contributions in this symposium illustrate the role of the adaptive use of representations and models in mathematical thinking and problem solving. Pantziara and Gagatsis study the role of different dia-

grams in sixth graders non-routine problem solving; Van Dooren et al. investigate whether performance tasks can elicit adaptivity in sixth graders' modeling behavior; Merenluoto searches for the relation between adaptive expertise and conceptual understanding in student-teachers' learning diaries; and Elia et al. study the role of different representations in secondary and university students' understanding of functions.

The use of diagrams in solving non-routine problems
Marilena Pantziara, Dept. of Education, University of Cyprus, Cyprus
Athanasios Gagatsis, Dept. of Education, University of Cyprus, Cyprus

The mathematics education community has espoused the importance of using multiple representations in the problem solving process (NCTM, 2000). Diagrams are considered as one kind of such representations (Novick & Hurley, 2001). Specifically, diagrams are considered structural representations, in which the surface details are not important (Veriki, 2002). Novic and Hurley (2001) proposed three general–purpose diagrams, networks, matrices and hierarchies that suit a range of problem situations especially elementary non-routine problems (Booth & Thomas, 2000; Diezmann & English, 2001). Non-routine problems are the problems that do not involve routine computations but the application of a certain strategy, in this case a diagram, is required in order to solve the problem (English, 1996). Research concerning the efficiency of the use of diagrams in solving non-routine problems is often contradictory and thus inconclusive (Diezmann, & English, 2001; English, 1996; Booth & Thomas, 2000).

The study explored the efficiency of these three diagrams in solving non-routine problems. Two types of tests were administered to 194 12-year old students, each of which consisted of six non-routine problems that could be solved with the use of a diagram. In Test A students were asked to respond to the problems in any way they wished whereas in Test B problems were accompanied by diagrams and students were asked to solve these problems with the use of the specific diagrams presented. The results revealed that there was no statistically significant difference between the two tests. The findings show that students who used the hierarchies and network diagrams in solving some of the problems were more efficient than students who did not use the diagrams. The results also revealed that it was not the same group of students that were successful in the two tests.

Sixth graders' routine-wise application of proportionality: The impact of performance tasks

Wim Van Dooren, CIP&T, University of Leuven, Belgium
Dirk De Bock, CIP&T, University of Leuven, Belgium
Dirk Janssens, Dept. of Mathematics, University of Leuven, Belgium
Lieven Verschaffel, CIP&T, University of Leuven, Belgium

Previous research has shown that primary and secondary students routinely rely on proportionality, and apply it also where this is inadequate, e.g. thinking that the area of a square enlarges k times if its sides are enlarged k times. This irresistible tendency was mostly observed by means of collective tests with school-like word problems. The current study investigates whether students more easily leave their routine problem solving when a mathematical problem is embedded in a more meaningful, authentic performance task. 72 sixth graders – who on a pre-test were found to over rely on the proportional model – were involved in semi-standardized individual interviews. By matching, they were distributed over three interview conditions: - S-condition: The student solved a non-proportional problem, formulated as a typical school-like word problem. - D-condition: The student got the same word problem, together with a drawing. - P-condition: The student was introduced in the real problem context with real materials, and needed to do a meaningful task/performance. The results showed that the provided drawings already had a positive effect on students' answers. But performance tasks clearly had a stronger impact on breaking students' routine-wise application of proportionality. 21 of 24 students in the S-condition solved the non-proportional word problem proportionally. 2 students made another error and only 1 student found the correct solution. In the D-condition, 8 of 24 students solved the word problem proportionally and 16 gave the correct answer. In the P-condition, only 2 students applied a proportional approach, 2 students made another error and 20 students gave the correct answer. Generally, students in the P-condition who found the correct answer needed considerably less time than students in the D-condition, and they were more strongly convinced about the correctness of their answer.

Searching for adaptive and routine problem-solving expertise in student-teachers' learning diaries

Kaarina Merenluoto, University of Turku, Finland

The aim of this study is to use writing to learn mathematics as a teaching approach in order to find out if and how it helps student-teachers to develop adaptive exper-

tise versus routine (Hatano, 1982) or progressive versus best-fit strategies in their problem solving (Bereiter & Scardamalia, 1993). Using routine strategies in problem solving means that the students use formulas and practices they have been used to. The adaptive expertise is seen as an ability to approach new situations flexibly, to have meta-conceptual awareness in their problem solving, and attempt to move beyond their present abilities. Routine problems solving is close to what Bereiter and Scardamalia (1993) refer to best-fit strategy and it deals with the immediate problem quite effectively but it does it so that it minimizes learning. The first-year student-teachers were given an option to work through their course on didactics in mathematics by writing a learning-diary during their first university year. Sixty-two student teachers (12 men and 50 women) decided to write diaries while the rest of them (26%) chose taking the exam. In the diaries the student-teachers were asked to write about their thinking of numbers and about their problem solving in unusual problems with multiplicative structure. They were also encouraged to express their thinking and reflect on them in their process of problem solving. The writings of the students were qualitatively analysed to search for adaptive and routine problem-solving practices. The results indicate that while the majority of student-teachers used routine strategies of mechanical calculations, the writing helped them to develop their meta-conceptual awareness of their thinking. The use of adaptive strategies or a progressive problem solving (one tenth of student-teachers) had a relation to the conceptual understanding of rational numbers and their feelings of self-efficacy in mathematics.

The role of different representations in secondary and university students' learning of function

Iliada Elia, Dept. of Education, University of Cyprus, Cyprus
Athanasios Gagatsis, Dept. of Education, University of Cyprus, Cyprus
Panayiotis Spyrou, Dept. of Mathematics, University of Athens, Greece

The concept of function, as it is understood today, consists one of the most important tools in Mathematics. Nevertheless, many students do not sufficiently understand the abstract but comprehensive meaning of function. Also, the diversity of representations related to function does not seem to facilitate the understanding of this concept. This paper investigates the effect of different modes of representations on the understanding of the complex concept of function by students of different age and educational background, by combining and discussing the main findings of two recent studies. The sample of the first study consisted of secondary school students from Greece, while the sample of the second study consisted of students

of the University of Cyprus. For the first study's needs the tests that were administered to the students included tasks involving the translation of functions from one mode of representation to another. For the second study's needs the test that was administered to the students included tasks of recognition of functions among other forms, given in various types of representation and asked students to give a definition for function and two examples of the use of function in situations of everyday life. For the processing of the data, Gras's implicative statistical analysis was used in both studies. Despite the differences of the studies on the age of their participants and the research methods they employed, an important common finding occurred. Compartmentalization (lack of competence in the conversion between different kinds of representation) was a general phenomenon that was observed in students' behaviour. Thus, an important educational objective is for students to use efficiently various forms of representation in learning functions and communicating with one another in order to prevent them from identifying any of these with functions and help them to develop a deep understanding of the concept.

G 2   25 August 2005   08:30 - 10:30   Room A109

Symposium
Mathematics Education

DEVELOPMENT OF MATHEMATICAL KNOWLEDGE AND SKILLS: WHAT ROLES DO WORKING MEMORY AND EXPERIENCE PLAY?

Chair: Joke Torbeyns, University of Leuven; FWO Flanders, Belgium
Organiser: Joke Torbeyns, University of Leuven; FWO Flanders, Belgium
               Ernest Van Lieshout, Free University of Amsterdam, Netherlands
Discussant: Valerie Camos, University of Bourgogne, France

During the last decade, an ever-growing number of researchers in cognitive and educational psychology has analysed inter- and intra-individual differences in children's and adolescents' mathematical performances. Although these studies significantly increased our knowledge of the cognitive and contextual variables that underlie the development of knowledge and skills in (especially) the domain of (early) arithmetic, Cowan (2004) identifies four important issues that require further investigation, including (a) what role does experience play in causing individual variation and atypical development?; (b) what roles do cognitive factors play in creating individual differences?; and (c) what are the bases of atypical development? (p.

67). This symposium brings together four empirical studies that aim at unravelling the role that both contextual variables, and more specifically children's mathematical experience, and cognitive variables, namely working memory, lexical retrieval speed and processing speed, play in the development of mathematical knowledge and skills. Taking into account the questions cited above, special attention is paid to the development of mathematical knowledge and skills in children and adolescents with, or at risk for, a mathematical disability. Furthermore, all papers attempt to unravel children's and adolescents' mathematical development using highly-sophisticated methods for gathering and analysing data, like the ability-level match design, the integration of correlational and experimental research methodologies, and ex-Gaussian analysis techniques. Moreover, the four papers cover diverse sub-domains of mathematics education; they do not only address the (very frequently studied) domain of simple addition, but also the (far less frequently studied) domains of simple subtraction, single-digit multiplication and multi-digit arithmetic. Finally, next to these theoretical and methodological contributions, all papers clearly discuss the educational significance of the results, (thus) offering guidelines for the optimisation of current practices in mathematics instruction.

Arithmetic achievement, strategy use and cognitive correlates in children with a genetic risk for math disability: the case of Velo-Cardio-Facial Syndrome
Bert De Smedt, University of Leuven; FWO Flanders, Belgium
Pol Ghesquiere, University of Leuven, Belgium
Lieven Verschaffel, University of Leuven, Belgium
Ann Swillen, University of Leuven, Belgium
Koen Devriendt, University of Leuven, Belgium

One of the difficulties in research on children with mathematical disabilities (MD) has been the identification and/or definition of MD. An enrichment of this line of research might be the study of children with a genetic disorder known to be at risk for the development of MD. Therefore, the aim of the present study was to investigate the various cognitive processes implicated in MD in children with Velo-Cardio-Facial Syndrome (VCFS) as a case-study that may provide a window onto MD in general. Twenty-two children (mean age=11.08 years) participated in the study. Eleven children with VCFS were individually matched on sex, IQ, age, and parental educational level to a control group, selected from the same class. We assessed different areas of mathematical cognition (number processing, counting, single- and multidigit arithmetic and word problems) and general cognitive competencies related to MD (working memory, lexical retrieval speed and processing speed). Our

analyses revealed that there were no differences in accuracy between both groups on the math tasks. However, children with VCFS were significantly slower in comparing numbers, which might indicate impairment in their representation of magnitudes. Children with VCFS were also slower in single-digit addition and subtraction and this for carry but not for no-carry items. There were no group differences in multiplication. Both groups used the retrieval strategy equally often. In addition and subtraction, children with VCFS used more (immature) counting strategies than children in the control group. Children with VCFS were slower in the execution of decomposition, but not in counting and retrieval strategies. We did not find any group differences on the general cognitive competencies but children with VCFS scored higher than controls for non-word repetition. Since phonological processing skills may influence growth in mathematical computation this might explain the relatively preserved retrieval of arithmetic facts in children with VCFS.

Solving multi-step subtraction problems: strategy choice and working memory
Ernest Van Lieshout, Free University of Amsterdam, Netherlands

In order to study the role of working memory (WM) during mathematical problem solving, 26 students (age 10.3 years) were selected from grade 3 and 4 of a Dutch elementary school. They had poor to average achievement scores on a subtraction task requiring multi-step solutions (e.g.: 72–34=) and also differed in WM capacity, measured by a sentence span task. During the same type of task they did in one condition or did not in another condition get support when they forgot parts of the problem or subsolutions. Aim of this study was to find converging evidence from a correlational and an experimental approach for a causal role of limited WM resources in poor arithmetic performance.
The errors the children made during the solution process were categorized as (a) errors consisting of forgetting (part) of the problem or a subsolution, and (b) errors that were not caused by forgetting. In the support condition as soon as the child seemed to have forgotten the problem or solution steps the experimenter showed during 5 seconds a card with (part of) the problem or the problem with a subsolution. As expected, the number of errors due to forgetting problem information or subsolutions correlated negatively with performance with WM, whereas no correlation was found between the other errors and WM. It was also shown that experimental reduction of memory load decreased selectively the number of errors that originate from forgetting during the solution process. These two findings together give strong support to the contention that insufficient working memory resources in a situation of relatively high memory load is an important cause of the poor perfor-

mance in multi-step mental arithmetic (i.e. subtraction with regrouping).

The effect of counting speed on developing a reliance on retrieval
Sarah L. Hopkins, University of Western Australia, Australia
Michael J. Lawson, Flinders University, Australia

Some students do not develop a reliance on retrieval for basic addition facts by the end of elementary school. These students experience compounded difficulties at high school as they work to grasp new concepts whilst still depending on finger counts to make the simplest of calculations. The inability to develop, strengthen, and access associations in memory that allow for the rapid and accurate retrieval of answers to problems such as 3+2, 4+5 and 8+7 is a distinguishing and persistent characteristic of a mathematical learning difficulty. The 'two-factor theory' of math fact learning (Robinson, Menchetti & Torgesen, 2002) proposes that a weakness in semantic or phonological processing relating to number underlies the difficulty associated with mastering basic facts. To date the empirical support for this theory has been limited and its application to explain why continued, successful practice does not lead to a reliance on retrieval for simple addition, is not clear. In the current study the simple addition performance of seven adolescents (age 13 to 17), still reliant on counting, was examined using a case study methodology. Each student performed less than 50% of single digit additions using direct retrieval. A regression analysis of reaction times to counting trials revealed counting-speed to be an important factor in helping to explain why practice had not lead to retrieval. For these students, the problem and computed answer were not activated in working memory at the same time, so that practice would not lead to the strengthening of problem-answer associations in memory. Patterns of unusual reaction time variability in counting and retrieval trials were also investigated and explained in terms of working memory limitations. The findings are discussed in terms of supporting and advancing the two-factor theory of math fact learning and the implications for designing alternative methods of instruction are considered.

Strategy selection and strategy efficiency across student populations: effects of mathematical experience
Ineke Imbo, Ghent University, Belgium
Andre Vandierendonck, Ghent University, Belgium
Yves Rosseel, Ghent University, Belgium

Strategy development and strategy use have been shown to differ across cultures,

but also across persons. People indeed vary in their mathematical education, calculation experience, motivational factors and preferences for certain strategies. However, there has been little research examining such differences in adults' cognitive processes in arithmetic. The present study investigated whether student populations with different amounts of arithmetical experience differed in their strategy selection and strategy efficiency. Sixty high-school students participated in this experiment. There was one group with a low level of mathematical experience, one group with an average level of mathematical experience, and one group with a high level of mathematical experience. They all had to solve simple addition and multiplication problems as fast and accurately as possible. Their strategy choices were collected on a trial-by-trial basis, which provided information about strategy selection, whereas their latencies provided information about strategy efficiency. All students also completed a standardized test of arithmetic fluency and a brief questionnaire about their calculator use. Results showed that the student groups differed in both strategy selection and strategy efficiency. Students with more mathematical experience used the fast retrieval strategy more frequently than the less-experienced students. Moreover, when the high-experienced students used a procedural strategy, they did it faster than the less-experienced students. However, retrieval efficiency did not differ across student groups. In addition, ex-Gaussian analyses were used to further examine the present results. These results also indicated that the student groups did differ in procedural efficiency, but did not differ in retrieval efficiency. Finally, regression analyses showed that problem size, mathematical experience, arithmetic fluency, and calculator use were predictive of both strategy selection and strategy efficiency. Implications of the present findings for our views on strategy development and educational settings are discussed.

Symposium
Assessment of Competence

**ASSESSMENTS AND THEIR POTENTIALS FOR STUDENT AND TEACH-
ER LEARNING AND ASSESSMENT: WHAT CAN WE LEARN**

Chair: Theo Wubbels, Utrecht University, Netherlands
Organiser: Dineke Tigelaar, University of Maastricht, Netherlands
               Erica Jane Sainsbury, University of Sydney, Australia
Discussant: Simon Barrie, University of Sydney, Australia

In the last two decades, assessment has undergone a major change. This transi-
tion from testing to assessment (Gipps, 1994) is characterised by the integration
of assessment and instruction, with assessment being viewed as a tool to enhance
instruction and learning (Dochy & McDowell, 1997). This means that assessments
should be meaningful, authentic and challenging to candidates. Moreover, both the
learning process and the outcomes of this process must be assessed in a relevant
context (Dierick & Dochy, 2001). Constructive alignment, i.e. optimal integration
of assessment and the learning process, is an important notion in this respect (Biggs,
1996, 1999). However, more research is needed on theoretical approaches and or-
ganization of assessments in order to enhance their impact on student and teacher
learning and assessment. The aim of this symposium is to explore the potentials of
student and teacher assessments as tools for learning and assessment. Four papers
will be presented. Line Wittek takes a socio-cultural perspective to understand the
potentials of portfolios as an artefact to externalize student knowing. Erica Sains-
bury also takes the socio-cultural perspective, approaching student assessments as
social processes as tools to enhance student learning. Renate Klaassen will present
a case-study of six university lecturers, focusing on the assessment of portfolios
and potentials for staff development and teacher qualifications. Finally, Dineke Ti-
gelaar focuses on judging teaching portfolios, offering recommendations for the
assessment of portfolios that are consistent with considerations on teaching from
a constructivist viewpoint, that enable carefully constructed interpretations of test
information and enhance the intended assessment consequences. After the paper
presentations, Mike Prosser will firstly discuss the different papers and then the
audience will be invited to join. We stimulate a discussion on the potential benefits
of assessments for student and teacher learning and assessment, and the practical

implications for organizing assessments.

Assessment as a vehicle for learning: extending collaboration into testing
Erica Jane Sainsbury, University of Sydney, Australia
Richard Walker, University of Sydney, Australia

Tertiary educators increasingly recognise the benefits for student learning of collaboration and groupwork, and this is reflected in the widespread use of group projects, in addition to examinations. However, it is commonly perceived that examinations should be completed without the opportunity for interaction with other learners or use of relevant resources as they are seen as primarily designed to measure knowledge and skills that individual students have attained up to a specific pointing time. We suggest an alternative approach, based on the sociocultural concept that learning is a fundamentally social process, and the dynamic assessment model described by Magnusson, Templin & Boyle (1997). Within a first year university course, three in-class quizzes consisting of true/false questions are undertaken collaboratively by students. During the quizzes, students are permitted access to any relevant written resources, and are encouraged to discuss their answers with students in their immediate vicinity. In this discussion phase, students are able to put forward explanations, and to defend their reasoning in debate with their peers. The primary advantage of this approach is that students are given the opportunity to learn during the assessment, rather than simply being penalised for not knowing, however a secondary benefit is that the environment of the test is considerably less pressured and a sense of fun is often evident. Drawbacks to the approach include students who simply use the answers of their peers, and the possibility that a more dominant student may persuade others to change from a correct to incorrect answer. Despite this, student feedback both qualitative and quantitative, suggests that student learning is significantly enhanced by this approach. This paper will describe the approach, the test results, and the outcomes of student evaluations.

The portfolio as artefact and actor: a tentative theoretical framework
Line Wittek, Oslo University College, Norway
Laurence Habib, Oslo University College, Norway

This paper presents a tentative framework for the analysis of portfolio assessment. The portfolio is presented as an artefact for learning and assessment in the light of an analytical tool based on three sets of theoretical ideas. The first set of concepts is borrowed from Wartofsky's conceptualisation of perception as a highly evolved

and specific mode of human activity through the creation of artefacts. A second set of concepts is derived from actor-network theory (ANT) as developed by, for example, Latour, Callon and Akrich. The notions of internalisation, appropriation and mastery as described by Wertsch constitute the third set of concepts used for the purpose of enhancing our understanding of the portfolio both as a tool to go through an educational curriculum and as an approach to life-long learning. We propose to consider the portfolio both as an artefact from an historical epistemology perspective and as an actor from an actor-network perspective. We understand artefacts as being means created by people for specific purposes, and human knowing becomes externalised through those artefacts. We treat perception as a historical mode of outward action that is derived from other forms of outward activity. Perceptual activity is performed in the world, is part of that world and is transformed by other activities and through interaction among people or between people and tools. We suggest that the portfolio is inscribed with a certain programme of action and that a large number of actors such as decision-makers within and outside a learning institution, educators and software developers contribute to the process of inscription. The portfolio is in turn translated, i.e. interpreted and appropriated by those who use it (e.g. students, teachers, examiners, administrators…).

From portfolio assessment to total performance assessment of university teachers' competencies
Renate Klaassen, Delft University of Technology, Netherlands
Toine Andernach, Delft University of Technology, Netherlands

In the Netherlands a trend has recently developed in which the quality of university lecturers is no longer dependent on coincidence, but on a systematic approach towards staff development. Delft University of Technology (DUT), for example, has implemented a university qualification programme which focuses on the development of teaching knowledge and skills in a variety of educational settings. During the programme participants follow a series of courses and compile an electronic portfolio of their teaching competencies, which is the basis for awarding the certificate Qualified University Teacher. In recent years, the teaching portfolio has become an increasingly frequent topic of discussion within universities (Seldin, 1998). They are considered by some to be an effective means of documenting the teaching competencies of university lecturers. At Delft University of Technology, the teaching portfolio has been incorporated into the educational qualification programme in order to capture the pedagogical competencies participants have acquired on the job and during the programme. In this paper we discuss a pilot case-study of six

lecturers who finished the portfolio in the academic year 2003-2004, and focus on the assessment procedure of the final portfolio. We conducted a survey and semi-open interviews with the assessors of the portfolios, who had different scientific backgrounds. They were asked to explain how they reached their judgements about the presence or absence of specific lecturing competencies. We argue firstly that observer agreement is only achieved if the assessors have similar backgrounds in educational technology, and secondly that a portfolio assessment is insufficient to assess a lecturer's ability to perform well in practice. Finally, we argue that a portfolio mainly reflects the ability of a lecturer to present him/herself in writing and captures a lecturer's pedagogical competencies only to a limited extent.

Quality issues in judging portfolios: implications for organizing teaching portfolio assessment procedures
Dineke Tigelaar, University of Maastricht, Netherlands
Diana Dolmans, University of Maastricht, Netherlands
Ineke Wolfhagen, University of Maastricht, Netherlands
Cees van der Vleuten, University of Maastricht, Netherlands

Recent insights in teacher research have changed the concepts of teaching and of the way teaching should be assessed. Multiple methods are needed and information should be gathered over a period of time to obtain a comprehensive picture of teachers' knowledge and performance. For assessment to be a positive learning experience, it should be authentic, realistic and meaningful to teachers. A characteristic of modern assessment modes, including portfolios, is that their information is often qualitative and originating from different contexts. Unambiguous, objective rating of portfolios is difficult to achieve, because the richness and unicity of the contents necessitate interpretation and taking account of context before judgement can be passed. From this follows that traditional approaches and criteria for evaluating the quality of an assessment can no longer be applied. The central question of this paper is: Which approach and which quality criteria are most appropriate for the assessment of teaching portfolios, and what implications follow from this for the organization of teaching portfolio assessment procedures? Assessment literature was analysed, seeking to find a methodology that is consistent with and applicable to teacher assessment using portfolios. Consequently, we used the findings as a basis for recommendations regarding the way procedures might be organised for portfolio assessment for both formative and summative purposes. We advocate the use of a hermeneutic, interpretative approach to the judging of portfolios as well as quality criteria to establish trustworthiness in performing and monitoring portfo-

lio assessment. A constructivist approach aimed at generating maximum diversity in interpretations and debate on ideas by the different stakeholders is proposed. Finally, we offer recommendations regarding portfolio assessment procedures for both formative and summative purposes.

G 4   25 August 2005   08:30 - 10:30   Room E102

SIG Invited Symposium
Morality, Religion and Education

CURRENT RESEARCH IN RELIGIOUS AND SPIRITUAL EDUCATION

Chair: Kirsi Tirri, University of Helsinki, Finland
Organiser: Kirsi Tirri, University of Helsinki, Finland
                   Zehavit Gross, Bar-Ilan University, Israel
Discussant: Fritz K. Oser, University of Fribourg, Switzerland

The purpose of this symposium is to explore the current research in religious and spiritual education in different countries. Today some writers use the terms religion and spirituality interchangeable to add linguistic variety to their terminology. However, many researchers define spirituality in contrast to religion. In these definitions religion is usually defined as the organizational, the ritual, and the ideological. The spiritual then refers to the personal, the affective, the experiential, and the thoughtful. The claim, that an individual can be spiritual without being religious or religious without being spiritual has become a standard part of many papers on spirituality (Pargament, 1999). It seems clear that spirituality must be seen as a wider concept than religion. This kind of understanding of these concepts indicates that religion and spirituality share some common areas but they also have their own areas of interests (Stifoss-Hanssen, 1999). We have five presentations from four different countries who explore either religion or spirituality in their studies and an expert discussant who can reflect on the studies from developmental and educational perspectives. Each presentation provides a different view on the theme studied. The study from Netherlands presents the opinions of vocational secondary school students (N=686) concerning the values their teachers should subscribe and enact. The study from Finland explores the differences in religious thinking between sixth-grade students (N=100) and ninth-grade students (N=100). Religious thinking of these students is measured with the test based on Oser's theory on religious judgment. The other study from Finland compares above and average-ability 5th

and 6th grade students (N= 184) spiritual intelligence scale ratings. The study from Israel explores the enhancement of spiritual identity through advanced information and communication technology. The Australian study widens the discussion and explores interfaith education in the context of Judaeo-Christianity and Hinduism.

What students think about their teachers' role
Cees Klaassen, Radboud University Nijmegen, Netherlands

The research project that will be presented is directed to student views about the values and the value-oriented behaviour of their teachers. The research project was carried out in Dutch secondary vocational schools. A number of 686 students gave their opinions in a questionnaire study about the actual and desired values their teachers (should) subscribe or better 'embody' or 'incorporate'. For teachers it is important to be conscious about their own values, because they play such an important part in the moral and political socialization of the younger generation. Reflection on the ways values and especially moral values influence and steer the professional actions of teachers and those of fellow teachers can take place in different ways. In this study we pay attention to the moral values of teachers and their religious identity and the religious denomination of their schools. However in this study and contrary to most empirical studies in this field, we did not ask teachers about their own moral values, but we have asked students to give their opinion about the actual and desirable values. In the presentation of our research we will describe the theoretical starting points, the research design of our study and pay attention to the relations between the opinions of the secondary school students about the moral values and value-oriented behaviour of their teachers working in schools with a different religious mission.

The differences in religious thinking between 6th and 9th graders
Antti Rasanen, University of Helsinki, Finland
Kirsi Tirri, University of Helsinki, Finland
Petri Nokelainen, University of Helsinki, Finland

In this paper we explore the differences in religious thinking between sixth-grade (N=100) and ninth-grade students (N=100). The students are Finnish sixth-graders (12-13 years of olds) and ninth-graders (14-15 years of olds) from two different locations in Finland. The gifted students are represented by students who attend a special school for academically gifted students. The average-ability students are represented by average Finnish students who have not been selected to any special

program for gifted learners. Religious thinking of these students is measured with the test based on Oser's theory on religious judgment. Religious judgment test is an experimental questionnaire based on Oser's theory. The test is executed in three phases: 1) the objects of the experiment read a dilemma text. 2) They answer open questions (which yield qualitative information) and 3) the objects gauge statements, which rest on five developmental stages of Oser's theory. There are two statements for every five development stage, one positive and another negative (in relation to judgment between man and God). The scale is posed in 5-point Liker format from strongly disagree to strongly agree. Oser has modified his research instrument from Lawrence Kohlberg's moral development theory, which means dilemma stories and a semi-clinical interview method. Georg Lind has developed moral judgment test (MJT), which is based on Kohlberg's theory (Lind & Wakenhut 1985; Rasanen 2002). The religious judgment test is based on Lind's test.

The differences in spiritual intelligence between above and average-ability students

Petri Nokelainen, University of Helsinki, Finland
Kirsi Tirri, University of Helsinki, Finland
Martin Ubani, University of Helsinki, Finland

This paper studies the possible existence and nature of spiritual intelligence among academically gifted students. Our sample consists of both above (n=102) and average-ability (n=79) Finnish 5th and 6th grade elementary school students with age median of 12 years. The operationalization of the spiritual intelligence is based on Hay's (1998) and Bradford's (1995) categories of spiritual sensitivity consisting of the following four dimensions: (1) awareness sensing, (2) mystery sensing, (3) value sensing and (4) community sensing. Our first research goal was to study if the items reflect the four dimensions of spiritual intelligence scale in our two empirical samples. Secondly, we examined the differences between responses of the above and average-ability children in the spiritual intelligence scale. We performed Bayesian network modeling to produce the most plausible structure for the spiritual intelligence dimension. The analysis confirmed that spiritual intelligence, based on Hay's (1998) and Bradford's (1995) definitions of spirituality, consisted of following four dimensions in all the samples: (1) awareness sensing, (2) mystery sensing, (3) value sensing and (4) community sensing. The results of reliability analysis showed that original 20-item solution was adequate to describe the spiritual intelligence dimension. We conducted group-wise comparison between responses of the above and average-ability children in the spiritual intelligence scale. Results

showed that in three items out of five the above average-ability children reported higher values for the mystery-sensing dimension than the average-ability children. This finding supports the assumption that typical characteristics of gifted children include creative use of imagination. In addition, the above average-ability children rated item measuring social conscience clearly higher than the average-ability children. We found no statistically significant difference between the group means in awareness sensing and value sensing dimensions of the spiritual intelligence scale.

The enhancement of spiritual identity through advanced information and communication technology
Zehavit Gross, Bar-Ilan University, Israel

This paper aims to examine how media and computers can serve as a vehicle for the enhancement of spiritual and religious identity. An innovative typological model (RSTM) for assessing secularity and religiosity and its implications on the need for utilizing advanced information and communication technology (ICT) are discussed. In addition, another innovative theoretical model (KPIF) describes how, through the use of advanced ICT, information is transformed into knowledge and becomes an integral part of the meaning-making and spiritual identity-formation process.

Interfaith education: Exploring the space between Judaeo-Christianity and Hinduism
Terence J. Lovat, The University of Newcastle, Australia

The paper will explore the potential for those engaged in multi-faith dialogue to come to enriched understanding not only about other religious traditions but about their own tradition and, indeed, their own selves. Employing notions of knowing that stretch back to Aristotle and have been reinvigorated by moderns such as Habermas, the paper will explore the potential for Judaeo-Christians to come to this enriched understanding through dialogue with Hinduism and its associated derivative spiritualities. The author will employ some of his own empirical investigations in making the case that multi-faith enrichment implies far more than enhancing one's head knowledge. The thesis behind the paper is that multi-faith dialogue possesses an educational and formative potential quite beyond that which is normally conceived and explored through the goals and processes implicit in most religious studies and interfaith religious education programs. The more sophisticated knowledge and formation is seen theoretically in the epistemological work of key figures like Aristotle, Aquinas and Habermas, and in practical terms in the discipleship of

figures like Bonhoeffer and Dom Bede Griffiths. The species of knowing and understanding that stands at the centre of these works promises not only that level of communicative competence that lies beyond cognitive enhancement but, moreover, a profoundly critical and self-reflective knowing that necessitates that any claim on the part of an individual to 'know' is accompanied by practical action [or what Habermas describes as 'praxis']. The first part of the paper will briefly explore these theoretical perspectives, while the second part of the paper will make application of the theory to the practical goals that can ensue from the Judaeo-Christian engaging in intensely honest study of Hinduism and its derivative spiritual traditions.

G 5   25 August 2005   08:30 - 10:30   Room E010

Symposium
Epistemological Beliefs

CONCEPTUAL AND METHODOLOGICAL ISSUES OF RESEARCH ON EPISTEMOLOGICAL BELIEFS

Chair: Elmar Stahl, University of Muenster, Germany
Organiser: Elmar Stahl, University of Muenster, Germany
              Rainer Bromme, University of Muenster, Germany
Discussant: Geraldine Clarebout, University of Leuven, Belgium
              Gale Sinatra, University of Nevada, United States

Research on epistemological beliefs, i.e. learners' beliefs on the nature of knowledge and knowing, has considerably increased during the last years. Epistemological beliefs are examined as condition and as result of learning processes. They e.g. affect students' processing and interpretation of textual information, comprehension monitoring, conceptual change, learning processes within computer-based scenarios, and information retrieval within the Internet. Further on, there is evidence that students' beliefs about knowledge and academic concepts depend on teaching style and epistemological beliefs of their teachers. Therefore, epistemological beliefs also constitute a promising basis to define teaching and learning goals in science education (scientific literacy). Nevertheless, a variety of conceptual and methodological issues have to be taken into account within further studies. To specify the effects of epistemological beliefs it seems necessary to find theoretical differentiations of this construct, e.g. concerning the numbers and kinds of dimensions the concept encompasses, interactions between epistemological beliefs and other constructs of learn-

ing and cognition, and the location of epistemological beliefs within the cognitive system. Existing instruments seem to be insufficient to get deeper insight into these issues. For example Schommers' Epistemological Questionnaire is often criticised concerning reliability and validity, but even revised versions of this questionnaires often inherit the same type of problems. The aim of the symposium is to present new research related to these conceptual and methodological issues. The papers deal with issues of interactions between epistemological beliefs and other (meta-)cognitive variables and help to get a deeper insight into the fundamental nature of the construct epistemological beliefs. Further, new instruments and tasks to grasp epistemological beliefs are presented and experiences with validity and reliability of existing questionnaires are reported. All papers include suggestions of conceptual differentiations of the construct epistemological beliefs. The symposium should inspire the exchange of experiences of researchers dealing with these issues.

The development of epistemological reasoning in primary and secondary school children
Cornelis de Brabander, Leiden University, Netherlands
Jeroen Rozendaal, Leiden University, Netherlands

In a first study, a hypothesized transition from an absolutistic to a multiplistic level of epistemological reasoning was confirmed (Rozendaal, de Brabander, & Dahl, 2003). Objective of this study was to replicate our first study and to track the transition from multiplism to evaluativism. Following Kuhn, Cheney, and Weinstock (2000), it was hypothesized that the transition from absolutistic to multiplistic reasoning in the social domain precedes this transition in the physical domain, whereas in the transition from multiplistic to evaluativistic reasoning this is expected to be reverse. Newly developed interpretation and evaluation tasks were used to measure the development of epistemological reasoning in children (N=48). Differences in performance between groups (5th grade, 7th grade, 1sty secondary pre-vocational education, 1sty secondary general education), gender, domains (physical vs. social phenomena), and task presentation types (pictures vs. stories) were compared by MANOVA. Relationships between domains and task presentation types were explored by PCA. With respect to the occurrence of absolutistic and multiplistic responses, early results indicated a significant difference in the expected direction between first year general secondary education students and the other groups. With respect to the transition from multiplism to evaluativism, no group effect was found. Overall, students performed better on situations in the physical than in the social domain. Earlier we made a conceptual distinction between an operational and a

metacognitive level of epistemological beliefs. The results in this study and the differences with our earlier study lead us to conjecture that reasoning at the operational level of epistemological beliefs is intrinsically intertwined with the problem solving capacity of the individual. This would explain why all known epistemological positions are found repeatedly in subjects of all ages. The development of metacognitive epistemological beliefs, however, is more sophisticated and not to be expected until rather late in one's educational career.

Evidence-based reasoning as a component of epistemological beliefs in young adults?
Petra Barchfeld, University of Munich, Germany
Beate Sodian, University of Munich, Germany
Merry Bullock, American Psychological Association, United States

In numerous studies, epistemological beliefs have been operationalized using the theoretical model and method provided by Schommer (1990). From her Epistemological Belief Questionnaire (EB-scale) she derived four factors: Innate Ability (1), Simple Knowledge (2), Quick Learning (3), and Certain Knowledge (4). The present study concentrates on the connection between epistemological beliefs and one type of applied epistemology. In our investigation, which is based on Kuhn (1991), people were asked to generate empirical evidence relevant to testing beliefs they hold with some conviction (i.e. create a hypothetical study analysing causes for criminal recidivism). Our main aim was to validate the EB-scale by linking epistemological beliefs to evidence production. Low scores on the EB-scale should correlate with genuine evidence production and the generation of alternative theories in the recidivism interview. We administered the Epistemological Belief Questionnaire and the recidivism interview to N 63 male and 57 female participants with a mean age of 21 years. Consistent with Kuhn's studies subjects have difficulty distinguishing evidence generation from theory elaboration. The majority of the 21-year-olds failed to produce genuine evidence. Furthermore, there were only moderately negative correlations between just one belief dimension Certain Knowledge and valid evidence production and the development of alternative theories. Obviously, there is a difference between epistemological beliefs and the production of evidence based on such beliefs. It may be assumed that the acquisition of evidence production skills consists of at least two components: Mature epistemological beliefs and specific knowledge about methods for producing valid evidence (like controlled experiments). This kind of methodological knowledge has not yet sufficiently been taken into account when analyzing people's epistemological beliefs.

CAEB: A semantic differential to measure connotative epistemological beliefs
Dorothe Kienhues, University of Muenster, Germany
Elmar Stahl, University of Muenster, Germany
Rainer Bromme, University of Meunster, Germany

A semantic differential (CAEB – connotative aspects of epistemological beliefs) that we developed to examine students' connotative epistemological beliefs is presented. In CAEB students read an initial sentence like knowledge in genetics can be described as: and are asked to judge their beliefs about knowledge (thus in this case about genetics) on 24 pairs of adjectives (like: dynamic–static; objective–subjective). The selection of adjectives is based on searches in reviews and experimental studies on epistemological beliefs. CAEB allows to establish judgement-profiles on item level as well as to calculate factor scores of subject. In two studies with large samples of university students a stable three factor solution was found with the dimensions: texture (beliefs about structure and accuracy of knowledge), variability (beliefs about stability and dynamic of knowledge) and genesis (beliefs about creation of knowledge). In these studies CAEB also proved to be able to measure differences of students' epistemological beliefs for different domains of natural sciences. Further, we found effects of epistemological beliefs on learning processes and outcomes. Theoretically CAEB is based on our proposal to differentiate between connotative and denotative aspects of epistemological beliefs. Denotative aspects refer to students' explicit assumptions about the nature of knowledge and knowing - often in reference to a specific context. Connotative aspects refer to affective-evaluative associations about knowledge and knowing - often derived from more general, less context-dependent beliefs. We assume that students' responses to items in traditional questionnaires (for example the Schommer questionnaire) often result as a mixture of connotative and denotative aspects. We suggest to develop different types of instruments for measurement of connotative and of denotative aspects. CAEB which is focussed on the connotative aspect could supplement existing questionnaires, which are - if further advanced and appropriately contextualized- better suited for the measurement of denotative aspects of epistemological beliefs.

Which dimensions should the construct 'epistemological beliefs' comprise?
Barbara Moschner, University of Oldenburg, Germany
Hans Gruber, University of Regensburg, Germany

Theoretical interest and empirical research in the area of personal epistemology

have grown tremendously in the past few years. Although research on epistemological beliefs is flourishing, key issues are still not resolved concerning the definition of epistemological beliefs, the boundaries of the construct, and the appropriate measurement. The aim of the present research is to develop a questionnaire for epistemological beliefs which integrates different lines of research. Epistemological beliefs were conceptualised as a broader construct than in most studies, including for example beliefs about gender related ways of knowing and about the cultural bound nature of knowledge. Although these dimensions are discussed in the literature, they have not yet been addressed as dimensions in questionnaires. A pilot study with a newly developed questionnaire was conducted during a summer-school of the Studienstiftung (German National Academic Foundation). Subjects were 104 scholars of the Studienstiftung, half of them from Germany, the other half from different countries. Based on exploratory factor analyses and internal consistency estimates of reliability we identified ten sub-scales, which were considerable different from Schommer's scales. The results of the pilot study encouraged us to revise the questionnaire using a broader sample. In this study a revised version of the questionnaire was administered in an online-study. The sample included 223 females and 91 males. Exploratory factor analyses identified seven sub-scales, which proved to be highly reliable. Sub-scales were: absolute knowledge, learning to learn, relativity of knowledge, gender-related ways of knowing, cultural bound nature of knowledge, silence of knowledge, and innate ability. In a next step, translations of the new instrument into different languages will be used to do cross cultural research about epistemological beliefs.

The role of personal epistemology and disciplinary background on interpretation of controversial ethical issues
Matthias Nueckles, University of Freiburg, Germany
Markus Salhab, University of Freiburg, Germany

The ability to evaluate controversial issues and to take up a position in complex debates is a learning goal in many academic disciplines. Research has shown that people's interpretations of controversial issues are influenced by factors such as their prior knowledge, personal values and epistemological beliefs, that is, people's assumptions about the nature of knowledge and the processes of knowing. Within the growing body of empirical reserach on epistemological beliefs, comparatively few studies have been devoted to the question how disciplinary background, that is, an individual's socialisation by a discipline, influences or interacts with personal epistemology. To explore the relationship of disciplinary background and personal

epistemology, an explorative study was conducted. 38 advanced students of biology and philosophy (master and doctoral level) participated. They read a text which presented two controversial ethical positions regarding the use of embryonal stem cells for medical research. The participants' task was to write a paragraph in which they explicated and justified their own position with regard to the ethical debate presented in the text. Predictors of the quality of the participants' interpretations were their disciplinary background, their prior knowledge, and their epistemological beliefs. The results revealed differences in preferred ethical positions and epistemological beliefs (i.e., certainty of knowledge) between students of biology and students of philosophy. At the same time, the quality of the students's interpretations was mainly influenced by domain independent factors. Multiple regression analyses showed an influence of simple knowledge and fixed ability on the quality by which a personal ethical position was elaborated. These results suggest a differentiated picture regarding the interplay between disciplinary background and personal epistemology: Disciplinary background influenced certain aspects of epistemological beliefs, whereas the ability to define one's position was mainly influenced by domain-independent aspects of personal epistemology, which were unaffected by disciplinary background.

G 6   25 August 2005   08:30 - 10:30   Room A112

Symposium
Problem Solving

INSTRUCTIONAL SUPPORT FOR ENHANCING STUDENTS' INFORMATION PROBLEM SOLVING SKILL

Chair: Saskia Brand-Gruwel, Open University of the Netherlands,
             Netherlands
Organiser: Saskia Brand-Gruwel, Open University of the Netherlands,
             Netherlands
Discussant: Jean-francois Rouet, University of Poitiers, France

Presently, in education students are often faced with information problems: situations or assignments which require them to identify information needs, locate appropriate information sources, extract and organize relevant information from each source, and synthesize retrieved information. It is often assumed that students become information literate and master the complex cognitive skill of information

problem solving all by themselves.. However, research reveals that without adequate support most students are unable to locate information efficiently and effectively. They have, for instance, difficulty dealing with complex information that is spread across multiple sources and fail to accurately regulate their information problem solving process. So special attention to foster the development of the information problem-solving skills is called for. The papers in this symposium revolve around the issue of how instructional support may resolve these skills deficiencies. Special emphasis is put on the support of metacognitive or regulation activities. Stadtler, Bromme and Stahl, for instance, reveal that it is possible with the computer-based tool 'met.a.ware' to fosters laypersons use of metacognitive strategies while solving an medical information problem. The research of Schorr and Gerjets evaluated CIS-WEB (Competent Information Search in the World Wide Web), a training program that sought to improve pupils' processing of information in Web search tasks. The training was found to enhance pupils? declarative knowledge about the Web and their search performance. Lazonder's work provides insight in the surplus value of collaboration during information problem solving, and his conclusion is that collaboration promotes self-regulation. Wopereis and Brand-Gruwel argue that instruction in information problem solving should be embedded in the curriculum. An instruction to foster students information problem solving skills was embedded in a psychology course. Results revealed positive effects on students regulation activities.

Laypersons and the WWW: The integration of complex documents while searching the WWW for medical information
Marc Stadtler, University Muenster, Germany
Rainer Bromme, University Muenster, Germany
Elmar Stahl, University Muenster, Germany

According to the theory of documents representation (Perfetti, Rouet & Britt, 1999), success-fully dealing with multiple texts requires readers to form documents models, i.e. to deal with contents and sources. This is particularly relevant when laypersons are searching for medical information on the WWW, since medical information is complex, sometimes contradictory and differ with regard to quality. However, currently little is known about factors fostering the formation of documents models in authentic reading situations like laypersons' internet re-search. We assume that the active use of metacognitive strategies is crucial to the formation of documents models. The acquisition of content knowledge may be supported by comprehension monitoring processes while the acquisition of knowledge about

sources requires layper-sons to intensely evaluate sources. To test this assumption we conducted a study in which we fostered the use of metacognitive strategies using the computer-based tool met.a.ware. In met.a.ware laypersons are prompted to engage in metacognitive activities (monitoring and evaluating) each time they paste information into a text window. One hundred undergraduate university students with little medical knowledge searched the WWW for information about the topic of cholesterol. The availability of metacognitive prompts was systematically varied across four met.a.ware conditions: Par-ticipants either received evaluation-prompts, monitoring-prompts, both types of prompts or no prompts. A control group took notes using paper and pencil. We expected evaluation-prompts to foster the acquisition of knowledge about sources and monitoring-prompts to support the acquisition of content knowledge. Results show that laypersons receiving evaluation-prompts outperformed control subjects with respect to knowledge about sources. Further, laypersons receiving monitoring-prompts acquired significantly more knowledge about facts, but did not perform better on a compre-hension test. Summarizing, the results reveal that it is possible to support laypersons in dealing with complex information on the WWW and underline the importance of metacognition in dealing with multiple sources.

Student collaboration to promote self-regulation during information problem solving
Ard Lazonder, University of Twente, Netherlands

This study compared Pairs of students with Single students in Web search tasks. The underlying hypothesis was that peer-to-peer collaboration encourages students to articulate their thoughts, which in turn has a facilitative effect on the regulation of the search process as well as search outcomes. Both hypotheses were supported by the results. Pairs located the target information more often and in less time than Singles did. Pairs also employed a richer repertoire of search strategies and were more proficient in monitoring and evaluating their search behavior. Implications of these findings for practice and further research are discussed.

Competent information search in the World Wide Web: Development and evaluation of a Web Training for pupils
Tina Schorr, Knowledge Media Research Center, Germany
Peter Gerjets, Knowledge Media Research Center, Germany

Today's information society creates an omnipresent demand for immediate access

to comprehensive information about diverse topics. The World Wide Web seems to be today's information environment of choice to meet these needs. However, the web is characterized be a couple of particular features that impose specific cognitive processing demands and knowledge requirements onto information seekers. The common assumption that pupils may acquire these prerequisites by attending one of the currently popular web trainings in school has to be doubted. This is because existing web trainings for pupils predominantly focus on technical aspects of the Web and neglect most of the abovementioned cognitive aspects of skilled information search. In a first study we evaluated existing web trainings for pupils and demonstrated their lack of effectiveness for teaching competent information search in the web. In a second study we evaluated a training program CIS-WEB (Competent Information Search in the World Wide Web) that was developed to improve pupils' processing of information in order to foster their ability to competently search for information in the WWW. The training is based on two types of theoretical analyses: A conceptual analysis based on models of information literacy and information retrieval allowed us to identify five content domains that should be covered by effective web trainings. These content domains specify skills and knowledge required by users for the performance of a competent information search within the web. Additionally, a task analysis of information problems was used to define a generic subgoal structure that covers different types of information problems occurring in the web The empirical evaluation of CIS-WEB yielded that the training enhanced pupils' declarative knowledge about the web and their search performance far beyond conventional web trainings. Consequently, CIS-WEB can be used as an effective instrument to foster pupils' competent information search in the WWW.

The effect of embedded instruction on solving information problems
Iwan Wopereis, Open University of the Netherlands, Netherlands
Saskia Brand-Gruwel, Open University of the Netherlands, Netherlands

Students in higher education are often confronted with learning tasks or assignments that require them to identify information needs, locate information sources, extract and organize information from each source, and synthesize information from a variety of sources. This set of activities is frequently defined as Information Problem Solving (IPS). IPS can be regarded as a complex cognitive skill. Therefore, in order to acquire the skill, extensive instruction is necessary. In this study a pretest posttest control-group design was used to examine the effect of IPS instruction on student's performance of the IPS skill. Since IPS is often firmly rooted in profes-

sional tasks, the IPS instruction was not designed 'in isolation', but embedded in a larger instructional system. This instructional system included a web-based course on research methodology within the domain of psychology. During the experiment sixteen Psychology students followed the web-based course. Half of the sixteen students attended a version of the course with integrated IPS instruction. The other half completed a variant of the web-based course without extra IPS instruction. Before and after the course the students were asked to solve a complex information problem while thinking aloud. The results of the pretest and posttest indicate that the experimental group performs aspects of the IPS constituent skills 'search information' and 'scan information' more often. Further, students in the experimental group regulate their process more often after training. An increase of regulation activity has a positive effect on the execution of the IPS skill.

G 7   25 August 2005   08:30 - 10:30   Room E003

Symposium
Technology in Education and Training

THE APPLICATION AND EVALUATION OF AUTHORING TOOLS IN RESEARCH AND PRACTICE

Chair: Susanne Narciss, University of Dresden, Germany
Organiser: Shaaron Ainsworth, University of Nottingham, United Kingdom
                Caroline Dupeyrat, University of Toulouse, France
                Antje Proske, University of Dresden, Germany
                Maria Virvou, University of Piraeus, Greece
Discussant: Ton DeJong, University of Twente, Netherlands

Authoring tools allow teachers and researchers to create innovative learning environments at a fraction of the time and cost that is associated with creating such environments from scratch. With the mounting availability of such systems, it is increasingly important to evaluate the practicality and effectiveness of authoring tools to enhance educational practice . In addition such tools provide valuable opportunities to research issues in learning and instruction. The purpose of the symposium is therefore to present and discuss studies investigating either how teachers use authoring tools to create learning environments and experiences for their students, or how researchers use authoring tools to create learning environments with specific instructional features in order to examine how students learn with these

environments. The papers of this session will go beyond simple descriptions to discuss a) the realistic benefits and constraints on how teachers or instructors use such tools for creating adaptive textbooks (Maria Moundridou & Maria Virvou, University of Piraeus, Greece); b) the experiences of both authors and learners in order to evaluate the value of simple authoring tools (Shaaron Ainsworth, University of Nottingham, UK); c) the roles such tools may play in helping students to develop information literacy by authoring their own learning experiences (Antje Proske, Susanne Narciss & Hermann Koerndle; University of Dresden, Germany) d) the roles that students themselves might play in learning efficiently with learning environments created with such authoring tools (Caroline Dupeyrat, Christian Escribe & Hermann Koerndle; University of Toulouse, France). Important issues and directions for future research raised by these papers will be discussed by Ton de Jong (University of Twente, Netherlands).

When does increasing the usability of authoring tools at the cost of simplifying the resulting learning environments pay off?
Shaaron Ainsworth, University of Nottingham, United Kingdom

The REDEEM authoring environment was developed to allow educators with no programming knowledge to design learning environments (simple Intelligent Tutoring Systems) for their students in a time-effective manner. REDEEM works by allowing authors to import existing computer-based training (CBT) as a domain model and then use the REDEEM tools to overlay their teaching expertise. Consequently, the success of this approach depends on two key factors. Firstly, on the extent to which the authoring tool is usable by its intended author population (classroom teachers, university lecturers, adult trainers), and secondly, whether the resulting systems are effective at supporting learning. Over the last 5 years, a number of different studies have been conducted to examine whether REDEEM has met its goals. Evaluation of the authoring experience has found that REDEEM is usable by authors in a time efficient manner and that it provides much appropriate functionality. However, it has raised the issues of how to provide feedback to authors on their decisions and whether the overall knowledge-based (as opposed to story boarding) approach is the most appropriate way of authoring. Evaluation of learning outcomes have shown that REDEEM is more effective at supporting learning than the existing CBT it is based upon. However, the effectiveness depends on the extent to which learners are prepared to engage with REDEEM's interactive features. We conclude that in many ways REDEEM has exceeded our initial expectations for it, but that improvements to its design could further enhance its functionality.

How to apply study 2000-tools for fostering information literacy in university instruction

Antje Proske, University of Dresden, Germany
Susanne Narciss, University of Dresden, Germany
Hermann Koerndle, University of Germany, Germany

Study 2000-tools provide facilities for teachers and learners for integrating, representing, and presenting various materials and media into a web-based multimedia learning environment. Additionally they provide an exercise-format editor which supports the construction of various learning tasks and exercises. The aim of the study 2000-tools is to foster the acquisition of information literacy by facilitating the active construction and communication of knowledge with modern information technologies (Narciss & Koerndle, 1998; Narciss, Koerndle, & Proske, 2004; Proske, Koerndle & Narciss, 2004). This paper presents how study 2000-authoring tools can be applied in project based university courses. The learning aim of these courses was that students acquire and improve information literacy by using the study 2000-tools for creating a module for a multimedia learning environment. At the end of each course, these modules were integrated in a web-based learning environment, and made accessible to the course members and other students via the Internet. Furthermore, we evaluated the acceptance and estimated learning gains of each course compared to conventional university courses. The results of these evaluations indicate that the application of authoring tools did not only increase psychological knowledge acquisition, but also information literacy. Implications of these results will be discussed with regard to the restrictions and benefits of applying authoring tools in project-oriented university courses.

Applying of study2000-multimedia learning environments in research on learners motivation and behavior

Caroline Dupeyrat, University of Toulouse II, France
Christian Escribe, University of Toulouse, France
Hermann Koerndle, University of Dresden, Germany

Innovative multimedia learning environments have the potential to enhance students' knowledge acquisition processes and to foster deep understanding. However, a number of reviews of educational technology research literature (e.g., Dillon & Gabbard, 1998; Maki & Maki, 2002) conclude that not all students benefit from their use. It is therefore critical to better understand which factors affect students' engagement and learning in multimedia learning environments. Hartley & Bendix-

en (2001) recently stressed the need for more research into learner characteristics and their implications for the use of computer-based technologies in educational contexts. Following this perspective, the present study examined three of these potential individual factors: students' achievement goals, attitude towards multimedia learning environments, and study styles. Participants were 201German university students attending a lecture on introductory psychology. The study was conducted in a natural learning setting with a multimedia learning environment which was created with study2000-authoring tools (Studierplatz: working space for learning and studying ; Narciss & Koerndle, 1998; Proske, Koerndle & Narciss, 2004 http://studierplatz2000.tu-dresden.de). This multimedia learning environment complemented the introductory psychology lecture. Participants first completed a survey measuring their achievement goals, attitude towards multimedia learning environments, and study styles. They then were free to study on the Studierplatz as often and as long as they wanted. This program offers a variety of learning materials (e.g., texts, exercises) and tools (e.g., highlighting, note taking, self-monitoring and self-evaluation tools, etc.). Results highlighted the important roles of achievement goals and attitude in determining the actual use of the system. Study styles, however, were not strongly related to study activities in the multimedia program. Implications of these results will be discussed with regard to the question of how to foster active self-regulated learning with multimedia learning environments.

Evaluation studies concerning the authoring side of WEAR
Maria Virvou, University of Piraeus, Greece
Maria Moundridou, University of Piraeus, Greece

WEAR is an authoring tool for building Intelligent Tutoring Systems (ITSs) over the Web. Such tools provide environments that can be used by authors-instructors who are not necessarily computer experts to easily develop cost-effective ITSs. However, even through using an authoring tool, the design of courses by instructors is not necessarily easy for them. WEAR's approach for providing support to the instructional designers is mainly based on the instructor modelling component, a special component incorporated in WEAR's architecture. This paper reports on two evaluation studies on WEAR. The first study was a usability evaluation of the system's authoring environment, whereas the second one explored the utility of the existence of the instructor modelling component in WEAR's architecture. Both studies provided encouraging results. In the usability evaluation, authors were quite satisfied with the functionality of the system, they found it very friendly and easy to use and most importantly they stated that it could be really useful. In the second

study, almost all instructors found useful to consult other peers through sharing the design of the course in order to redesign it for future use. Furthermore, they showed interest in seeing the courses that were created by expert peers rather than those created by novice ones. Since the instructors' level of expertise is information that the individual instructor models hold, the conclusion we reach is that the instructor modelling component is a valuable part of WEAR. The studies reported in this paper provided incentive for future work both in the direction of improving WEAR and in conducting further research in the unexplored area of instructor modelling in ITS authoring tools.

G 8   25 August 2005   08:30 - 10:30   Room E112

Symposium
Instructional Design

SUPPORTING COHERENCE FORMATION IN LEARNING WITH MULTIPLE REPRESENTATIONS

Chair: Tina Seufert, Georg-August-University Goettingen, Germany
Organiser: Tina Seufert, Georg-August-University Goettingen, Germany
                Roland Bruenken, Georg-August-University Goettingen,
                Germany
                Rolf Ploetzner, University of Education, Freiburg, Germany
Discussant: Shaaron Ainsworth, University of Nottingham, United Kingdom

Computer based learning environments often comprise multiple representations such as texts, pictures, graphs and tables to present information to learners. Within these environments, successful learning requires that the learners understand each of these representations as well as construct a coherent mental representation, for instance by relating corresponding elements of different representations. This process of mental integration of representations, named coherence formation, is highly demanding with respect to the learners' cognitive and meta-cognitive skills. There is empirical evidence that this coherence formation process is not always successful and especially learners with lower levels of prior knowledge or other learning prerequisites often have difficulties in integrating multiple representations. Thus, learners often fail to come to a deeper understanding of the overall subject matter without help for coherence formation. The symposium aims at presenting and discussing various empirical studies in which different strategies for supporting coher-

ence formation have been evaluated. These support strategies vary along a number of dimensions such as (1) when should support be offered (before or while the learning takes place), (2) which kinds of activities are requested from the learner, (3) which level of mental processing is addressed, (4) who provides the assistance (the teacher, a peer student or the computer) and (5) how does support interact with the learners' prerequisites and special demands. The issues addressed in the symposium are highly relevant to researchers and developers interested in the design of effective multimedia learning environments as well as to psychologists concerned with the cognitive and metacognitive processes of learning with multiple representations.

Effects of active integration of texts and visualizations on learning
Mareike Florax, University of Education, Freiburg, Germany
Rolf Ploetzner, University of Education, Freiburg, Germany

Our research aims at supporting coherence-building processes during learning with explanatory texts and visualizations. Thereby, we focus on texts and visualizations which complement each other. In the past, two ways of presenting texts and visualizations to learners have frequently been compared with respect to their effect on learning success: spatially separated and spatially integrated texts and visualizations. It has repeatedly been demonstrated that learning with spatially integrated material is superior to learning with spatially separated material. John Sweller and his colleagues subsumed these findings under the term split-attention effect. Most of the current models that conceptualize the cognitive processes which take place during learning with multiple representations assume that constructing an integrated coherent model of the different kinds of information is crucial for successful learning. An instructional task that is explicitly designed to foster such coherence-building processes is the active spatial integration of texts and visualizations by the learner. In three experiments it was shown that – compared to learning with material that is already spatially integrated – learning can be further improved when learners spatially integrate texts and visualizations themselves. The empirical findings also indicate that the active integration of texts and visualizations by a learner might be increasingly beneficial the more complex the learning material. In order to investigate this hypothesis, we conduct an experimental study in which the complexity of the learning material is systematically varied within the same application domain. We expect that the active integration of texts and visualizations will be most successful when the most complex material is processed by the learners. We assume that the active integration of differently presented information evokes and supports

cognitive coherence-building processes and, therefore, is particularly helpful in intellectually demanding learning situations.

Constructing coherent understanding of physical concepts through the interpretation of multiple representations
Orit Parnafes, University of California, Berkeley, United States

This research concerns the development of conceptual understanding of a complex physical phenomenon through the use of physical devices and computer-based representations. An important aspect of scientific understanding is the ability to interpret various physical situations according to abstract scientific models and constructs. I examine the role of multiple representations in promoting this goal. In my talk, I will describe a mechanism by which students develop their understanding of natural harmonic oscillation (and related phenomena) by seeking coherence in their understanding of multiple representations of oscillation. The data was collected from case studies in which pairs of students were engaged in an exploration activity. The students explored the phenomenon of harmonic oscillation using physical oscillators and a simulation consisting of multiple representations. In the course of the activity, most students demonstrated a substantial development in their understanding of harmonic oscillation and related concepts. To analyze the process of developing understanding, and the role of multiple representations in this process, I use the theory of coordination class (diSessa & Sherin, 1998). Coordination class theory is a view of conceptual attainment that emphasizes difficulties of aligning different ways of seeing the same abstract concept in different circumstances. In this case, different circumstances comes down mainly to the use of different representational forms. Analysis of events from several case studies reveals that by trying to coordinate understanding of multiple representations and seeking coherence across different interpretations, students go through a process of reconstruction and refinement of their conceptions towards normative understanding.

Visualization and metacognitive control in science text comprehension: Effects of a training program
Claudia Leopold, Duisburg-Essen University, Germany
Robert Huellen, University Duisburg-Essen, Germany
Elke Sumfleth, University Duisburg-Essen, Germany
Detlev Leutner, University Duisburg-Essen, Germany

The aim of this training experiment was to investigate whether the visualization

of text content during reading and its metacognitive control can be trained as a learning strategy to improve science text comprehension. In addition it was tested whether the visualization strategy training could be conducted in a teacher-based or a computer-based format. Following pre-studies with simple visualization instruction treatments, 82 students participated in a training experiment using a 2x2-factorial design plus control group, including the factor training content (visualization training with metacognition, visualization training only) and the factor training format (computer-based, teacher-based). The control group received no training. After the training, students were given a science text to study, and the four experimental groups were instructed to apply the visualization strategy. Afterwards, students were tested on strategy knowledge and were asked about strategy application during reading. Finally, students were given 10 min to answer a multiple-choice comprehension test on text content. This test was administered again three months later. Results showed that (1) students gained strategy knowledge according to the experimental training conditions. (2) Students of the experimental groups reported significantly more visualization strategy application than the control group. (3) Concerning the immediate comprehension test, the two visualization training groups outperformed the control group, but did not differ of each other. Concerning the delayed comprehension test, however, the metacognitive control group outperformed the visualization only and the control group. Training format had no effect. On the theoretical side, the results support the importance of coherence formation based on active text processing with multiple mental representations. Especially the metacognitive control of strategy use seems to be necessary for long-term comprehension. On the practical side, the results demonstrate the specific value of a combined visualization and metacognitive control training.

Supporting coherence formation in multimedia learning on different levels of processing
Roland Bruenken, Georg-August-University Goettingen, Germany
Tina Seufert, Georg-August-University Goettingen, Germany

Learning with multiple representations is a highly demanding cognitive process because learners have to build referential connections between representations in order to construct a coherent mental representation. There is empirical evidence that learners often have difficulties with this process. Several approaches for supporting coherence formation have been examined, which can be assigned to two different types of helping strategies. First, learners can be assisted to recognize corresponding elements and structures on a surface feature level, e.g. by colour cod-

ing. Secondly they can be supported on a deep structure level, i.e. by explaining the meaning of corresponding structures more or less explicitly. In 2 initial studies with 60 and 86 participants we tested surface and deep structure level helps, each compared to no-help conditions. Both studies showed that help groups outperformed non-help groups on different levels of knowledge acquisition. In a subsequent 2x2 experimental study currently conducted with 120 university students, the effects of these two strategies are compared. In a learning system about chemistry help for coherence formation is given either on a surface feature level (by hyperlinking), on a deep structural level (by verbal explanations of the interrelations between the representations), on both levels of help or learners received no help at all. Knowledge acquisition is assessed on different levels of processing by a recall and a comprehension test. With respect to recall performance we assume that help on a surface feature level is most effective because it highlights relevant details of the learning material, which have to be memorized without overloading the learners? capacity by unnecessary information. In contrast, deeper level processing should be better supported by help on a deep structural level especially in combination with surface level help because the hyperlinks guides learners attention on relevant connections that are additionally explained by the semantic help.

G 9   25 August 2005   08:30 - 10:30   Room A018

Symposium
Academic Learning

ACADEMIC DEVELOPMENT WORKSHOPS: TO WHAT EXTENT ARE THEY EFFECTIVE LEARNING ENVIRONMENTS

Chair: Lynn Mcalpine, Mcgill University, Canada
Organiser: Lynn Mcalpine, Mcgill University, Canada
Discussant: Noel Entwistle, University Of Edinburgh, United Kingdom

Scientific and educational relevance: Learning to become an effective teacher is not easy; it involves a shift in focus from thinking about teaching (one's own actions) to thinking about how to design instruction for student learning (others' thinking and actions). In higher education, the role of academic developers is to create learning environments that facilitate this process. Workshops are one of the most frequent learning environments offered to academic staff. While these are frequently assessed in terms of participant satisfaction immediately following the workshop,

increasingly, in the literature, concern is expressed about the effectiveness of such workshops in the longer term. Thus, a natural question for us, as academic developers, is the extent to which we are successfully creating learning environments that are effective in helping professors to support student learning after the workshop ends.   The goal of this session is to provide a venue in which to examine the effectiveness of the learning environments that are typically offered to new academics to help them become effective teachers. Academic development workshops of at least five days in length developed at universities in Canada, Belgium, New Zealand and the US will be described. These workshops were chosen because a) the design of each integrates research on teacher thinking and emphasizes student learning, and b) efforts have been made to assess impact beyond participant satisfaction. In order that those at the session can make their own comparisons about the four workshops, each presenter will provide the following information a) how research on teacher thinking and student learning is integrated into the design b) what the workshop consists of, c) how impact is assessed, and d) what the findings are.

A collegial approach to course design and teaching development: What professors find meaningful and why
Cheryl Amundsen, Simon Fraser Unviersity, Canada
Cynthia Weston, Mcgill University, Canada
Lynn Mcalpine, Mcgill University, Canada

The focus of this paper is to describe the format, evaluation and impact of a five-day Course design and Teaching Workshop (CDTW) and a yearlong teaching support follow up group. The workshop has been offered to professors for over ten years at one Canadian university and more recently has become an annual offering at two others. Formal follow up groups are being conducted this year for the first time at all three universities. The intensive CDTW provides professors with an opportunity to discuss and reflect on their teaching with colleagues, and initiate changes to enhance the quality of student learning. The yearlong follow up group provides continued collegial support as faculty implement the changes they designed in the CDTW. We report how we have thus far assessed the usefulness and meaningfulness of the CDTW and follow up groups in a number of ways including, pre-post questionnaires, concept maps, and case studies.

K.U.Leuven programme on course design: Issues of impact

Mieke Clement, K U Leuven, Belgium
Elisabeth Laga, K U Leuven, Belgium
An Verburgh, K U Leuven, Belgium
Jo Breda, K U Leuven, Belgium
Kim Waeytens, K U Leuven, Belgium

This paper discusses the evaluation of a K.U.Leuven programme supporting faculty members to design one particular course. In order to document the programme's impact on teachers' conceptions and actual teaching practice an evaluation project was designed taking into account recommendations found in the literature. As a result both quantitative and qualitative data were collected. Data collection was spread over time and exceeded the level of mere participants' satisfaction. The evaluation instruments were aligned with the programme's rationale and explicitly involved stakeholders in defining the evaluation criteria. In the paper the evaluation results are discussed, as well as the difficulties one encounters when designing and enacting a complex evaluation project.

Measuring the Impact of Workshop Based Faculty Development on Teacher's Approaches to Teaching

Gregory Light, Northwestern University, United States
Melissa Luna, Northwestern University, United States
Denise Drane, Northwestern University, United States

This paper presents research investigating the impact of a workshop based faculty development initiative on change in approaches to teaching in 34 pre-tenure, research intensive faculty members.. The study measured change through a pre/post application of the Approaches to Teaching Inventory (ATI). The ATI measures teaching approach with respect to two broad orientations towards teaching, those concerned with teaching as essentially an organization of the content of the teacher's knowledge for transmission to the students, and those concerned with teaching as facilitating students' conceptual learning. A control group of comparable faculty not taking the program was studied in the same way. The study also analyzed actual teaching change implemented (or planned for implementation) during the period of the workshop program. This second analysis looked at evidence of student-focused teaching as disclosed in the critical teaching project accounts submitted by workshop participants at the end of the program. Results of the study reveal significant change towards student-focused approaches to teaching with respect to both sub-

scales of the ATI. Effect sizes in both cases are in the medium range (Cohen 1988). No appreciable effect was found on either scale in the control group. In addition, 32 of 34 faculty participants reported changes towards student-focused approaches in their teaching, actual or planned, and 16 participants directly attributed this change (unsolicited) to the faculty development program.

G 10   25 August 2005   08:30 - 10:30   Room E005

Symposium
Culture and Education

HISTORIES, EPISTEMOLOGIES, IDENTITIES: HISTORICAL THINKING IN CULTURAL CONTEXT

Chair: Sam Wineburg, Stanford University, United States
Organiser: Eli Gottlieb, Mandel Institute, Israel
Discussant: Lauren Resnick, University of Pittsburgh, United States

To bridge the gulf between historical inquiry as practiced by historians and history as a school subject, educational psychologists have studied the critical and interpretive skills of professional historians and sought ways to develop these among school students. This research has contributed both to our understanding of historical cognition and to the creation of innovative curricula. However, to this point it has focused on distant and schoolish topics rather than topics that inflame contemporary passions. It is one thing to interrogate accounts of things said and done by people with whom one feels no special connection. It may be quite another to interrogate accounts of the past that are foundational to one's sense of self and cultural heritage. This symposium brings together researchers from Israel, Spain, and the US to examine the relations between identity, culture, and historical thinking. The symposium addresses two key questions: First, how does the cultural and personal significance of historical claims affect how people think about them? Second what are the implications of such effects for the teaching of history in multicultural societies?

When history matters: Epistemic switching in the interpretation of culturally salient historical texts

Eli Gottlieb, Mandel Institute, Israel
Sam Wineburg, Stanford University, United States

This paper examines how 20 adult historians, Bible scholars, and ministers from various faith traditions in the USA read documents relating to the Biblical Exodus and the First Thanksgiving. In individual interviews, participants were presented with documents, including pictures, textbook accounts, primary sources, and contemporary scholarship about the events' historiographic status, and asked to think aloud as they read through them. Preliminary content and protocol analyses revealed that participants switched between multiple conceptions of historical truth in drawing and justifying conclusions about the events described in the documents they were reading. Such switching occurred both across and within topics. For example, many participants employed different conceptions of reliability to evaluate the Exodus and Thanksgiving documents, and some made further distinctions even within the Exodus material, using one set of criteria to judge some of these documents, and another set of criteria to judge others. Based on these findings, we propose that mature historical cognition involves the ability to distinguish between the cultural meanings of past events and their evidential status, while yet recognizing the importance of each. Moreover, it involves the ability to monitor one's own cognitive and emotional responses without sacrificing either one's head or one's heart. We suggest that the examples of historical thinking presented in this paper provide models of how to engage critically with the past while remaining an engaged and passionate historical actor. Just as first-generation studies of historical thinking led to innovative curricula that teach students how to read historical documents critically, so too can studies such as ours begin laying the foundations for curricula that teach students how to engage in disciplined thinking about history that matters.

Understanding the many epistemic faces of 'point of view' during a sixth-grade history lesson

Philip Bell, University of Washington, United States

From an early age in American society children are inundated with specific cultural narratives through their engagement with the books and films of popular culture. Although many of these narratives are about history we can presume that most students are not doing history when they engage with them. This research focuses on the question: How can elementary school students come to critically interrogate

mainstream cultural narratives from a historical perspective? What form does this take when the cultural narratives possess a deep cultural significance? This paper reports on a classroom design experiment that engaged sixth grade students in an evidence-based, historical investigation of events related to the American civil rights movement. Conversation analysis of classroom discourse and clinical interviews revealed a constellation of epistemic forms associated with the general intellectual construct of 'point of view.' Eight epistemic variations associated with ten, everyday linguistic terms were identified and analyzed in the talk. Analysis revealed how this point-of-view talk functioned within the scaffolded inquiry sequence of the students. It is argued that given even a modest educational intervention—which amounted to approximately forty hours of instruction with heavy sociocognitive scaffolding over the course of the year—students were able to engage in specific prototypical, historical forms of thinking and argument. Accordingly, students were able to elaborate multiple perspectives associated with specific historical events. Although it was productive to leverage and to further discipline students' epistemological knowledge associated with point-of-view, subsequent research should focus on understanding how to help students judge and reconcile such conflicting accounts.

Expertise and the development of epistemologies of history: An empirical study
Margarita Limon, Universidad Autonoma de Madrid, Spain

This paper will present an empirical study that is part of a broader research project which has two main aims:
1. To describe the differences on the epistemology of history sustained by individuals with a different level of expertise on history.
2. To study the relationships among a) individuals' epistemological beliefs, b) individuals' beliefs about learning and teaching a particular domain and c) individuals' epistemology of a particular domain. Data presented in this paper will refer just to the first of these two aims. To characterise individuals' epistemology of history, a proposal suggested by the author (Limon, 2002) was used. She proposed four basic general epistemologies of history: history as a chronicle, history as a narration, history as comprehension and history as explanation. A paper and pencil questionnaire was developed to assess participants' epistemologies of history. The sample was made by 75 individuals (25 history freshmen, 25 history senior students and 25 high school teachers of history). All college students studied at the Autonoma University of Madrid (Spain). Interesting differences were found between freshmen and senior students' views of history. For example, freshmen gave the highest

score to history as a chronicle (X= 3,32, Sd= .75, score range 0-4), whereas senior students gave to this view the minimum score (X=2,20, Sd=1,15, score range =0-4). Although it can be said students showed a rather eclectic view of history, after receiving four years of training they seem to consider that history and historians should work to understand the past more than to describe, narrate or even explain facts and events. These results may be reflecting just what this specific sample of students think about history. Likely, results would be different if data would be collected in different cultural and educational settings. Educational implications for history learning and teaching will be developed.

Fundamentally different: Historical thinking in fundamentalist contexts
Simone Schweber, University of Wisconsin, United States

If the body politic is said to produce collective memory, then schooling is certainly one of its most prolific organs. This research shows, clearly and forcefully, that teachers' and students' religious orientations, especially if 'orthodox' of fundamentalist, affect their understandings of history, and, by extension, of the curriculum entire. It thus bears implications for anyone curious about the relationship between religion and schooling, God and history. This study interrogates how communities of faith (in culturally Christian terminology) or communities of action (in culturally Jewish terms) create usable pasts (Maier, 1988) and how youth in those communities grapple with history's embedded narratives. Empirically, the study juxtaposes the shape of the Holocaust as taught in two religious schools: one a fundamentalist, evangelical, charismatic Christian school, the other an ultra-orthodox Jewish, Chabad yeshiva. The research was designed to answer the question: How do religious master narratives shape Holocaust history and impact students' historical understandings? Although hinted at in previous works (Gourevitch, 1995; Peshkin, 1986; Schweber, 2003, 2004; Wineburg, 1999; Mosborg, 2003), the role of religious meta-narratives in forming teachers' and students' notions of history in general and of this history in particular has been mostly undeveloped. The data on the fundamentalist Christian school has already been gathered through classroom observations and interviews with teachers, select students and their parents. The data generation on the Chabad school was completed in June of 2004. All observations and interviews were tape-recorded, transcribed, coded and analyzed using an adaptation of 'grounded theory' (Strauss and Corbin, 1999). The portraits that result (Lawrence-Lightfoot & Davis, 1997) illuminate the religious master narratives at play in each school and how they contribute to teachers' and students' understandings of the Holocaust and of history.

Symposium
Team Learning and Organisations

MULTIPLE RESEARCH PERSPECTIVES ON SHARED UNDERSTAND-ING

Chair: Pieter Beers, Open University of the Netherlands, Netherlands
Organiser: Pieter Beers, Open University of the Netherlands, Netherlands
Discussant: Richard Joiner, University of Bath, United Kingdom

Research has devoted increasing attention to the topic of shared understanding. Its importance for scientific study is clear from research on team work in professional organisations; research has shown that team performance depends on a team's ability to attain shared understanding. Shared understanding serves as a basis for construction of new knowledge. Also, it caters for the coordination of individual team members' actions. A lack of shared understanding has been shown to result in suboptimal performance. This symposium addresses multiple research perspectives on shared understanding. The processes involved in achieving shared understanding have received attention from a number of theoretical perspectives. To give a rough overview of the breadth of theoretical attention: cognitivists have modelled this process as communication between experts and laypersons; linguists have stressed mechanisms in conversation that point at the achievement of common ground; constructivists have pointed at co-construction of meanings in teams; and socio-culturists have emphasised the emergence of shared understanding as a joint activity, which is embedded in cultural activities. As different as these approaches may seem, they have in common that they are different models of the same phenomenon. This symposium explores some of these approaches with the aim to identify commonalities and complementarities between these theoretical perspectives, and to foster the theoretical conceptualisation of shared understanding. The symposium features work from the cognitive side about the processes involved in adapting language use to discussion partners, as well as work about the facilitation of knowledge sharing. Furthermore, there is a review study about the use of cognitive and socio-cultural perspectives on shared mind in empirical literature about teams. Finally, there is a contribution about the use of artefacts for bridging different professional perspectives in teams from the socio-cultural perspective.

How do medical experts adapt to their patients? The impact of laypersons' lexical decisions on establishing mutual understanding in expert-layperson communication

Bettina-Maria Becker, University of Muenster, Germany
Regina Jucks, University of Muenster, Germany
Thomas Wagner, University of Muenster, Germany
Rainer Bromme, University of Muenster, Germany

The adaptation of contributions to the degree of mutual understanding is a key variable in the facilitation of expert-laypeople-communication. Within a cognitive and psycholinguistic framework, adaptation processes were studied in the applied context of online health counselling. Giving online advice is especially challenging, because the cyberdoctors hardly know anything about the inquiring patients. How do medical experts adapt their answers to certain features of patients' inquiries? A phenomenon of adaptation well documented in face-to-face communication is the standardization of vocabulary in conversation, referred to as lexical entrainment or lexical alignment. Study 1 investigated whether lexical entrainment can be found in written net-based communication between experts and laypersons. Medical experts (n = 46) answered patients' queries. Language technicality was manipulated. One version contained medical concepts in everyday language (e.g. obesity), the other in technical language (adiposity). Do experts adapt their replies to the vocabulary in the inquiry? Analyses provide evidence of the lexical entrainment phenomenon. Furthermore, semantic analyses show that experts adapt the content of their answers to the technicality of the inquiry, providing more explanations, essential facts and behavioural tips in their replies to inquiries everyday language inquiries. A second study was conducted to test if these response patterns could be explained with regard to experts' conscious assumptions about laypersons' knowledge. N = 68 medical experts were provided with a content-specific knowledge assessment questionnaire. More knowledge was ascribed to laypersons solely concerning issues treated in the enquiry. Beyond that, no differences in knowledge ascription were found. The results suggest that variations in experts' semantic and lexical decisions are not caused by experts' explicit assumptions about the laypersons' knowledge, but are triggered 'directly' by the laypersons' language use. The findings of our studies are discussed with respect to their implications for knowledge sharing between interlocutors with great differences in knowledge level.

NTool: Facilitating the negotiation of common ground in multidisciplinary teams
Pieter Beers, Open University of the Netherlands, Netherlands
Henny P A (Els) Boshuizen, Open University of the Netherlands, Netherlands
Paul A Kirschner, Open University of the Netherlands, Netherlands

Professional organisations expect multidisciplinary teams to cater for improved problem solving, especially in the case of complex problems. However, research has shown that these expectations only hold when the individual team members achieve a common cognitive frame of reference, often referred to as common ground. This paper deals with the facilitation of grounding processes with an ICT-tool called NTool. NTool is an online communication tool that facilitates the grounding process by making users explicate their private understanding of other's contributions. In laboratory experiments NTool influenced both the grounding process and the amount of common ground (Beers et al, In press). However, these experiments were done under highly regulated circumstances, with highly motivated participants. In this paper, we report on an experiment in a practical educational setting. Twenty multidisciplinary teams solving a complex design problem were studied in a secondary vocational education institution. The experiment was conducted as a practical. Participants worked on a design task, both collaboratively and alone. Two versions of NTool were studied. The Stringent version used highly coercive constraints to maximise effects on negotiation and common ground, whereas the Idiosyncratic version used minimal coercion. Main aim was to replicate our laboratory results in a practical setting. Furthermore, we wanted to explore social effects of NTool, and possible adverse effect of NTool in terms of cognitive load. Preliminary analysis suggests that NTool had no adverse effects on collaboration, and that the Stringent teams may have acquired more knowledge from different perspectives during discussion than Idiosyncratic teams. However, Stringent teams also reported less common ground than Idiosyncratic teams. Further analysis is needed to reveal whether the communication data and the individual problem solutions confirm the common ground results, the alternative explanation being that the Idiosyncratic groups operated under a false illusion of common ground.

Shared mind in groups: Cognitive and socio-cultural perspectives
Sanne Akkerman, Utrecht University, Netherlands
Piet Van den Bossche, Maastricht University, Netherlands
Wilfried Admiraal, Utrecht University, Netherlands
Wim Gijselaers, Maastricht University, Netherlands
Mien Segers, Leiden University, Netherlands
Robert-Jan Simons, Utrecht University, Netherlands

Various recent strands of research in educational and organisational psychology focus on the ways groups collectively create meaning. Research in this area intends to understand the role of this process for successful collaboration, in order to advance group practice and group learning. However, although this research is expanding, there is a lack of conceptual clarity. This makes it hard to relate the findings of the various empirical studies and to build forward on these studies and formulate implications for practice. This lack of conceptual clarity is exacerbated by the multitude of terms used, such as common ground, team mental models, shared understanding, collective mind, etcetera, and the multitude of research methodologies. Therefore it is argued that more fundamental conceptual work needs to be done. In the present study, a literature review was conducted to compare and structure the different studies' conceptualisations and their operationalisations and the premises they are based on, in order to build a heuristic framework. Starting from the working term 'shared mind', we tracked down 22 studies that used it as a central concept, that applied it to groups and that studied it empirically. The analysis shows that 11 studies conceptualised shared mind as a state of similarity or overlap between individual mental models representing a cognitive perspective, and 5 studies conceived shared mind as a process of coordination of actions or as a dynamic unity of individual contributions in joint activity, taking a socio-cultural perspective on shared mind. Three studies used conceptualisations of shared mind that show one initial way of crossing the boundaries between the different understandings of shared mind in groups. Suggestions are made to foster more conceptual clarity and cross-fertilisation in future research by providing a heuristic framework that encourages researchers to question their assumptions in conceptualising shared mind and choosing according methodologies.

Future-oriented artefacts in multiprofessional teamwork
Jiri Lallimo, University of Helsinki, Finland
Hanni Muukkonen, University of Helsinki, Finland
Lasse Lipponen, University of Helsinki, Finland
Kai Hakkarainen, University of Helsinki, Finland

This paper explores how multiprofessional teams develop knowledge through the use of artefacts. Current research shows that knowledge intensive work cannot rely on individual efforts, but requires participants' joint efforts. This means that they have to bridge different fields of expertise, which is manifesting itself on different social and material forms. Managing dispersed knowledge is particularly essential in multiprofessional work. In previous studies, multiprofessional work (as shared and distributed practice) has been mainly studied from cognitive and linguistic perspectives. This study offers a sociocultural perspective on the use of mediating artefacts for bridging together different perspectives of activity. The leading question in this paper is: How do multiprofessional teams use mediating artefacts in developing new knowledge? In the study qualitative content analysis has been applied. First, the data was approached from the point of view of mini-historical cycles revealing aspects of past-present-future of the activity of the team. Further analysis focussed on the team's use of the mediating artefacts to develop knowledge. The results revealed two main functions of artefacts. First, different artefacts were used for bring ideas to other participants, and transferring ideas from individual perspectives to cover wider horizons of the whole team. Second, the use of future-oriented, `where-to' artefacts was important in steering the team's joint efforts. The study shows that sociocultural view on the role of mediating artefacts offers an important perspective to the study of multiprofessional teamwork.

G 12   25 August 2005   08:30 - 10:30   Room E009

Symposium
Multiculturalism in Education

INTERNATIONAL PERSPECTIVES ON IMMIGRANT STUDENT ACHIEVEMENT AND MOTIVATION

Chair: Petra Stanat, Max Planck Institute for Human Development,
                Germany
Organiser: Gayle Christensen, Stanford University, United States
                Petra Stanat, Max Planck Institute for Human Development,
                Germany
Discussant: Ed Elbers, Utrecht University, Netherlands

Highly developed industrialized countries have experienced high levels immigration in the last two decades. Yet immigrant students in many countries lag behind their non-immigrant peers in terms of achievement (OECD, 2001). Understanding how education systems can best serve the needs of immigrant students is thus a challenge facing these countries. This symposium examines immigrant student achievement and motivation and what factors may contribute to differences or similarities across countries. Stanat's examination of immigrant motivation and perceptions of school across countries helps shed light on whether immigrants have similar or different levels of these essential precursors to school success across countries. Christensen examines whether immigrants attend schools that are similar or different from schools attended by their native peers in 17 countries (e.g. do immigrant students attend schools where more or less time is spent on reading or math instruction?). She then examines what the implications of these differences are for immigrant student achievement. Coradi explores the role of school context for immigrant student outcomes. She examines how socioeconomic factors, such as wealth and unemployment, in different catchment areas are associated with immigrant achievement. Schnepf provides a summary of our understanding of differences in immigrant achievement. Using data from three rich international datasets, she is able to examine whether findings on the differences among immigrants in 10 immigrant receiving countries are robust. In addition, she explores how school segregation may play a role in these differences. Taken together, these papers provide a broad comparative perspective for understanding immigrant motivation and achievement. This is increasingly important for immigrant receiving countries, as

it becomes clear that immigrant's success in school is an important contributor to immigrants' (and their Children's) long-term economic and personal success.

Motivation and school perceptions among first and second generation immigrants: A cross-national comparison
Petra Stanat, Max Planck Institute for Human Development, Germany
Gayle Christensen, Stanford University, United States

Although the integration of students with migration backgrounds in schools presents a concern that is shared by many countries worldwide, there is little research approaching the issue from an international perspective. A few recent studies have examined achievement gaps between immigrant and native student populations across countries. Yet, no comparative investigation has explored immigrant students' situation with regard to motivation and perceptions of school. Using data from the first cycle of the OECD's Programme for International Student Assessment (PISA), the present study seeks to begin to fill this gap by examining differences in achievement, motivation and school perceptions among first-generation, second-generation and native students in 15 countries. An attempt is made to determine whether a pattern emerges substantiating one of three different models of immigrants' school success distinguished by Kao and Tienda (1995) (straight-line assimilation, accommodation without assimilation, immigrant optimism). Findings from multiple regression analyses indicate that, in most of the countries included in the analyses, first-generation students perform at much lower levels than their peers from native families. For the second-generation, however, the achievement gap is greatly reduced. A different pattern, however, emerges in analyses of students' motivation and perceptions of school. Despite their lower levels of achievement, first-generation immigrant students tend to be a highly motivated group. In most countries, these students report to invest more effort and persistence in their school work, and they are more instrumentally motivated. In a few countries, this motivational advantage is still observed among second-generation students. More frequently, however, it decreases considerably. Thus, more often than not, immigrant students' initial optimism seems to yield to assimilation processes resulting in increased similarity between immigrant students and their native peers. Results are discussed in terms of their implications for measures designed to promote immigrant students' school success.

A cross-national comparison of characteristics of schools attended by immigrants and the implications for student achievement
Gayle Christensen, Stanford University, United States

In the past two decades, North American, European and Pacific countries have experienced record levels of immigration, yet researchers have conducted very few comparative studies to provide policymakers with a clear understanding of the role of school factors for immigrant and non-immigrant achievement. Using data from the 2000 Programme for International Student Assessment (PISA) conducted by the Organization for Economic Cooperation and Development (OECD), this study provides an overview of the potential effects of schools cross-nationally focusing specifically on school characteristics and instruction. The variable selection and model development is based on the previous literature on school effects and focuses specifically on school characteristics and instruction in seventeen countries. After the overview of potential school effects, the substantive focus of this study examines two policy-related questions: (1) Do immigrant students attend schools with school and instructional characteristics that are generally considered less effective (based on the existing literature) than the characteristics of schools attended by non-immigrant students? (2) What are the implications for immigrant and non-immigrant student achievement? These two research questions allow for an investigation of significant school and instructional characteristics in the schools that non-immigrant and immigrant students attend. For example, do immigrant students attend schools where less time is spent on reading and math instruction and does this have implications for immigrant student achievement? The two research questions serve as a guide for the development of the quantitative results into a cross-national rubric of school and instructional elements experienced by immigrant students and potential effects of these characteristics for both immigrants and non-immigrant student outcomes. In turn, this study seeks to develop theoretical and practical approaches to further understanding of the potential importance of school and instructional characteristics for immigrant and non-immigrant student achievement in different national contexts.

Social and Geographical Segregation in Switzerland and its Consequences for the Academic Achievement of Fifteen Year Old Students
Maja Coradi Vellacott, Swiss Coordination Centre for Research in Ed., Switzerland

The social segregation of neighbourhoods and communities in Switzerland is a substantial issue when it comes to the problem of between-school-differences in student achievements. Better-off parents tend to live in communities with high housing costs, low taxes and in neighbourhoods where middle and upper class families live. They also tend to avoid certain schools by their choice of residence. Many disadvantaged, immigrant families, however, are forced to live in poor areas with cheap housing. If neighbourhood characteristics are associated with Children's competences and readiness to learn, as various research findings suggest, the problem of between-school-differences in student achievement in Switzerland has to be considered from this angle. Results from the United States (i.e. Sun, 1999; Leventhal & Brooks-Gunn, 2000; Kohen et al., 2002; Willms, 2002) point to the significance of neighbourhood affluence, cohesion and safety. In Switzerland research findings in this area are very rare. The research presented is based on the Swiss PISA data from the year 2000. To answer the research question, the data have been supplemented by information about the communities the students tested in PISA live in. The communities are described by a number of features to create a profile of their socio-economic characteristics. The data are examined to answer questions relating to the correlation of community characteristics as well as to the impact of community characteristics on between-school-differences. Some preliminary findings suggest that features, such as community tax policy, have substantial effects on both the environment of a school and the school itself.

How different are immigrants? A cross-country and cross-survey analysis of educational achievement
Sylke Viola Schnepf, S3RI, University of South Hampton, United Kingdom

This paper examines differences in educational achievement between immigrants and natives in ten countries with a high population of immigrant pupils: Australia, Canada, France, Germany, the Netherlands, New Zealand, Sweden, Switzerland, the UK and the USA. The first step of the analysis shows how countries differ regarding immigrants' educational disadvantage. Results indicate that immigrants perform similarly to natives in Australia and Canada but face on average high educational disadvantage in Switzerland, Germany and the Netherlands. Immigrants'

educational disadvantage is generally due to very low levels of performance of a comparatively small number of immigrants. In a second step, the paper compares immigrants' characteristics across countries focusing predominantly on educational dispersion, socio-economic status, language proficiency, immigrants' time spent in the host country and patterns of school segregation. Results show that countries vary greatly regarding these characteristics. Using a regression framework, the last step of the analysis investigates how the examined determinants of educational achievement can explain immigrants' educational disadvantage in the countries examined. Results indicate that especially socio-economic background differences between immigrants and natives are important determinants of countries' differences in immigrants' educational disadvantage. However, once family background is hold constant, immigration does still matter in some countries examined. In all countries, immigrants' language proficiency and in almost all countries immigrants' time spent in the host country as well as patterns of school segregation play an important role for explaining educational achievement. Results found are generally robust across different sources of educational achievement data: the Trends in International Maths and Science Study (TIMSS), the Programme of International Student Assessment (PISA) and the Programme of International Reading Literacy Study (PIRLS).

G 13   25 August 2005   08:30 - 10:30   Room E113

Symposium
European Integration and Learning

LANGUAGE ASSESSMENT AND THE EUROPEAN FRAMEWORK – INTEGRATING LINGUISTIC AND EDUCATIONAL PERSPECTIVES

Chair: Eckhard Klieme, German Institut for International Educational
              Res., Germany
Organiser: Nina A. Jude, German Institute for International Educational Res,
              Germany
              Johannes Hartig, German Institute for International Educational
              Res, Germany
              Eckhard Klieme, German Institute for International Educational
              Res, Germany
Discussant: Cordula Artelt, Max-Planck institut for Educational
              Research, Germany

The evaluation of students' language abilities plays a decisive role in recent national and international assessments. The results are used to ensure quality in the teaching and learning processes and to enable feedback not only to students and teachers but also to educational policy makers and language researchers. In recent research, different theories, models of competence and assessment methods have to be integrated to enable a multinational and multidisciplinary exchange of assessment approaches. Thereby, the question of valid standards and assessment methods is raised as well as the demand for comparable levels of competence. This symposium will give insight in latest national and international research projects on language assessment from three different countries, aiming at an integration of linguistic, psychometric and educational perspectives in language assessment. The national representative studies work with criterion-referenced tests based on specific theoretical models of language competence and use latest methods of psychometric measurement. They were designed to enable feedback for teachers and policy makers referring to national standards (Cuurriculum). Furthermore, all of these different approaches are linked to the international standards of the Common European Framework of Reference for Languages (CEFL). This makes it possible to integrated theoretical models and to compare levels of competence across countries. The presentations in this symposium will include latest findings for the do-

mains of listening (Germany), reading (Hungary) and writing (Norway). Thereby, the empirical validation of theoretical models of competence will be discussed as well as methodological challenges in establishing scales based on Item-Response theory and the adequacy of assessment tasks. Additionally, the presentations will include the question of how to combine scales, standards and competence models. An emphasis is placed on the importance of European standards and the integration of different perspectives in national language assessment, enabling a discussion about the implementations for language teaching and learning.

Language assessment – integrating national and international standards in levels of competence
Nina A. Jude, German Institute for International Educational Res, Germany
Johannes Hartig, German Institute for International Educational Res, Germany
Eckhard Klieme, German Institute for International Educational Res, Germany

Latest language assessment approaches need to meet multiple requirements to enable the evaluation of educational systems and to contribute to language teaching and learning processes from different perspectives: In educational policy, language assessment has to identify strengths and weaknesses of the educational system based on comparable standards, to increase the overall outcome level and to reduce inequalities. For language researchers, assessment has to supply the basis for multi-dimensional competence models and profiles of abilities whereas feedback for teachers has to describe the abilities of language learners on different levels of competence using criterion-referenced descriptions. The challenge here is the alignment between standards, competence levels and assessment methods. This presentation introduces a German large-scale study, assessing students' language competence in the native language German and the foreign language English with a representative sample of 11.000 participants in grade 9. Specific tests for German and English were developed based on national curricula, theoretical models of language learning and integrating descriptors of the Common European Framework for languages (CEFL). Using Item-Response-Scaling, levels of competence were described and verified, matching the national curricula as well as international standards. Based on these levels, students competencies in the native language can be compared to those in the foreign language and result in feedback for teachers. This presentation will exemplify the necessity of standard-based language tests, presenting first findings of differences in language profiles depending on the competence level of specific groups of students (high versus low overall tests scores). Moreover, the relationship between language levels in the native and foreign language

will be analysed. Resulting competence levels as a basis for feedback to schools, educational researcher and policy makers will be presented. Furthermore, the implications for linking this project to latest endeavours of language assessment on a European level will be discussed.

Quantitative and qualitative approaches to the validation of a listening comprehension test of English as a foreign language
Guenter Nold, University Dortmund, Germany
Henning Rossa, University of Dortmund, Germany

This presentation will provide insights into different quantitative and qualitative approaches to validation of constructs of language competence focusing on a test of listening comprehension as an example. A procedure was developed that involved ratings of task characteristics and application of the Dutch CEF Grid (cf. Alderson et al. 2004). This process aimed at three interconnected goals: to specify the contents of the test, to predict item difficulty and to relate both the test tasks and the scale of competence to the descriptors and the levels of the Common European Framework of Reference for Languages (cf. Council of Europe, CEF 2001). The first part of the presentation is concerned with the investigation of the construct validity of a listening comprehension test. A system of task characteristics was developed to define what the language test items demanded from the test-takers. It was then possible to match the specific test items with theoretical facets of the listening construct and, more specifically, the respective cognitive operations involved in performance on the tasks. This investigation led to the development of a model of listening competence. The second part of the presentation reports qualitative research which focuses on the same listening comprehension test. The study seeks to provide evidence for aspects of construct validity and specifically explores student perceptions of task difficulty to add to the validation processes laid out above. Both objectives draw on qualitative data from the points of view of the test-takers, employing a think-aloud technique and stimulated recall interview data. The results show the possibility of matching specific models of competence, empirically ascertained item-difficulties and test-takers perceptions of items to the European Reference Scale as an international framework. Conclusions for further language testing approaches will be discussed.

Constructing reading competency scales for second language assessment: Using data of different age groups for IRT scaling
Gyungyuer Molnar, University of Szeged, Hungary
Marianne Nikolov, University of Pecs, Hungary
Beno Csapo, University of Szeged, Hungary, Hungary

This paper provides insights into how IRT has been applied to translate Hungarian students' performances on English as a foreign language reading tests in a nation-wide survey into a scale used in international comparative studies. The samples for the analysis were representatively drawn form the Grades 6, 8, and 10 with a total number of participants over 6,000. The test booklets for the three different years covered levels A1, A2 and B1 in the Common European framework of reference for languages. A number of anchor tasks were included making IRT analysis possible and placing scaling into a developmental context. A detailed analysis points out how well the empirical difficulty of test task corresponds to the CEFR level. As for the developmental aspect, the results show a different pace of development for the two age ranges (grades 6-8 and 8-10): younger learners' development is significantly slower than that of their older counterparts.

Norway's national assessment of writing proficiency
Kjell Lars Berge, University of Oslo, Norway
Lars Sigfred Evensen, Norwegian University of Science and Technology, Norway
Rolf Fasting, University of Oslo, Norway
Ragnar Thygesen, University of Stavanger, Norway
Wenche Vagle, Norwegian University of Science and Technology, Norway

In many countries today the school authorities launch national monitoring programs in the key competencies. An issue of current interest is advantages and disadvantages of various methods of assessment and criteria for assessment. In 2003 Norway initiated a national system for the assessment of proficiency in reading, writing, numeracy (mathematics), and English at four levels of the compulsory school. The Norwegian writing test is primarily based on a primary trait model, meaning that what is assessed has been specified for a limited set of dimensions. The test aims at sorting out students who do not profit from regular education. Therefore, the assessment scale of their written texts categorizes them in relation to a challenge level, a functional level or an at-risk level. As a basis for the assessment, we have formulated a set of basic writing competencies that we expect a student to perform at each level: Communication and Reflection; Situated Acts of Writing; Multimodality and

Esthetics; Text, Language and Motor Aspects of Writing; Strategies of Work, Attitudes and Motivation. The basic competencies coincide with the assessment categories: General first impression; Specific act(s) of writing, Communication; Content; Composition; Use of language; Spelling and punctuation; Use of the written medium as such. For each writing task, these categories are further specified for the actual type of text that the student is supposed to write. In spring 2005 the whole student population at four levels of the compulsory school will undergo the assessment program. Based on the data from this assessment, we will discuss our experiences with the primary trait approach with a special focus on meaningful ways of summing up the data at aggregated levels, and whether or not we should adopt the Common European Framework of Reference for Languages scale for writing.

G 14   25 August 2005   08:30 - 10:30   Room A007

Symposium
Self regulation

SELF-REGULATION IN LEARNING: EMOTIONAL, MOTIVATIONAL AND COGNITIVE COMPONENTS AND POWERFUL INTERVENTIONS

Chair: Bernhard Schmitz, TU, Germany
Organiser: Bernhard Schmitz, University of Darmstadt, Germany
Discussant: Franziska Perels, Institue of Psycholgy, Germany

The aim of the symposium is point to new developments in the theory of self-regulation in learning, using different methodological approaches. We also want to show ways to improve self-regulation in learning to allow for changes in educational practise. The importance of self-regulated learning is growing for learning in school, in the university and for lifelong learning. Our theory is based on the model of Schmitz (2001) which is process adaptation of Zimmerman's (2000) self-regulation model, which in addition to learning strategies also includes emotions and motivation. New developments for self-regulated learning stem from progress in studying the components of self-regulation as well as the whole self-regulation cycle. Among the important components are motivational, emotional processes and learning strategies. In this symposium one of the presentations deals with the development of motivation, one with emotions and its regulation and one with learning strategies. The two other presentations try to outline interventions designed to enhance the whole self-regulation process.

Can self-regulation in learning be enhanced by a diary self-monitoring proce-dure?
Bernhard Schmitz, University of Technology, Darmstadt, Germany

Because self-regulated learning is of growing importance we try to introduce a method of enhancing self-regulated learning by using standardized diaries. This method is based on a process model of self-regulation following Zimmerman (2000) and Schmitz (2001). This model includes phases before learning (e.g. goal-setting, motivation, planning), during learning (e.g. learning and volitional strategies) and after learning(e.g., self-reflection and affect). The diaries are applied during the home-work behaviour of students. They were asked each day regarding important components of the self-regulation model. A sample of 95 students from grad 8 is given this diary as experimental treatment. They answered questions in the diaries for seven weeks before and after learning with respect to their homework, leading to a possible number of 4655 diaries. The control group consisted of 103 students. Both groups were administered pre- and post-tests containing self-regulation variables and a math test for problem-solving. The results showed that the synchronous and asynchronous relationships between the variables were as proposed by our model. Regarding pre-post-test comparisons, we also found, that the diary group showed significant enhancement for self-regulation and problem-solving whereas the control group did not change. Time-series analyses yielded significant trends during the 7 week observation period for important self-regulation variables like planning and self-reflection. We conclude that our results give important hints how to enhance self-regulated learning: the diary method could be a simple and effec-tive way of enhancing self-regulation and could possibly be widely applied for students doing their homework.

Self-regulation of emotions in school
Tina Hascher, Universtity of Bern, Switzerland

In most educational systems school is - beneath the family - the second impor-tant learning environment for children and adolescents. From this point of view it is a very difficult situation that many students' school life is pierced by negative emotions (Bergmann & Eder, 1996; Hascher, 2004; Pekrun et al., 2002). Negative emotions in school can be caused by failure, by social rejection, by the pressure to learn, by a lack of subjective relevance of the topics to be learned, by troubles with teachers or classmates and so on. As the experience of negative emotions in school cannot be fully prevented students need to develop strategies for coping with nega-

tive emotions and to regulate the emotional arousal in school. Based on theories on emotion-regulation (Calkins, 1994; Thompson, 1994) the presentation will focus on situations which cause positive or negative emotions in students' everyday school life, on students' strategies in coping with negative emotions and the learning potential resulting from positive emotions. About 1300 emotion episodes reported from 58 adolescent students (cf. Hascher, 2004) were analyzed with regard to their emotional, cognitive and action-related reactions to emotions. Qualitative analyses of the reactions showed functional as well as dysfunctional reactions. Among those reactions were the following: aggression against the cause of negative emotion like 'hate against the teacher because he is a fool', good intentions for a following similar situations like 'learning more for the next test', self-doubt and self-criticism, reinterpretation of the situation like 'strictly speaking it's not a situation to feel bad' or changing attitudes toward the persons involved like 'teachers are only humans, too'. Results of the study will be presented and discussed with regard to the impact of self-regulation of emotions on success in school.

Development of task-motivation at primary school: A cross-lagged longitudinal study
Jari-Erik Nurmi, University of Jyvaskyla, Finland
Kaisa Aunola, University of Jyvaskyla, Finland

Task-motivation refers to the extent to which an individual is motivated by particular school subjects. Previous research on task-motivation includes, however, two limitations. First, few cross-lagged longitudinal studies have examined the prospective associations between task-motivation and learning outcomes. Second, only few studies have investigated the kinds of combinations of task-motivation children show towards different school subjects. Consequently, the following research questions were examined: Do pupils' task-motivation change from Grade 1 to Grade 4?. What kind of developmental dynamics children show in terms of their task-motivation and academic skills? What kinds of patterns of task-motivation children show? 4) To what extent these patterns are reflected in the children's problem behavior. 211 children participating in the Jyvaskyla. Entrance into Primary School Study were examined twice during Grade 1 and Grade 2, and once during Grade 4. At each measurement point, the children were tested on their task-motivation, performance in reading and math, and external and internal problem behavior. The preliminary analyses showed that task-motivation concerning math, reading and writing became increasingly stable starting from the spring term of Grade 1. Moreover, among the girls, there was a substantial decrease in interest in mathematics during

the primary school years. Four groups with different task-motivation were identified: a high school motivation, a high math-motivation, a low math-motivation and a low school motivation groups. The results showed further that a high level of math skills and a low level of reading skills predicted children's subsequent move into high math-motivation group, whereas an opposite pattern predicted children's move into low math motivation group. Moreover, the low school motivation group showed an increase in external problem behaviour, in particular, across the measurements.

Analyzing students' learning strategies

Michaela Glaeser-Zikuda, University of Ludwigsburg, Germany
Waldemar Mittag, University of Ludwigsburg, Germany

Learning is considered to be a dynamic conceptualization of person-environment relationships and intra-personal functions including self-regulation processes of cognitive, motivational and emotional factors (Boekarts 2001; Boekarts et al., 2000; Schunk & Zimmerman, 1994). Learning strategies are important cognitive components of self-regulated learning related to learners' pre-knowledge and achievement, as well as to their emotions and motivation (Pintrich et al., 1991; Weinstein & Mayer, 1986). The majority of the empirical studies on students' learning strategies focused on their relation to achievement, but less is known about their relation to students' emotions and motivation. Furthermore, students' learning strategies were assessed usually with questionnaires based on complex item formulations without regarding the specific learning context (Weinstein, 1987). The present contribution tries to bring some light to these shortcomings of learning strategy research. On the basis of a qualitative study with 100 eight-grade students a questionnaire was developed first which takes into account the situation specificity and the context relation of the learning strategies. The validity of this instrument was checked by factor analyses in two studies with 120 and 968 eight-grade students within three different school subjects (Biology, German Language, and Physics). Five sub-scales were differentiated: (1) task anticipation, (2), planning with respect to time and learning topic, (3) memorizing (4) elaboration and (5) structuring/organizing the learning material. In a further step, the relation of learning strategies and students' achievement, motivation and emotions were analyzed within a sample of 936 eight-grade students. Learning strategies were mainly related to students' emotions (worry and well being) and motivation (competence orientation), but less to students' achievement. The results will be discussed concerning their relevance within the framework of self-regulated learning.

Vienna E-Lecturing (VEL) Program: Internet based self-regulated learning at university

Barbara Schober, Petra Wagner, Christiane Spiel, Moira Atria & Ralph Reimann, Faculty of Psychology, University of Vienna, Austria

E-learning becomes a booming industry not only in the modern economy but also in the traditional educational system. However, there is a lack of experience in the application of theoretically well-founded e-learning techniques in university lectures. In addition, e-learning courses are rarely systematically evaluated. The paper presents Vienna E-Lecturing (VEL) designed as a blended learning concept. It follows up four goals: imparting (1) professional content (methods of research and evaluation), (2) cooperative learning, (3) self-regulated learning, and (4) e-competences. The theoretical background of VEL is provided by the process model of self-regulated learning (Schmitz, 2001). To implement a blended learning concept the program consists of virtual learning modules realized at a learning platform and face-to-face sessions. The modules are constructed as follows: (1) information input (postings of book chapters, links, etc. on the server), (2) self test (to check the declarative knowledge), (3) group work (to establish procedural knowledge). The face-to-face sessions consist of (1) tutorials given to train students in knowledge and information management, in virtually team working, and in the handling of the learning environment, (2) a training program to promote the self-regulated competences, and (3) units called meet-the-expert intended to give the students a frame and to discuss very difficult topics of the lecture. The evaluation of VEL compares students attended the VEL program to students attended a reduced e-lecturing course (without the aspects cooperative and self-regulated learning). One of the results shows that the attendance at VEL improves content knowledge (see first goal) – mainly knowledge concerning ambitious productive test items.

G 15   25 August 2005   08:30 - 10:30   Room E111

Symposium
Computer-supported Learning Environments

COMPUTER-BASED ASSESSMENT AND SUPPORT OF METACOGNITION

Chair: Joachim Wirth, Duisburg-Essen University, Germany
Organiser: Joachim Wirth, Duisburg-Essen University, Germany
Discussant: Annemie Desoete, Ghent University, Belgium

Metacognition is a popular term in almost every field of educational research. But the meaning of metacognition differs a lot between these fields. The same is true for computer-based methods. The use of computers in educational settings is popular but methods vary from computer-based questionnaires to web-based learning environments. The aim of the symposium is to integrate multiple perspectives on metacognition when dealing with different computer-based assessments and learning environments in order to find a shared view on metacognition in dynamic learning situations. Additionally, different computer-based methods are evaluated concerning their particular strengths of dealing with specific aspects of metacognition.
All papers are on metacognition in learning contexts and focus on learning regulation. They all use the computer as a tool for assessing and/or fostering metacognitive processes. They differ in their particular educational field and the specific computer-based method used for their research. Wirth, Meyer, and Leutner (Duisburg-Essen University, Germany) present different tools for the Assessment of Behavioral and Reflective Aspects of Metacognition when solving mathematical problems. Wichmann (Vaexjoe University, Sweden), Kraemer (University of Potsdam, Germany), and Jonassen (University of Missouri, USA) are Exploring the Benefits of Using Metacognitive Strategies within Scientific Inquiry. Proske and Narciss (University of Dresden, Germany) are Creating and Evaluating Web-Based Writing Tasks for Fostering Metacognition in Academic Writing. And Winter (University of Mannheim, Germany), Horz (University of Greifswald, Germany), and Hofer (University of Mannheim, Germany) examine Self-Monitoring as Meta-Cognitive Support for Self-regulated Learning using web-based diaries. Annemie Desoete (Ghent University, Belgium) reflects on similarities and differences of the presented perspectives on metacognition and will stimulate a discussion about possible ways to come to a shared view on metacognition in various educational (research) contexts.

The session is chaired by Joachim Wirth.

Assessing Behavioral and Reflective Aspects of Metacognition
Joachim Wirth, Duisburg-Essen University, Germany
Katja Meyer, Duisburg-Essen University, Germany
Detlev Leutner, Duisburg-Essen University, Germany

In the study we assessed behavioral and reflective aspects of metacognition in order to investigate their differential effects on scientific discovery learning and its outcomes. The two metacognitive aspects were assessed on two levels: On a behavioral level we assessed the execution of appropriate experimental strategies based on computer-based log-files recorded during learning. On the reflection level we captured the learner's overall evaluation of his or her learning based on questionnaire data collected during and after learning. Our research questions were whether the use of both behavioral and reflective measures is appropriate to capture both behavioral and reflective aspects of metacognition and whether the two different metacognitive aspects influence learning and learning outcomes differently. We used a computer-based learning environment embedded in a mathematical context where learners first had to explore the quadratic function. Afterwards the amount of acquired knowledge and the ability to apply this knowledge was tested. 747 15-years-old students from 28 schools of different types participated in this part of the German extension of the PISA 2003 study. Correlational analyses and structural equation models show that behavioral and reflective aspects of metacognition have different effects on scientific discovery learning and its outcomes. Behavioral aspects contribute strongly to knowledge acquisition and knowledge application when the learner has no specific knowledge about the learning environment. The impact of reflective aspects is weaker but not affected by the amount of specific knowledge. Altogether, results demonstrate that behavioral and reflective aspects of metacognition have different effects on learning and should be assessed by using behavioral and reflective measures. Computer-based methods seem to be especially appropriate for the assessment and the support of behavioral aspects of metacognition.

Exploring the benefits of using metacognitive strategies within scientific inquiry

Astrid Wichmann, Vaexjoe University, Sweden
Tanja Kraemer, University of Potsdam, Germany
David Jonassen, University of Missouri, United States

Approaches of inquiry learning can give students the opportunity to see science not only as a list of facts, but also as complicated phenomena that can be explored systematically. To give students the opportunity to develop deep scientific knowledge, they should be encouraged to use metacognitive strategies within the scientific inquiry process. This paper explores the benefits of using metacognitive strategies in an food in space environment by using an adapted scientific inquiry method. A computer-based graph annotation tool and model-based simulation allowed students to autonomously run experiments by developing hypotheses, analyzing visualized data sets and making inferences from experiment results. The student artifacts developed in these activities were analyzed regarding the types of metacognitive strategies used as well as the quality of scientific understanding. Most strategies within the area of metacognition were action planning, evaluation and reflection about content and anticipating. Results from the content analysis indicate that students who wrote most scientifically sophisticated explanations used the most metacognitive strategies while interpreting results. Students who also were able to formulate coherent follow up research questions used all anticipating strategies when analyzing experiment data. After the activity students were given a questionnaire to investigate the perceived value of the adapted scientific inquiry method. The questionnaire answers showed that the adapted inquiry method could help to avoid mistakes, improve experimentation plans and to get accurate results. Combining the results from the questionnaire as well as from the content analysis our findings emphasize the importance of metacognition within authentic inquiry activities.

Creating and evaluating web-based writing tasks for fostering metacognition in academic writing

Antje Proske, Technical University of Dresden, Germany
Susanne Narciss, Technical University of Dresden, Germany

Academic writing is a complex task that involves a variety of cognitive and metacognitive processes. Inexperienced writers fail in organizing their writing process effectively und may feel overwhelmed when working on a writing assignment. Sitko (1998) recommends that writing instruction should provide explicit guides to reduce the students' strain and encourage a range of activities such as goal setting.

This paper presents the development and evaluation of web-based writing tasks for fostering metacognition in academic writing. The primary aim of the writing task user interface is to reduce the writer's load when working on the task, especially when planning and drafting. Therefore, using a file card-metaphor the user interface divides the writing task in different steps and instructs an adequate sequence. Each file card represents one sub-task of writing: Collecting information from sources; formulating a thesis; defining terms; determining argumentation structure; drafting an introduction; organizing an outline; and drafting the text/writing. We evaluated the students' behavior and students' acceptance of this user interface. Furthermore, we analyzed relationships among self-reported strategy use and performance in the writing task. The results of these evaluations indicate that such a web-based form of writing instruction is an appropriate means to develop metacognitive awareness and control of writing. Implications of these results will be discussed with regard to the restrictions and benefits of fostering metacognition via web-based strategic instruction.

Self-monitoring as meta-cognitive support for self-regulated learning
Claudia Winter, University of Mannheim, Germany
Holger Horz, University of Greifswald, Germany
Manfred Hofer, University of Mannheim, Germany

In research on self-regulated learning, a common conceptualization of learners has emerged as metacognitively, motivationally, and behaviorally active participants within their own learning process (Zimmerman, 1986). But research indicates that learners in self-directed learning environments often have difficulties in strategic and metacognitive learning behavior (Veenmann, Elshout & Meijer, 1997). Therefore, a web-based monitoring tool based on models of self-regulated learning (e.g. Pintrich, 2000; Winne & Hadwin, 1998) was developed to support students to plan, monitor and evaluate their learning behavior. Since motivational as well as cognitive strategies play a crucial role for successful learning (Boekaerts, 1997), two versions of the tool were developed in order to gain insight into how these aspects affect self-regulated learning. In a experimental field-study, changes in the use of self-regulated learning strategies and in learning performance were examined within an educational statistics seminar. Using the web-based monitoring tool was obligatory for all 33 course participants. Half of the students worked with the motivational and the other half with the cognitive version of the tool.
Correlation analyses were used to determine different relationships between self-regulation strategies and learning performance across the different monitoring

conditions. For the motivational monitoring condition significant positive inter-correlations were only found for motivational strategies and self-assessed learning performance. For the cognitive monitoring condition significant relationships between self-assessed learning performance and (1) cognitive learning strategies, (2) motivational learning strategies as well as (3) effort and (4) regulation could be found. Overall, no monitoring condition seemed to be superior, but monitoring of motivational strategies had more influence on thoroughness of using the tool as well as on effort, regulation strategies and self-assessed learning performance. Further analyses showed that thoroughness of using the tool had more influence on study time, effort and learning performance in the cognitive monitoring condition than in the motivational monitoring condition.

G 16   25 August 2005   08:30 - 10:30   Room A107

Symposium
Collaborative Learning

CAN EFFECTIVE COLLABORATIVE LEARNING BE DESIGNED?

Chair: Jerry Andriessen, Utrecht University, Netherlands
Organiser: Jerry Andriessen, Utrecht University, Netherlands
Discussant: Michael Baker, CNRS - Universite Rene Descartes, Paris V, France
                Paul Kirschner, Open University, Netherlands

Collaborative learning can be investigated from different perspectives. The acquisition metaphor studies the phenomenon from the point of view of knowledge acquisition, that is, the individual mastery of required knowledge and skills. The participation metaphor regards at the same situation from the viewpoint of effective participation in collaborative teams. The knowledge creation metaphor investigates knowledge building, as the joint construction of new knowledge. Underlying these different metaphors one may suppose different educational goals, views on learning, knowledge, relations between learners, tasks and activities, and, finally, assessment criteria. The question raised in this symposium is to what extent such different views on collaboration relate to different views on designing and evaluating collaboration in practice. More specifically, the problem that will be addressed, from multiple perspectives, is: can current instructional design (in a larger sense: any design approach) develop any desired type of collaborative learning, for example according to each of the three metaphors expressed above, or is the resulting

effectiveness of collaboration mainly a matter of understanding the constraints of a specific educational practice? Four presenters will discuss this issue by presenting examples of interventions in educational practice, and explaining their results in terms of the constraints of educational practice in relation to their approach to designing collaborative learning.

Implications of collaborative knowledge building on instructional design: lessons from design-based research
Christopher Hoadley, Penn State University, United States
Ke Fengfeng, Penn State University, United States

In this presentation, we explore how knowledge-building and participatory models of learning suggest ontological differences in how learning environments may be designed. In particular, while traditional direct instruction can be designed using principled models such as those proposed by Dick and Carey (Dick, Carey, & Carey, 2001), designing environments in which collaborative knowledge-building takes place requires a different kind of design. Design based research is a new paradigm for studying complex educational phenomena in context. Design-based research has been successfully used to create and study collaborative knowledge-building environments (Hoadley, 2002). We draw on this paradigm to identify some challenges posed by the design of learning environments that rely on knowledge building or participatory models of learning. Just as design-based research implies some shifts in assumptions about research to accommodate design (Design-Based Research Collective, 2003; Hoadley, 2004) we believe that research-based design of complex, collaborative environments will demand some adjustments in assumptions about design to accommodate new kinds of research-based learning metaphors. These shifts include responding to increased learner control, the emergence of learning goals from the setting, designing around dynamic equilibria and tipping points, and tentative generalization. By viewing learning as a product not only of human psychology and designed artifacts, but also of social contexts, we are forced to rethink what instructional design really is.

Designing for participation: The impact of functional roles on CSCL in distance education
Jan-Willem Strijbos, Open University, Netherlands
Rob Martens, Leiden University, Netherlands
Wim Jochems, Open University, Netherlands

Computer-Supported Collaborative Learning (CSCL) has become a popular approach at most education levels, including higher education. Yet, there are no clear guidelines to determine how a CSCL environment should be designed. Although discussion forums are increasingly used, a lack of student participation is observation. Moreover, distance education students are geographically dispersed, have job and family obligations and therefore it is often not possible for them to meet at the same time. Asynchronous communication technology appears to be a natural choice in order to enable them to collaborate, but it has disadvantages such as a lack of immediate feedback and coordination conflicts are more likely to occur. Group effectiveness depends on the use of alternate opinions and the handling of increased coordination. Roles can promote cohesion and responsibility, and they can be defined as more or less stated functions or responsibilities that guide individual behaviour and regulate group interaction. This paper discusses two studies in which functional roles were implemented during computer-supported project-based collaborative learning in distance education. Results reveal that functional roles positively affect the degree of perceived group efficiency and the amount of coordinative communication. The degree of perceived group efficiency depends on the extent to which preconditions are controlled. In an uncontrolled environment the functional role increase the awareness of perceived group efficiency, whereas in a controlled environment the level of perceived group efficiency is increased. Although there was no difference between role and nonrole groups regarding the learning result (group grade), the experience of efficient and effective collaboration can enhance student adoption and implementation, in both educational and professional contexts. Finally, institutions of higher/distance education need to reconsider the tension between flexibility and imperative interdependency in collaborative learning. A review of current implementation is required to further the design of effective collaborative learning environments.

Pedagogical structuring of collaboration: Contextual perspective

Maarit Arvaja, University of Jyvaskyla, Finland
Raija Hamalainen, University of Jyvaskyla, Finland

The objective of this study is twofold. Firstly, we are studying how different ways of pedagogical structuring of collaboration process effects knowledge construction activity of the group. The aim is to identify those cognitive, social and contextual features that support or hinder effective knowledge construction. Secondly, this knowledge is used to further develop advanced pedagogical models for supporting collaboration. Thus, the study leans on design-based study approach (Brown, 1992; Cobb et al., 2003). The participants of the study are 90 first year teacher education students studying the pedagogy of pre and primary education either in small groups or in a web-based learning environment. For the purposes of the study different levels of interventions, varying according to pedagogical structuring, are constructed. Process-oriented data sources consist of videotapes of student groups' activity, students' interviews, as well as material used and produced both in face-to-face and computer-based activity. In studying the knowledge construction of the student groups and at the same time the effectiveness of the designed pedagogical models, the focus of analysis is in the negotiation process of the students. Linell's (1998) notion of contextual resources will be used as an analytical tool in studying how students negotiate meanings in their activity and what resources they use in this process (Arvaja, submitted). This study will give information of how different structuring is manifested in groups' work at the level of negotiating meanings and constructing knowledge. Through this it is possible to evaluate how different structuring influences the process of collaboration and collaborative learning. This helps to identify and develop advanced pedagogical models for supporting collaboration especially in higher education contexts.

Collaborative learning with the support of computers: Grounded design, structuration theory and the appropriation of the structural features of the tool

Wouter van Diggelen, Utrecht University, Netherlands
Maarten Overdijk, Utrecht University, Netherlands
Jerry Andriessen, Utrecht University, Netherlands

In our presentation we discuss a method for collaborative learning with computer support. The method is based on structuration theory and social constructivist perspective on learning and has been developed according to the 'grounded design research' approach. The method emphasizes the active role of students when they

participate in a discussion. It states that one should provide the students with the appropriate means that enables them to shape their interactions according to the task at hand. The evolving method has been implemented in several classroom settings: in the beginning with less success, later on the method proved its added value.

G 17   25 August 2005   08:30 - 10:30   Room A111

Symposium
Educational Effectiveness

DEVELOPING AND TESTING THEORIES ON EDUCATIONAL EFFECTIVENESS

Chair: Bert Creemers, University of Groningen, Netherlands
                Leonidas Kyriakides, University of Cyprus, Cyprus
Organiser: Leonidas Kyriakides, University of Cyprus, Cyprus
Discussant: Jan Van Damme, Catholic University of Leuven, Belgium
                Pam Sammons, University of Nottingham, United Kingdom

Past research in the area of educational effectiveness resulted in numerous factors associated with educational effectiveness but has been criticized as atheoretical. Due to that fact, it could not provide insights of what makes schools and teachers effective. In the last decade, more attention is given to the development and testing of theories on educational effectiveness. This symposium will provide a critical review of the main theories on effectiveness and of the studies which have been conducted in order to test and develop a theoretical framework of educational effectiveness. It also attempts to identify new directions for theory building in effectiveness by establishing dynamic models of effectiveness that can be used for improving educational practice.
More specifically, the aims of the symposium are to:
1. discuss the importance of building a theoretical framework for research on educational effectiveness,
2. present the comprehensive model of educational effectiveness which is one of the most influential theoretical constructs in the field,
3. present results of studies testing and expanding the model conducted in various countries,
4. present a dynamic version of the model, and
5. identify implications of the dynamic model for the development of educational

effectiveness research and the practice for improvement. The symposium will consists of presentations on:

1. The importance of theory building in educational effectiveness and the main assumptions of the comprehensive model of effectiveness

2.The studies which were conducted in Cyprus in order to test and expand the comprehensive model of educational effectiveness

3. The studies which have been conducted in Netherlands in order to test aspects of the comprehensive model and

4. The development of a dynamic model of educational effectiveness and its implications for research in effectiveness and evaluation of improvement practices

The Comprehensive Model on Effectiveness: Background and Major Assumptions
Bert Creemers, Groningen University, Netherlands

So far, research on educational effectiveness (EE) has been looking for factors associated with student results of learning and gives information about what might 'work'. However, EE Research needs a theory in order to explain differences in student outcomes. In the last decade, several framework theories have been designed which can guide research in this area. What these theories have in common is an emphasis on the individual student factors, the importance of the learning level, teachers and conditions in the wider context of learning. Some theories emphasise teaching, while others stress the importance of school factors like culture, organisation and leadership as conditions for effectiveness on the learning level. The comprehensive model takes as point of departure the learning level and focuses on educational factors that can explain the differences between student outcomes.

The validity of the Creemers' model: a review
Peter Sleegers, University of Amsterdam, Netherlands
Jos de Kock, University of Amsterdam, Netherlands

Research in the field of school effectiveness and school improvement has often been criticized for it's a theoretical nature. To fill this gap, Creemers (1994) made a significant contribution by developing a comprehensive model for educational effectiveness. The model is based on empirical research into educational effectiveness and is intended to be a starting point for the development of a theoretical background. In this paper, the validity of this model will be discussed using recent empirical studies in which components of the model are studied. Three questions were formulated for our review: 1.Which components or factors do explain educational

effectiveness? 2.Which factors/elements of the model should be revised? 3.How can the validity of model be tested in further research? To answer the research questions, recent empirical studies in which components or factors of the Creemers model were used, were analyzed (Reezigt et al., 1999; Driessen & Sleegers, 2000; Kyriakeides, Campbell & Gagatsis, 2000; De Jong, Westerhof & Kruiter, 2004). Also recent literature on New learning is used to analyze the validity of the model as a theoretical framework that combines the new educational outcomes with school and classroom factors. The results of the review show that the factors at the student and classroom level (time spent, opportunity to learn and quality of instruction) are the most important in predicting achievement. Second, the concept of motivation and the relation between motivation and teacher behavior needs to be defined more precisely. Also attention should be given to include different aspects of learning environment for New learning (e.g. cooperative learning, apprenticeship model) in the Creemers'model. Furthermore, no empirical evidence is found for the assumption of consistency and cross-level relationships. Finally, future research should use both different methodologies and multilevel models to test the validity of the model more carefully.

Building a theoretical framework of educational effectiveness research through testing creemers' model: a synthesis of three empirical studies conducted in cyprus
Leonidas Kyriakides, University of Cyprus, Cyprus
Jim Campbell, University of Warwick, United Kingdom

This paper argues that there is a need to examine the extent to which Creemers' model, which is one of the most influential theoretical constructs in the field, could help us create a theoretical framework for Educational Effectiveness Research (EER). Thus, three studies, which have been conducted in Cyprus in order to test the validity of Creemers' model in relation to different criteria of measuring effectiveness (cognitive, psychomotor and affective), are presented. These studies used multiple methodologies and provided empirical support to the main assumptions of Creemers' model. It was found that most of the variables in Creemers' model showed the expected effects, irrespective of the criterion used to measure effectiveness. Moreover, it was examined whether the variables 'personality', 'thinking style' and efficacy-beliefs explain variances of achievement at student level and should be included in Creemers' model. It was found that some types of personality and some styles of thinking were related to either cognitive and/or affective achievement gains. This implies that both personality and thinking style should be included in Creemers' model. Finally, we argue for the importance of conducting four types

of research in order to identify the extent to which a theoretical framework of EER based on Creemers' model can be developed. First, researchers should attempt to conduct comparative studies and identify the effect on student achievement of factors at national level mentioned in the model. Second, we should identify some further variables at student level which are related to achievement gains since at student level more than 13% of variance in each outcome measure remained unexplained. Third, it is important to examine relationships between levels and specifically indirect effects from higher-level factors through lower-level factors on student achievement. Finally, further research should demonstrate whether the four formal principles of Creemers' model contribute to student achievement.

A critical analysis of the current approaches to modelling educational effectiveness:
Bert Creemers, Groningen University, Netherlands
Leonidas Kyriakidis, University of Cyprus, Cyprus

This paper argues that researchers in the area of educational effectiveness should attempt to develop a new theoretical framework. Thus, a critical analysis of the current models of educational effectiveness research is provided. This analysis reveals the major weaknesses of the three main approaches to educational effectiveness modeling: the economic approach, the educational psychological approach and the generalist-educationalist approach. It is also argued that a dynamic model of educational effectiveness must: a) be multilevel in nature, b) be based on the assumption that the relation of some effectiveness factors with achievement may be curvilinear, c) illustrate the dimensions upon which the measurement of each effectiveness factor should be based and d) define relations among the effectiveness factors. Then, a dynamic model of educational effectiveness focused on teachers' contribution to student learning is provided. Specifically, the proposed model refers to the following eight effectiveness factors which describe teacher's instructional role: teacher assessment, structuring, orientation, questioning, management of time, applications, teaching modeling, and teacher role in making classroom a learning environment. Moreover, the five dimensions which are taken into account in order to define each effectiveness factor are as follows: the frequency a type of activity is used by the teacher, the focus of the activity, the stage of the lesson at which it takes place, its quality, and the extent to which any type of differentiation is involved with it. It is, however, acknowledged that a dynamic model of educational effectiveness should also refer to other factors at teacher level found to be associated with student achievement as well as to effectiveness factors at student and school level.

Finally, we provide suggestions for the type of research which can be used in order to test the validity of the proposed dynamic model and elaborate further the relations among the effectiveness factors.

G 18   25 August 2005   08:30 - 10:30   Room A010

Symposium
Motivation

RELATEDNESS AS A KEY FACTOR IN EFFECTIVE LEARNING ENVIRONMENTS

Chair: Rob Martens, Leiden University, Netherlands
Organiser: Rob Martens, Leiden university, Netherlands
                Monique Boekaerts, Leiden University, Netherlands
Discussant: Alexander Minnaert, Groningen University, Belgium

The conference theme calls for reflection on the role of the context in learning and instruction. This symposium focuses on a specific and important aspect of this context: characteristics of the school climate and teacher behavior in relation to students' sense of relatedness. The self-determination theory of Ryan and Deci (2000) states that a feeling of relatedness is crucial to foster students' intrinsic motivation and their willingness to invest effort in school related activities. Feelings of relatedness tapped by measures of school climate and the nature of teacher-student relationships, as well as feelings of belonging, inclusion, and interpersonal support, are linked to academic outcomes but also to aspects of motivation (such as self-efficacy, achievement values, positive affect, effort, interest and task goal orientation). They are also linked to belongingness outcomes such as social identity, approval, and proscoial behavior. Furrer and Skinner (2003) contrast this with patterns of disaffection, ' (…) in which individuals are alienated, apathetic, rebellious, frightened, or burned out, that turn people away from opportunities for learning.' (p. 149). When we consider relatedness as an outcome variable of the learning environment, evidence about the impact of school climate and teacher-student relation on non achievement outcomes is slowly building up. We know for instance that teachers with higher intrinsic motivation increase students' intrinsic motivation (Filak & Sheldon, 2003), but information on this takes place lacks. And what about other contextual antecedents, or the relation with norm violating behavior? As a result, clear guidelines on how to improve relatedness are missing. This symposium ad-

dresses the issue by combining research results on the processes underlying relatedness. This symposium is linked to a symposium that focuses on cognitive outcomes. The discussant will pay interest to the interesting relations between the four presented studies and to the practical implications of the conclusions.

Relationship between maladaptive social behavior and belongingness
Marie-Jose Koerhuis, Leiden university, Netherlands
Monique Boekaerts, Leiden university, Netherlands

It is assumed that feelings of identification with school encourage students to adopt rules and regulations in school that withhold them from norm violating behavior, and influence their learning. Positive social interaction is expected to increase attachment and feelings of identification with the person(s) or institution. Students who value the goals set by teachers and school administration will feel attached to these persons, groups and institutions that are part of the wider school community, because under these conditions their need for social relatedness has the best chance to be fulfilled. However, students may also have contradicting expectations; their peers might expect behavior that their teachers consider maladaptive. For those students maladaptive behavior has a specific purpose: it is used as a strategy to achieve belongingness goals. In this study more than 900 students reported on their belongingness goals, frequency of maladaptive social behavior, feelings of identification with school and peers, perception of school climate and social support. Profiles of students with high and low frequencies of maladaptive social behavior will be reported. Furthermore the salience will be investigated of a wide host of variables in investigating the relationship between belongingness, school identification and maladaptive social behavior. These results and implications for education will be presented and discussed.

Relatedness in preservice teacher education
Susan Bobbitt Nolen, University of Washington, United States
Chris Ward, University of Washington, United States
Reed Stevens, University of Washington, United States
Lani Horn, University of Washington, United States
Katherine Estacio, University of Washington, United States

In this presentation we describe the results of two linked studies of relatedness among students in a graduate-level, cohort-based, preservice teacher education program. This is part of a larger investigation of teacher identity, motivation to learn,

commitment to teaching, and relatedness across multiple contexts, and includes both a quantitative (longitudinal survey) study and an ethnographic/interview study of members of the same cohort. We are particularly interested in how relatedness mediates the stressfulness of identity development and the need to negotiate sometimes conflicting views of good teaching across field and university contexts. Ryan and his colleagues (Ryan & Deci, 2000; Ryan, La Guardia, Solky-Butzel, Chirkov, & Kim, in press) have described relatedness as one of three basic needs for well-being. Ryan, et al (in press) have demonstrated the benefits of emotional reliance on others to the extent that the three basic needs of autonomy, competence, and relatedness are met. Cohort-based preservice programs are designed, in part, to reduce students' feelings of isolation and encourage collaboration and support among cohort members. These studies investigate possible mechanisms underlying these benefits, as well as limitations or interactions with other variables that might influence outcomes. Relatedness was defined in these studies as feelings of belonging, emotional support, and cooperation with others in their cohort. In the survey study, a 10-item scale was used to measure relatedness across four time points, focusing particularly on hot-points in the program where identity, motivation, and relatedness may be in flux or particularly salient. The ethnographic study includes observations and interview items and probes meant to prompt student descriptions of their relatedness to cohort members.

The origins and outcomes of supportive teacher-student relationships
Julianne Turner, University of Notre Dame, United States
Rebecca Bickelhaupt, University of Notre Dame, United States

Just as we know that family relationships matter in terms of Children's healthy development, we are beginning to recognize the complementary role of classroom relationships in students' motivational and academic development. Research from psychological and moral development perspectives has demonstrated that what teachers say and do in the classroom is related to students' motivation. In this paper we will discuss relatedness through the lens of students' perceptions of teacher support. We defined teacher support as caring about the individual both as a student and as a person. Drawing on a large longitudinal study of early adolescent students' motivation in mathematics (Turner et al., 2002), we will 1) examine relationships among perceptions of teacher support and other motivational outcomes and 2) analyze instructional discourse of supportive vs. non-supportive teachers to demonstrate how messages about relatedness are sent and how students interpret them. As a special case, we will discuss the contribution of teacher discourse to establish-

ing relationships in the early days of the school year. Perceptions of teacher support were positively related to students' reports of self-efficacy, self-regulation, and positive coping and negatively related to avoidance behaviors, projective coping, and low teacher expectations. Analyses of teacher discourse in classrooms during the first two days of school indicated that teachers established climates that differed substantially in perceived support. Further analyses of mathematics instruction in the same classes during the year demonstrated that teacher discourse that supported students motivationally, emotionally and socially was associated with higher reports of teacher support and other positive motivational outcomes. Teachers may be unaware of the motivational potential of their discourse, and analysis of discourse may be a fruitful tool for teachers in learning how to build supportive relationships with students.

G 19   25 August 2005   08:30 - 10:30   Room A108

Interactive Poster
Social Aspects of Learning

REPRESENTING DIVERSITY IN EDUCATION: STUDENT IDENTITIES IN CONTEXTS OF LEARNING AND INSTRUCTION

Chair: Roger Saljo, Gothenburg University, Sweden
Organiser: Eva Hjorne, Gothenburg University, Sweden
Discussant: Sangeeta Bagga-Gupta, Orebro University, Sweden
                Kristiina Kumpulainen, Univerity of Oulu, Finland

The purpose of the symposium is to address issues of how diversity is represented, understood, and accommodated to, in educational settings. It also seeks to explore how these representations and categorisations relate to student identities and to expectations of student adaptation and performance. Diversity, in terms of social background, cultural and ethnic origin, language, perceived learning ability and so on, is a prominent feature of most educational settings in complex societies. Intra-institutional factors within the educational system, such as the introduction of comprehensive schools, the integration of students with handicaps, and the growth of higher education to include new groups, contribute to making student populations more diverse. General social transformations such as migration and a changing labour market add to the trends of increasing diversity. How educational institutions deal with diversity is one of the most important determinants of learning and

instruction, but one which has received relatively little attention. In the symposium, this general issue will be explored with a focus on analysing how diversity is represented and categorised. Practices of representation and categorisation are central to the manner in which teaching and learning is organised. The contributions address these questions by reporting empirical research that focuses on A) the educational construction of disabilities/learning difficulties in primary education (Choo, Renshaw, and Austin in an Australian context; Hjorne and Saljo in Swedish schools; Riddell, Tinklin, and Wilson in UK university contexts), B) the expectations by teachers of the school success of Portuguese students in the UK (de Abreu), and, finally, C) the work performed by psychologists in diagnosing and assessing student resources for participating in schooling (Grossen, Florez, and Lauvergeon who work in a Swiss context).

Psychological assessment as a situated practice: The psychologists' accounts for their clients' participation

Michele Grossen, University of Lausanne, Switzerland
Douchka Florez, University of Lausanne, Switzerland
Stephanie Lauvergeon, University of Lausanne, Switzerland

When children or adolescents face difficulties at school, they are sometimes referred to a psychologist who may proceed to a psychological assessment in order to make a diagnosis and propose an adequate intervention. While psychometry and clinical psychology offer a number of studies which discuss psychological assessment (with topics ranging from the construction and validation of tests to clinical aspects of psychological assessment), far less is known about the actual practices of psychological assessment. How do psychologists actually use their tests? How do they interpret the instructions of the User's manual and contextualise them to a concrete face-to-face interaction? What are, according to their experience, the difficulties of a psychological assessment? What are the conditions that, in their opinion, make a child or an adolescent testable or not testable? All these questions show that the psychologists' actual practices draw upon contextual resources that cannot be described by the instructions (or prescribed practice) which are given in a User's manual. Consequently, we need to gain a deeper insight into the psychologists' actual practices and into the way in which they account for their assessment practices. This is precisely the aim of the study which will be presented in this paper. 17 psychologists working in three different counselling centres of a Swiss town were interviewed about their practices of psychological assessment. In this paper, our analysis will focus upon one specific point: how do the psychologists speak of the

clients (mainly children and adolescents) they have to evaluate? What are the verbal categories they use to refer to their clients? More specifically, what are, according to them, the conditions that make a client testable or not testable? We shall answer these questions by drawing upon methodological tools pertaining to a dialogical conception of language and communication.

The accomplishment of the Child-with-a-disability in parent and professional's everyday interaction

Juliet Choo, Griffith University, Australia
Peter Renshaw, Griffith University, Australia
Austin Helena, Griffith University, Australia

Academic discourse of disability has largely centred on the medical, social and critical models of disability. This paper employs Membership Categorisation Analysis (MCA) to investigate the everyday discourse about disability through the written-talk between a parent and professional about their child/pupil with autism spectrum disorder in his communication book. In applying MCA, this paper examines the category Child-with-a-disability to investigate disability. From an ethnomethodological perspective, what disability 'is' is an 'accomplished' phenomenon, in the sense that it is actively constituted through the talk and the work of the members. This paper seeks to understand what the parent and professional take to be the Child-with-a-disability in the mundane, situated, here-and-now of their interaction. The participants were a Vietnamese mother and an Anglo-Australian case manager of a boy with autism spectrum disorder who attended a state school with a special education unit. The analysis reveals that the child's communication book is organised around episodes involving library books, his behaviour at school, a vomiting incident and his health. The study finds that the child is accomplished by the parent and case manager as having lower academic capacity than his peers; having social difficulties; not responsible for practicalities of school; having contested agency; emotionally fragile; having unpredictable behaviour. Through the book, a slightly different child is constructed over specific incidents in detailed and situated events across time. In this sense, the category Disability may become foregrounded at various moments and the child's disability identity can be interpreted as shifting and occasioned in moment-to-moment situations. Although the analysis also showed that the contents in the book are highly indexed by Disability, it also revealed that the representation of the Child-with-a-disability as incompetent is the effect of parents and professionals orienting to themselves as responsible and accountable for such practicalities of school.

The local understanding of learning difficulties - categories and the shaping of identities in the Swedish school

Eva Hjorne, Gothenburg University, Sweden
Roger Saljo, Gothenburg University, Sweden

This paper reports an analysis of pupil welfare team meetings as an institutional context for handling dilemmas of schooling. Our focus is on how difficulties encountered by teachers and pupils are categorized and accounted for by team members (teachers, school administrators, and various experts). The pupil welfare team has considerable power in defining problems and in allocating resources for dealing with them. More specifically, we are analysing accounts and members' categories (in an ethnomethodological sense) used to describe children with alleged learning difficulties in school. The empirical setting in which the study has been carried out in a primary school. More specifically, we have followed the meetings of a pupil welfare team during one school year. These meetings have been audio-recorded and later transcribed. The data presented here were generated during these meetings. The results show that the meetings are highly routinized and characterized by a high degree of consensus among the staff as to the perspectives relevant for handling the problems encountered. The accounts produced individualize the problems of pupils by pointing to lack of ability or other necessary qualifications on the part of the individual pupil for managing life in school. Thus, the alleged problems are conceived as resident within the child. The problems are very rarely seen as consequential to pedagogical practices or teacher actions. This accounting practice results in a preference for using categories referring to intellectual capacity or classifications grounded in biomedical traditions (ADHD etc.). This process has considerable consequences for the educational careers of pupils. It is also noted that the pupils have no say in articulating their accounts of the issues discussed.

Disabled students in higher education: widening access and the negotiation of identity

Sheila Riddell, University of Edinburgh, United Kingdom
Teresa Tinklin, University of Edinburgh, United Kingdom
Alastair Wilson, University of Strathclyde, United Kingdom

This paper draws on findings from an ESRC funded research project entitled Disabled Students and Multiple Policy Innovations in Higher Education (R000239069). The paper begins with a brief review of theories of the negotiation of identity and their implications for widening access policies for disabled students. Using data

from the Higher Education Statistics Agency, the paper analyses the social characteristics of disabled students in higher education and critiques the categories employed. The largest and fastest growing group of disabled students within higher education are those diagnosed with dyslexia, who tend to be male and middle class. Poorer disabled people and those with more significant impairments have been less likely to be included. The paper then presents case studies of disabled students to explore the implications of institutional audit for their conceptions of self. It is argued that the adoption of a categorical approach in relation to disabled students, in line with new public management strategies which pervade UK social policy, does not fit readily with disabled students' conceptions of self, which tend to be much more fluid and contingent.

Teachers' views of the academic development of Portuguese students in British schools
Guida de Abreu, Oxford Brookes University, United Kingdom

This presentation examines teachers' accounts of the academic development and learning of Portuguese students in British schools. The analysis draws on a research project aimed at understanding the experiences of Portuguese children and adolescents in English schools. The project originated from a concern with their school achievement. Increasing number of Portuguese families moving to work in Britain have been exposing their children to a school linguistically and culturally dissimilar from their home practices. An ethnographic approach was adopted, characterised by a multiple-method strategy of data collection; multiple-data sources (schools, students, parents, teachers); a bilingual-bicultural strategy enabling data collection in English and Portuguese languages. This presentation will draw selectively on data from interviews with teachers who taught Portuguese students in England and Jersey schools. Theoretically this study was informed by a socio-cultural approach. Taking this perspective into account a specific dimension of the socio-cultural context of schooling of Portuguese students in England is explored: how teachers described the academic development of these students and how they talked about their learning difficulties. Our findings show that some teachers described Portuguese students as no different either academically or socially from students of other ethnic backgrounds. Teachers used examples of bright and fluent in English Portuguese students to support this belief. However, other teachers expressed deep concern that this group of students appeared to be experiencing more difficulties compared with children from other ethnic backgrounds. When explaining these difficulties some teachers focused on the students themselves, some on the school and some on the

community outside of the school. In the analysis I will attempt i) to illustrate the way teachers talked about difficulties, needs and problems of Portuguese students; ii) to discuss the reasons given by the teachers for the location of the needs on a particular social category or structure.

G 20   25 August 2005   08:30 - 10:30   Room E103

Interactive Poster
Teacher Education

VIDEO-BASED RESEARCH IN TEACHING AND TEACHER EDUCATION: METHODOLOGICAL CHALLENGES AND POSSIBILITIES

Chair: Elaine Munthe, University of Stavanger, Norway
Organiser: Elaine Munthe, University of Stavanger, Norway
Discussant: Helmut Fischler, Free University of Berlin, Germany

As the use of video to enhance learning and the use of video as a way to collect data steadily increases, it is necessary to take a critical look at which possibilities and challenges are involved for knowledge creation. Knowledge creation is related to the methods used to create knowledge, and in this symposium four presenters from four countries will present differing perspectives on the use of video based methodology. Two presenters focus on affordances provided by video for teacher learning and two presenters focus on analysing video as data. Deinum addresses the question of how video cases should be designed for use in a virtual learning environment whereas Sheard & Harrison report findings on how video presents a powerful associative tool for generating insights into teachers' learning. Pianta, LaParo and Hamre present and discuss the processes involved in developing and testing a standardized classroom assessment method for studying and improving classroom interaction, and finally,?strem discusses a content analysis method in contrast to an ethnographic approach to video analyses of teachers' work.

Online video cases in teacher education
Jan Folkert Deinum, University of Groningen, Netherlands

To make teacher training more flexible for students we started a project to develop digital video cases. From literature we know cases can be very effective in teacher education. Video is needed to visualize a case in teacher education, because cases

based on text only never contain the whole complexity of teaching a class. In such a video case a student teacher tells about a problem he has had when being in-service teaching a class or in other situations when working on a school. The situation in the classroom is filmed, just as interviews with pupils and experienced teachers. These video fragments are put in a virtual learning environment. Teacher education trainers have the opportunity to add questions and assignments around these video fragments can change the order of appearance and can select different fragments. New student teachers can use these digital video cases in the virtual learning environment so they are better prepared for their in-service teaching and can prepare them on their own time and pace. The aim of this study is to analyze how these video cases has to be designed and how they can be used in teacher education. This study takes place in three different groups of teacher training. The teacher trainer was free in using the cases as he/she wants. Lessons are observed and students got a questionnaire about the video cases. Besides that a group of 20 expert teacher trainers studied the cases. They are questioned about how they think the video cases can be used and what criteria they use to select the video cases.

Learning from teachers' representations of learning with video: A methodological focus
Mary K. Sheard, University of Nottingham, United Kingdom
Colin Harrison, University of Nottingham, United Kingdom

Video technology has offered unique affordances for teacher education as a vehicle for teachers' learning, particularly in attempting to represent the complexities and immediacies of effective teaching as exemplary practice, and through critical self-analysis for professional improvement (Brophy, 2004). However, relatively little systematic research has been undertaken on the effectiveness of video on practice-effecting learning, and even less on the use of 'video as method'. In the present paper, 'video-as-method' refers to the potential of video to elicit representations of teachers' learning through their discourse in response to video extracts. It draws on video as a vehicle of learning, and engagement with and response to video as data, and is concerned to explore the process of learning through association. The research question underpinning the inquiry, and the focus of the present paper, is What are the affordances of 'video–as –method' in identifying how teachers engage in practice-effecting learning? The paper reports on an empirical study with 12 participating primary teachers responding to video extracts of exemplary writing instruction. The method uses semi-structured and unstructured interviews, task analysis discourse and task observations. Data is investigated using types of rep-

resentations of learning (episodic, conceptual, and active; Simons et al, 2000), and modes of representations (narrative, prepositional, and analytical; de Jong et al, 1999) as analytical lenses. Early findings suggest that 'video-as-method' presents a powerful associativetool for generating insights into teachers' learning, particularly in reference to teachers' beliefs, educational philosophies, and constructions of reality about teaching writing.   The paper evaluates 'video-as-method' in terms of its potential to contribute insights into the process and impact of practice-effecting learning, and into teachers' beliefs underpinning their learning in the domain of writing instruction. Associated methodological issues are discussed, and implications and directions for future research are indicated.

Understanding teachers' work – using two methods of video analysis
Sissel Ostrem, University of Stavanger, Norway

Video observation is an excellent tool when interested in people's actions. This paper deals with how two ways of analysing the same video observations – content analysis with predefined categories and a more ethnographic inspired way of analysing- produce different answers to the same question: What are the challenges of teachers' work and how do teachers cope? In the paper I also argue that 'understanding' through the lenses of activity theory observations will not be a sufficient tool but need to be combined with other methods like in depth interviews. Activity theory claims that human beings are able to create their own history within the frames and restrictions of the outer material world embedded in a certain culture and period of time. Thus teachers' work needs to be placed in a cultural and historical context. At the same time we are looked upon as subjects with our own needs, motives and purposes for our actions and thus teachers' own accounts of what's important to them needs to be taken into consideration to understand their actions. The golden moments or streams refers to both the teachers' perspective of their work and the perspective of research conducted on teaching in my struggle to explore what constitutes what may be called the golden actions.

G 21   25 August 2005   08:30 - 10:30   Room B107

SIG Invited Symposium
Assessment and Evaluation

ETHICAL ISSUES IN ASSESSMENT AND EVALUATION

Chair: Jim Ridgway, University of Durham, United Kingdom
Organiser: Kari Smith, Oranim Academic College of Education, Israel
               Jim Ridgway, University of Durham, United Kingdom
Discussant: Donald Christie, Stratchclyde University, United Kingdom

Ethical concerns in relation to assessment and evaluation are not new (Schmeiser, 2004); numerous associations involved with education have engaged in the discussion of moral and ethical aspects of assessment mainly regarding the behaviour and responsibilities of professionals within the assessment community. ILTA, the International Language Testing Association, adopted at their annual meeting in 2000, a code of ethics including nine principles reflecting language testers' desired behaviour and responsibility in relation to test takers, relevant to the field of language testing and to the stakeholders and society. Ethical issues in assessment and evaluation are widely discussed and documented in assessment circles. However, there is still very little research focusing on ethical issues in designing and using assessment tools and the impact or consequential validity (Messick, 1981, 1989a, 1989b) of testing, assessment and evaluation on the various stakeholders, and foremost the assessees. This invited symposium seeks to draw the attention of the assessment and evaluation research community to this important, yet rather pioneering aspect of our field in terms of research. Four papers from four countries will discuss the moral act of assessment from an international perspective. There are specific foci on: gender differences in responses to various testing and assessment designs; ethical issues related to peer-feedback; and an examination of current school assessment practice in light of the International Declaration of Children's Rights. The contexts of the studies vary greatly; from the education of engineers in Sweden, to medical education in the Netherlands, and secondary school education in Israel.
The objective of this symposium is to draw the attention of researchers to the importance of ensuring that the great attention paid by the educational community to moral and ethical aspects of education is reflected in our practices of testing, assessment and evaluation.

Ethical dilemmas in Assessment: just say NO
Eduardo Cascallar, Assessment Group International, Belgium

It has been said that assessment is a moral act. By the act of choosing what we assess and how we assess it, we clearly enunciate what we value, in any given programme and in education in general. An institution may present a wide range of documents, a wonderfully developed mission statement, programme specifications, a complete range of competencies, skills, and concepts that our students may be expected to acquire or achieve… but if you really want to know about the quality of such program, course, or institution, the proof will be in whether these goals are assessed and how well they are assessed. If there is no evidence of appropriate assessment, whichever the form, then the evidence invalidates the superficial claims. In this case, the evidence at best indicates that our goals may not have been achieved, at worst, it may indicate that the claims were for the benefit of other audiences, not for the profession, the students, or society. The same is true in all areas of assessment and evaluation. This presentation will analyse real world experiences in a wide variety of settings, (educational, professional, organizational), and will conceptualize the issues from a multidimensional perspective taking into account the type of assessment, the purpose of the assessment, its use, its impact, and the organizational structure, as well as the technical and political context. The ethical principles and situational variables will be discussed on the basis of concrete and practical ways of dealing with such conditions in different assessment settings. The technical aspects of possible psychometric tools to address some of the issues will be described. More importantly, the ethical standards will be discussed with the view that ultimately, being a moral act, assessment implies a vision of individuals, profession, and society that we should openly acknowledge and address.

Assessing group work projects in higher education: some pedagogical and ethical considerations
Michael F. Christie, Chalmers University, Sweden
Fariba Ferdos, Chalmers University, Sweden

In this paper we present our findings from a research project connected with group work in a first year engineering course at Chalmers University, Sweden. Our research data is based on twenty interviews with both male and female students involved in first-year electrical engineering projects. We argue that men and women have different attitudes to small group work and different ways of behaving in the group.   In our study women preferred a more communicative approach to learn-

ing but were often frustrated in this by the more logistical and product oriented approach of male group members. Under pressure, discussion gave way to divided tasks which were generally devised and allotted by strong male members of the group. Men were more often engaged with procedural and conditional knowledge while women worked with declarative knowledge. In a subsequent test that examined what students had learnt during their group work, women did particularly badly. One reason for this, we argue, is that the test examined higher order knowledge. Men had a deeper understanding of the problems because they had been more actively engaged with them. Communication skills, gender awareness and team work were some of the other aims of the group work. These were not tested. This raises both questions about the fairness of the test and the design of the group work. We conclude that better designed and more closely monitored group work would ensure that women, on the one hand, are involved in more active problem solving while men, on the other, would be required to communicate better. In this way generic skills such as effective communication and gender awareness would be enhanced and all members of the group would have the opportunity to engage actively with higher-order subject-specific skills and knowledge.

Ethical issues in giving and receiving formative feedback in medical education
Dominque Sluijsmans, Open University, Netherlands
Frans Prins, Open University, Netherlands

General practitioners (GP) are increasingly settling down into practice with colleagues. Supervisors in medical faculties show a growing interest in engaging prospective GPs in the development and assessment of peer feedback skills, as these skills are essential for successful collaboration in practices. For the design of activities that guide student-GPs in the development of their feedback skills, it is important to involve students in the definition of assessment criteria on two aspects: 1) how to give adequate (peer) feedback; and 2) how to receive (peer) feedback. For this study, the giving and receiving of feedback was focused on a skill that is crucial for GPs, namely 'giving medical consults'. Aim of the study was to develop assessment criteria for both the feedback skill and the skill to give medical consultations. First, 15 supervisors were asked - by means of a video of a medical consultation – to write a qualitative feedback report on the medical consultation. In a next session with 24 student GPs, students watched the same video and were then confronted with the reports of the supervisors. Students were asked individually to select the report with the most adequate feedback and to indicate on what criteria they chose this report. Protocol-analysis of the feedback reports and the observations during

the sessions revealed that supervisors have idiosyncratic strategies in giving feedback and that students have idiosyncratic strategies in receiving feedback. In a joint session supervisors and students negotiated about the assessment criteria and designed two performance assessment scoring rubrics, one for giving and receiving feedback and one for giving medical consults. The supervisors and the students valued the involvement in defining assessment criteria for feedback purposes. In our contribution, we present the complete procedure in which supervisors and students systematically identified the criteria for feedback and medical consults.

Assessment in light of the UN Convention of the Rights of the Child
Kari Smith, Oranim Academic College of Education, Israel

his paper discusses selected paragraphs in the UN Declaration of the Rights of the Child (1989) in light of current assessment practices in an Israeli context. The paper examines if current assessment practices are in accordance with the rights expressed in the selected paragraphs (§3, §12 and §13), serving the child's best interest, the child's right to express their view freely in all matters affecting the child, and the right to freedom of modes of expression, and to seek, receive and impart information and ideas through any media of the child's choice. A group of Israeli teachers of various school subjects were interviewed about their assessment goals and practices. Drawing upon the information from the interviews, a questionnaire with special focus on learner involvement and impact of assessment on the learner was designed to elicit information about current assessment practice from a larger group of teachers. Teachers from the latter group were then presented with the selected paragraphs from the UN Declaration of the Rights of the Child and asked to respond to open questions regarding what assessment practices would best reflect the content of the selected paragraphs. The findings are still preliminary, but in light of the extended use of standardized testing in Israel and decreased teacher autonomy regarding assessment practice, it is hypothesized that there is a gap between the way learners are actually being assessed and how teachers believe assessment should be practiced in order to honor the Rights of the Child.

EARLI Invited Symposium
Teaching and Instructional Design

UNDERSTANDING CLASSROOM PROCESSES THROUGH DIFFERENT METHODOLOGICAL APPROACHES

Chair: Wolfgang Schnotz, University of Landau, Germany
Organiser: Wolfgang Schnotz, University of Landau, Germany
Discussant: Gavriel Salomon, Haifa University, Israel

As a scientific association aiming at a deeper understanding of processes of learning and instruction, EARLI encourages research from multiple disciplines, multiple theoretical perspectives and multiple methodologies. Using a specific methodology is highly dependent on the specific research question at hand. Frequently, however, even different methodological approaches can be used for answering the same research question. In both cases, a general problem arises:
- Which methodology is most useful for which purposes?
- What are the strengths and what are the weaknesses of a specific methodology?
Unfortunately, these questions are usually not explicitly discussed. In many cases, researchers are firmly rooted within their methodological camp; they do not consider alternative approaches and do not reflect about the interrelationships between these approaches. This is an unfortunate situation insofar as an inter-methodological discussion might have strong synergetic and stimulating effects on the field. The symposium therefore aims at a comparative analysis of different methodologies used for a specific topic – the study of classroom processes – as an example in order to attain a better understanding of these methodological approaches, their specific contributions, their strengths and their weaknesses for research. The symposium will hopefully contribute to a broader and more integrated view of possible methodological approaches and research perspectives on learning and instruction.

Affordances for learning
Ference Marton, Gothenburg University, Sweden
Kerstin Signert, Gothenburg University, Sweden

One of the most important aims of education today is to enable the learners to handle novel situations in powerful ways. In order to handle novel situations in

powerful ways the learners have to become good at discerning critical features of those situations; they have to learn to see novel situations in powerful ways. In order to learn to discover a certain feature, the learner must experience variation in that feature. In order to experience variation in a certain feature, other features must be invariant. Learning to see in this particular sense is a function of the experienced pattern of variation and invariance during the learning occasion. Several educators – such as Jean Marc Gaspard Itard (1774-1838), Edward Seguin (1812-1881), Maria Montessori (1870-152) among others – have gained and practiced this insight during the last two centuries. The same insight is also intuitively -and to various extents – shared by teachers today. We will give some examples of looking at learning outcomes in terms of learning to see and of looking at teaching in terms of what learning is made possible by means of the pattern of variation and invariance constituted in the classroom. By the examples we are going to demonstrate that there is a very close relationship, indeed,between what learning is made possible in the classroom and what the students actually learn.

Characteristics of classroom cultures and practices with respect to (non-)realistic mathematical modeling: an integrated psychological and sociocultural perspective
Fien Depaepe, Catholic University of Leuven, Belgium
Erik De Corte, Catholic University of Leuven, Belgium
Lieven Verschaffel, Catholic University of Leuven, Belgium

This paper outlines the impact of the culture of the mathematics classroom on the development of students' beliefs about and approaches to (realistic) mathematical modeling, from a socioconstructivist perspective. According to this perspective, the social level (including the normative aspects of the classroom) and the individual level (including teacher's and students' subjectively held beliefs) of the mathematics classroom are closely intertwined, and each constitutes the background from which the other level can be interpreted (Cobb et al., 2001).
Previous research revealed that many students neglect their common-sense knowledge while solving mathematical application problems in a school context (Verschaffel et al., 2000). These researchers have hypothesized that students' tendency to neglect real-world knowledge results from being immersed in the culture and practice of the mathematics classroom. More specifically, this enculturation is hypothesized to be due to the following two aspects of the current instructional practice and culture: (1) the nature of the problems given, and (2) the way in which these problems are conceived and treated by teachers (Verschaffel et al., 2000).

However, strong and systematic empirical evidence directly supporting this claim is largely lacking. Twelve sixth-grade classrooms using the most frequently used mathematical textbook in Flanders participated in this study. In each classroom we videotaped and analyzed the same two problem solving lessons with a view to unravel the establishment of the social and the socio-mathematical norms in the different classroom cultures. This social perspective was integrated with a psychological perspective through an analysis of both the teacher's and the students' beliefs about realistic mathematical modeling by means of, respectively, an in-depth individual interview and a questionnaire. Finally, the impact of the characteristics of different classroom cultures and practices on students' (non-)realistic modeling processes and skills was examined by means of a word problem test.

What we can learn from experiments about students' learning processes
Elsbeth Stern, Max-Planck-Institute for Human Development, Germany

Appreciation of experimental research on learning and instruction may vary considerably. Any researcher who, having spent much time and effort on some intricate analyses of a large-scale data set, has to give in to the fact that, due to certain irremediable confoundations, conclusions as to the most favorable instructional settings remain as unsubstantiated as before, will long for some controlled experimental procedure. For economical, ethical and epistemological reasons, experimental procedures may well be what is called for. Laboratory studies allow for observations and inquiries that would be impossible to make in natural instructional settings. Since time is a rare commodity in institutionalized instructional settings, it may indeed make sense to resort to the laboratory first, in order to conduct some global comparisons between different instructional settings or between certain elements of such settings. The effect of specific exercises/explanations may be tested by presenting a control group with a treatment where these features are omitted. In natural instructional settings, this procedure would be problematic for ethical reasons, since it would disadvantage a number of students. Three studies of the ENTER-PRISE project will be outlined which seek to elucidate the kinds of visual-graphical representations and reasoning tools that are adequate for inducing concept shift and knowledge transfer in elementary school children, as well as the precautions one has to keep in mind. The following sic questions will be addressed:
1) Why resort to an experimental setting?
2) Which is the logic underlying the construction of control conditions?
3) Is the comparison devised as a global one between groups or are specific dimensions addressed?

4) Which problems have arisen concerning the comparability of groups?
5) Which results will apply to natural instructional settings as well?
6) Which elements of knowledge are due to the fact that the studies were conducted in the laboratory?

Video-based classroom studies:Integration of different methods of video analysis for a differentiated perspective on teaching and learning processes
Kurt Reusser, University of Zurich, Switzerland
Isabelle Hugener, University of Zurich, Switzerland
Christine Pauli, University of Zurich, Switzerland

Video based classroom studies have a great potential to gain further insight into the process of teaching and learning, as different (international) video surveys demonstrate (http://www.didac.unizh.ch/forschung/videostudien.htm).

The presentation focuses on the methodological approach to the analysis of filmed lessons in two large scale international classroom video studies. The low inferent coding as a description of the instructional activities and different versions of more high inferent quality ratings will be introduced and discussed as complementary methods. In terms of the low inferent coding, in a first step the complete lesson was analysed with regard to social forms, content-related activities and the functions in the learning process according to event sampling, and was divided into different sequences. This sequencing also forms the precondition for further codings of particular sequences. This includes the analysis of the instructional dialogue in certain didactical settings (development of new content vs. discussion of solutions), which were identified with the help of the coding of the function in the learning process in the first step of the coding process. The key aim of high inferent quality ratings and of the analysis of instructional conversations is to evaluate the quality of instructional behaviour.

A combination of both procedures enables it to be examined whether the quality of teaching is related to certain forms of instructional arrangement. In other words, the question can be addressed as to which forms of instructional arrangement give rise to particular qualitative instructional features.

This points to the added value of video-supported instructional research in relation to the understanding of processes and quality of instruction, in particular when integrating other data sources such as questionnaires, achievement tests or interviews.

Symposium
Moral Development

MORAL COMPETENCE AND TEACHERS' BEHAVIOUR

Chair: Cees Klaassen, Radboud University Nijmegen, Netherlands
Organiser: Cees Klaassen, Netherlands, Netherlands
              Rikkalotta Toivonen, University of Helsinki, Finland
              Sofie Maas, Radboud University Nijmegen, Netherlands
Discussant: Nava Maslovaty, Bar Ilan University, Israel

In society at large a discussion is going on about values and norms and the peda-gogical assignment of the school as well as the moral role of the teacher. In many schools a continuing debate is going on about the moral conflicts, norm violations and misbehaviour that teachers are confronted with in daily practice. In the opinion of many teachers the way they have to cope with the day to day working relations in school and classrooms influences the possibilities for effective learning. Pedagogi-cal difficult situations put high demands on the moral competence and pedagogical action competence of teachers but also offer possibilities to contribute to the moral development of students. In this symposium we pay attention to the different ways in which teachers cope with these circumstances. In the various sessions of the symposium different aspects of the pedagogical and moral encounters of teach-ers and students come to the fore. They are investigated with different theoretical frames of reference and both qualitative and quantitative research approaches are used.

Uncovering the joint action of teachers' moral competence and action competence
Jukka Husu, University of Helsinki, Finland
Rikkalotta Toivonen, University of Helsinki, Finland

Educators are called upon to mediate upon many private and public interests that pertain to personal, professional, organizational, and societal values. This plural-ity of understandings is an integral part of the teaching profession. It is one of the teachers' professional tasks to discern how the competing interests can be served practically. The purpose of this study is to shift focus on the scene where the condi-tions and contingencies of this competence may be found. This means by exploring

day-to-day details of pedagogical encounters to see what they might offer in putting forth an understanding of teachers' moral competence in concert with their pedagogical action competence. To explore this idea necessitates interpreting teaching encounters for the way they promote or prohibit conditions for pedagogical ethics. This study uses the concept of phronesis as its starting point. It concentrates on three interpretations of the concept and their educational applications: the rationality code, the situational code, and the moral character code. These three interpretations of pedagogical practice should not be separated from each other. Rather, each interpretation is linked to the others. That is why this study highlights the connection between teachers' ethical competence and action competence. Theoretical analysis is illustrated with data from five intensive case studies conducted during the years 2004-5. The data contains investigation of five primary school teachers' moral competence by identifying emergent themes from observational data, field notes, and in-depth interviews of teachers. The analysis examines moral qualities embedded in teachers' pedagogical practice. We believe that the use of more than one theoretical and practical approach will expand and complement our understanding of teachers' professional morality. It may help us better understand the problems teachers face in their work; the dynamics of educational contexts; and value the impact of different approaches on teachers and students.

Morally critical situations as complex phenomena. The cognitive and affective dimensions of teacher behaviour
Sofie Maas, Radboud University Nijmegen, Netherlands
Cees Klaassen, Radboud University Nijmegen, Netherlands

Our research project is about teachers' moral task with regard to their students' moral development. The focus of our research is on teachers' (re)actions in morally critical situations, that is, situations in which moral values are being assaulted. These situations are of importance because, on the one hand, they provide teachers with an opportunity to teach their students something about values, and, on the other hand, they are complex phenomena in which there is not just one best way to act. From previous research we know that teachers' considerations in morally critical situations need to be studied more thoroughly and also related to the emotions that are at stake in a particular situation. Therefore, in our research, have formulated a more encompassing research design. Special attention was paid to the emotional aspects and the diverse considerations teachers had for acting in a particular way. This paper discusses the results of a questionnaire about morally critical situations that was administered among 234 teachers in secondary general education in the

Netherlands. Teachers' action strategies, considerations and emotions in six morally critical situations are described. Furthermore, the results of logistic regression analyses are presented and discussed. These analyses were used to explore how teachers' action strategies were related to their considerations and feelings in the situation, their evaluation of the situation and their opinions about their moral task and about the goals of moral education.

Role requirements and moral differentiation - An empirical perspective on the basis of moral education
Klaus Beck, Johannes Gutenberg-Universitaet, Germany

One of the basic assumptions underlying Kohlberg's theory of moral development states that moral judgments – besides during transition phases – are based on the highest stage principle a person has reached so far (thesis of structured wholeness). By following this conception the bulk of empirical research in this field has been designed to discover only the highest stage principle a test person is able to make use of (Kohlberg's modal stage). The design of our six years longitudinal study on young business people allowed for the identification of different modal stages dependent on different areas of life (job affairs, family, peers). It turned out that about 90 % of our test persons incline to differentiate their moral reasoning between domains according to the different roles they have to play within these domains. In its first part the paper will present some important findings showing the variation of people's moral judgments. Next, it will be argued that Kohlberg's assumption of the structured wholeness of moral thinking can be traced back to a universalistic ethical position (sensu Kant). Human condition of modern life seems not to accord with this idea. On the contrary, biological as well as social theories of evolution suggest that human life has been subject from the beginning to domain or situation specific moral demands. More so, modern mass societies provide environments into which individuals are embedded by highly subdivided role sets according to the subsystems of the respective societies. These subsystems (economy, right, power, education etc.) fulfill different functionalities and follow different moral standards – an argument for the preferableness of a certain kind of ethical relativism instead of ethical universalism. Finally, several implications of this view on moral education are discussed.

Between the Individual and the Common Good in Teachers' Ethical Dilemmas
Liron Dushnik, Tel-Aviv University, Israel
Naama Sabar -Ben Yehoshua, Tel Aviv University, Israel

Approaches that view teaching as a moral enterprise led to this study which adopts a qualitative-interpretive approach and whose objective is to gain an insight into how teachers themselves interpret their ethical commitments. Teachers were asked to relate ethical dilemmas they had encountered in their professional life. Analysis of the dilemmas shows that teachers feel committed to promoting the interests of students as individuals. This commitment is perceived as conflictive with teachers' commitment to safeguard the existing order for the good of all students, the education establishment and the public. This perception of conflict between the individual and the common good can be understood against the background of processes in Western society that modify the balance of power between the individual and society. Hence the ethics of the individual teacher is a result of social construction, and its shaping is contingent upon social structures and cultural imperatives. A communitarian perspective characterized some of the teachers and created an alternative to the dichotomous perception of the good of the individual-student and that of the public-establishment. These teachers regarded the class framework as a source for additional commitment. The class was perceived as a community for whose moral character they were responsible. It follows that it would be helpful to continue to examine the significance of the class framework and its perception as a community for the professional ethics of teachers.

H 1   25 August 2005   11:00 - 12:20   Computer Labs

CIT Sessions

Qualitative analysis software for educational research
Asher Shkedi, The Hebrew University of Jerusalem, Israel

Qualitative educational research challenges researchers with the Herculean task of organizing and analyzing huge quantities of data. The broader the research, the more difficult becomes the control of the massive amount of data. Qualitative researchers who wish to maintain a strict and transparent analytical process are in need of a tool with which to approach this task. In this workshop we introduce new computer analysis software. This software is not intended to replace researchers but to help them to organize the data mass, to divide the data into meaning units, to

categorize them, and to reorganize the data in a new meaningful order. The analysis software enables researchers to analyze simultaneously numerous cases and subjects while preserving the uniqueness of each. Researchers can focus on the entire data base or only part of it, merging of analyzing document or select from and divide it. Researchers can use the software for constructing qualitative description and/or grounded theory. The software analyzes data from word processor documents and exports the analyzed data to a new word processor document. The range of applications of this software makes it suitable for almost all types of qualitative research, from the more structured-'objective' qualitative type to the more constructivist type. The software is compatible with languages written from left to right as well as those written from right to left.

WBLST – Web based learning in sciences and technologies
Safwan El Assad, Polytech'Nantes, France
Velina Slavova, New Bulgarian University, Bulgaria
Gilles Nachouki, IUT - University of Nantes, France
Iordache Bogdan, Politechnica University of Bucarest, Romania
Georgi Rusev, Technical University of Varna, Bulgaria

This article describes the approach adopted and the results obtained by the international team developing WBLST - a multimedia Web-based application for self-learning in sciences and technologies. The application represents a complete platform for developing e-courses, covering three levels of knowledge domain offering content, exercises, and laboratories, aiming to be compatible with traditional classroom instruction. The approach used takes into consideration specific cognitive aspects and combines the possibilities of contemporary technologies. Based on core principles of learning sciences and on analyses of studies in the e-learning domain, the paper gives the reasoning which has led to the choice of an adequate on-line teaching strategy. The delivery model developed operates with domain concepts as relevant providers of semantic links, in order to use them for dynamic generation of coherent learning occurrences. Through the assistance of the learning model, the project aims at facilitating the overview and helping the establishment of a mental map of the learning material by allowing users to learn as they go along. The application developed is a Web-based application and comprises functionalities for organizing all the students learning processes. Each professor can create modules of learning materials containing lectures, exercises and laboratories. After that Professor create virtual classes similar to real-word classes based on every module. The learning materials can be accessed anytime and from anywhere by students which

have signed up for the class. For each section, specific design methods are applied for enriching the learning experience of the student. Learning assistance is provided by the organization of the learning materials and its relation with the domain concepts. The searching functionalities provide assistance for the construction of a coherent mental map of the course, corresponding to the concepts edifice and to the semantic links introduced. Finally, conclusions are presented and future work is described.

H 2   25 August 2005   11:00 - 12:20

Thematic Poster Session
Assessment and evaluation
Discussant: Leonidas Kyriakides, University of Cyprus

H1   Making non-formal and informal learning visible through the creation of a digital portfolio
Anna-Maria Ajello, University La Sapienza Of Rome, Italy
Cristina Belardi, University La Sapienza Of Rome, Italy

Throughout Europe it is recognised that there is a need to develop methodologies to evaluate competencies that are acquired outside traditional educational structures in the so-called non-formal and informal learning contexts (Cresson, Flynn, 1994) to facilitate the reintegration of people into the labour market and thus enhance their life-long employability. The In.Tra. project was founded by the E.U. in order to create a tool to make visible (Bjornavold, 2000) competencies acquired in IF and NF learning contexts by young, disadvantaged people with a low-medium level of education. Informal competencies are acquired in daily life contexts participating in activities which are clear and meaningful for the person involved (Rogoff and Lave 1984; Lave e Wenger 1991). We decided to elaborate a digital portfolio because we consider it to be a better tool for the recognition of competencies acquired by disadvantaged persons outside traditional learning contexts. In particular they refer to Laureen Resnick's (1997) general methodological suggestions on evaluation in a socio-cultural perspective. A tutor helps the young person to collect evidence of formal learning and evidence of non formal learning, then he/she will support the trainee during the process of analysing his/her informal skills conducting a semi-structured interview. Then they will make photographs of products produced in work-related activities and in free time and a video realised through the use of a digital video recorder. The tutor must guide the person through the realisation of

the digital portfolio without substituting his/her choices by creating a scaffolding activity (Wood D., Bruner J., Ross G., 1976). Moreover he must be able to validate the trainee's characteristics and competencies to support him/her in a process aimed at self-empowerment.

H2   Implementation of portfolio learning in professional education of general practitioners
Marie-Louise Schreurs, University of Maastricht, Netherlands
Bas Maiburg, University of Maastricht, Netherlands
Paul Ram, University of Maastricht, Netherlands

Portfolio learning provides a model for learning from experiences. General Practice-trainees (GP-trainees) mainly learn by working in a general practice. Reflective ability is necessary to gain most from these experiences. Daily, GP-trainers at the workplace discuss the learning experiences with the GP-trainee. Weekly, trainees follow a learning-programme at the faculty. In this complex learning environment, a portfolio can be helpful for them to steer their own learning process and improve professional development. In 2004 we started to implement the systematic use of a portfolio in the training-programme of GP-trainees. Portfolio has a formative aim as a tool to reflect on experiences, discuss these with the supervisor, receive feedback and plan future learning activities. The implementation process consisted of five phases: design of portfolio-format; inform of stakeholders (staff members, gp-trainees, supervisors); introduce portfolio (trainees compile portfolios); support the use of portfolio and evaluate the process. During this implementation we carried out several measurements. First, we investigated the perceptions of the trainees and supervisors towards the objectives of the portfolio. At the evaluation phase we conducted semi-structured interviews and group discussions with stakeholders about the effectiveness of the portfolio. Results show that half of the trainees consider the use of a portfolio as meaningful to visualize the learning process. First year and third year trainees differ in their opinion about the improvement of the discussion and feedback on the learning process by portfolio. The supervisors underline the meaningfulness of the portfolio, but they are relatively uncertain about their capacities to help the trainees to reflect and improve learning. However, the role of the supervisor seems crucial for effectiveness of portfolio. In our contribution we outline the process and present different perspectives of trainees and supervisors. We will discuss the factors that contribute to an active involvement in the use of the portfolio.

H3 The effects of keeping a portfolio on the learners' attitudes towards foreign language learning and towards carrying out a research

Pinar Ersin, Marmara University, Turkey
Gokce Kurt, Marmara University, Turkey

In the last decades, portfolios have been increasingly used in the second language education as an alternative assessment device and as an instrument for professional development. When used as an assessment tool with students, portfolios provide a continuous record of their language development. When used with pre-service and in-service teachers as an instrument for professional development and self-growth, portfolios illustrate an individual's development and also stimulate reflection among student teachers and teachers. In this study, portfolios were used in a different context for a different type of aim. Portfolios, constructed by language learners, were aimed at improving learners' attitudes towards language learning in general and towards conducting a research. The present study was implemented at English Preparatory School of Marmara University, Istanbul, Turkey in Spring 2004. Eighteen upper-intermediate Turkish (English as a Foreign Language) EFL learners participated in the study. The learners at the upper-intermediate level had 24 hours of English instruction every week, 12-hour grammar and academic listening instruction and 12-hour English for Specific Purposes (ESP), academic reading and academic writing instruction. The study was carried out in the reading/writing/ ESP course. The data were collected by means of pre- and post-attitude questionnaires investigating the learners' efforts in learning English, their desire to learn English and their affective reactions toward learning English. Moreover to find out his or her ideas towards research, each learner was interviewed in detail twice. The interview was conducted once at the end of the term (Spring 2004) to find out the immediate effects of the study, and once five months later (at the end of Fall 2004) to find out the long-term effects of the treatment. The findings of the study indicated that the process of portfolio construction affected learners' attitudes towards foreign language learning and carrying out a research positively.

H4 Portfolio in higher education: What do students gain from it?

Simona Tancig, Faculty of Education, University of Ljubljana, Slovenia

The goal of the work presented in this paper was to understand empirically how students perceive portfolio building. The investigation was aimed at identifying evidence of students' satisfaction regarding the experience of portfolio learning and assessment. METHOD: * Subject: A sample of 135 students of special pedagogy

of Faculty of Education, which were included in portfolio assessment were administered a questionnaire about their perception of portfolio benefits for their study process and assessment. * Materials: To construct a portfolio questionnaire recent literature was studied and interviews with students were carried out in order to discover their experience with portfolios. This pilot analysis for constructing portfolio questionnaire has been carried out during four years at the occasion of portfolio presentations and portfolio conferences. Based of acquired data the portfolio questionnaire comprising 22 items regarding the advantages, obstacles and suggestions of portfolios was constructed. Out of 22 items 18 deal with advantages and 4 with obstacles. * Analysis: Descriptive statistics, intercorrelations and factor analysis were applied to collected data. RESULTS: * Intercorrelations: Pearson's correlation coefficients for the first group of items (advantages) are positive and significant in most cases. The same is true also for the second group of items (obstacles). Zero and negative correlations coefficients prevail between the two groups of items. * Factor analysis: After normalization of data the factor analysis was applied. Five latent dimensions were extracted by principal component analysis. Five factors solution accounted for 24,9 %, 9,1 %, 7,4 %, 6,3% and 5,5 % of variance with initial eigenvalues of 5,4; 2,0; 1,6; The factors could be labeled as: F1 - Self-evaluation and active learning; F2 – Poor studying habits; F3 – Stimulation of good studying habits and creativity; F4 – Critical and reflective thinking; F5 – Connection between theory and practice.

H5   e-ELP: electronic European Language Portfolio
Charalambos Vrasidas, CARDET - Intercollege, Cyprus
Elena Landone, University of Milan, Italy
Michalinos Zembylas, CARDET - Intercollege, Cyprus

The electronic European Language Portfolio (e-ELP) is part of a Minerva project funded by the EU with main goal to adapt the ELP in an electronic format. Recent EU policies promote the language teaching and learning as a key element for European integration and mobility. EU underlines the necessity of a sort of language passport, called European Language Portfolio- ELP, which would be a personal document of the European citizen illustrating a detailed picture of all his/her language experiences and certifications. So far some ELPs has been validated and edited in a hardcopy format. These hardcopy editions present several limitations such as maintenance and long term updating. This paper will discuss the rationale behind the development of the digital version of the ELP, its technological and pedagogical aspects, and its advantages over print-based counterparts. Prototype examples of

the e-ELP and preliminary evaluation findings will be presented and discussed.

H6   A new tool for the assessment of individual differences in text comprehension of school aged children: a model of component processes

Chiara Levorato, University of Padova, Italy
Barbara Nesi, University of Padova, Italy
Maja Roch, University of Padova, Italy

This study was aimed at investigating the component processes underlying Children's text comprehension abilities and their relationships with the understanding of both verbal and written text and with verbal working memory analysed thorough the Listening Span test. A test adapted from Hannon & Daneman (2001) was used to analyse the component processes: a) to access prior knowledge from long-term memory; b) to integrate prior knowledge with text information; c) to make inferences based on information provided in the text; d) to recall new text-information from long term memory. One hundred and fourteen children from 8 to 11 year olds participated in the study: 56 third graders (mean age 8 years and 7 months) and 58 fifth graders (mean age 10 years and 7 months). The results showed that the task was able to distinguish between the two age levels and that the inter-correlations between the four component processes were high in both age groups. Moreover, the four components resulted to correlate both with listening and reading comprehension, mainly with the inferential component.

H7   Moving towards multidimensional evaluation of teaching in higher education: a study across four faculties

Raffaella Semeraro, Padova University, Educational Sciences Department, Italy
Elisabetta Ghedin, Padova University, Educational Sciences Department, Italy
Debora Aquario, Padova University, Educational Sciences Department, Italy

In many cases student evaluations of teaching have became a major source of data on teaching quality, and most universities have developed internal procedures for collecting and analysing these.Considering the Italian context, a national ministerial body has been activated with the aim of assessing quality, efficacy, and efficiency of the university system. The reports produced both at a national level and at a local level constitute an important basis to assess the university teaching. A significant internal evaluation must record the points of view of those who directly participate in the educational process. Currently university teaching evaluation in Italy is based on general indicators, which reflect a simplification of a complex phenomenon. The

research hypothesis is that the general aspects are independent from the context, on which italian university students give their evaluation at present. However, there are also specific aspects dependent from the context (planning of educational curricula, faculty organisation). In order to validate such hypothesis, this research considers the teaching processes, making a comparative study in four faculties of Padua University (Humanities, Psychology, Educational Sciences, Mathematics and Natural Sciences). The aim of the research was to ask the students of the four faculties chosen, as mentioned above, to express the criteria they consider important in the evaluation of the university teaching. The instrument used is the semi-structured interview. Qualitative analysis of the data collected are conducted using the scientific software Atlas.ti. The outcomes confirm our hypothesis showing differences among the four faculties considering the multiple dimensions of the university teaching. In accordance with these results, our proposal is to develop instruments for teaching evaluation, which consider general aspects (independent from the context) and, in particular, specific aspects dependent from the planning of educational curricula and faculty organisation.

H8   Preservice teachers' use of self-regulatory processes to learn how to teach and sustain motivation within the context of their practicum
Sylvie Frechette, Universite du Quebec a Trois-Rivieres, Canada
Frederic Legault, Universite du Quebec a Montreal, Canada
Monique Brodeur, Universite du Quebec a Montreal, Canada

The study investigated the use by trainees of self-regulatory processes to regulate the way they learn how to teach children and activate motivation. Data were collected from 115 secondary preservice teachers and 101 cooperative teachers by using two likert-style protocols. Findings showed significant correlations between cooperative teachers rating and preservice teachers' self-reports, and also between cooperating teachers rating and preservice teachers academic performance.

Learning and cognitive science
Discussant: George Spanoudes, University of Cyprus

H9   5th grade students' achievement on different types of realistic word problems
Rita Kelemen, University of Szeged, Department of Education, Hungary

The theoretical background of the present study relates to the realistic modelling of

word problems, where the term 'realistic' means that students have to activate their real-world knowledge in the problem solving process. (Verschaffel, De Corte and Borghart, 1997) In our investigation we aimed to reveal some additional details of students' realistic problem solving tendencies. Two tests were administered to 272 pupils from 14 different fifth-grade classes of seven South-East Hungarian elementary schools in the autumn of 2004. One of the two applied tests was a mathematical achievement test containing regular school tasks based on the subject-matter of some important schoolbooks and the requirements of Hungarian National Core Curriculum. The second experimental instrument contained so-called real-life word problems. The main characteristics of the tasks are similar to some well-known problematic word problems from Verschaffel, De Corte and Lasure's (1994, 1999) work, but the text-levels and the operation-levels of the problems were rewritten by the author. The problems can be grouped to three types according to the necessary problem solving strategies: interpretation of result, evaluation, and realization of meaninglessness. The results of the present investigation revealed that in most cases, the strategy-level characteristics of a problem have a strong influence in 11-13-year-old students' problem solving. In front of this fact, the most of the school word problems applied to the analysed age-group are similar in the strategy-level and solvable with one or more basic operations' straightforward application. If we intend mathematics education reaching the goal that the students should be confronted with problems from the real-world, than it would be beneficial to use different strategy-level tasks for modelling of the real-world problems.

H10   *Metacognitive competencies in mildly mentally retarded children*
Gerhard Buettner, University of Frankfurt, Germany

According to Nelson & Narens' (1994) procedural metamemory model, two metacognitive components are fundamental during self-paced learning: (1) self-monitoring and (2) study time allocation. Based on this metamemory model, a study was designed to explore mildly mentally retarded Children's procedural metacognitive abilities. It was hypothesized (1) that retarded children possess basic monitoring skills and (2) that these skills are developmentally delayed. Participants were 25 mildly mentally retarded fourth graders, 25 nonretarded first graders (same mental age) and 25 nonretarded fourth graders (same chronological age). The children were shown paired associate pictures of unrelated concrete objects. Afterwards, they had to assess whether the second picture of the learned pair could be remembered two minutes after finishing the learning procedure, when prompted with the first picture. In one condition, each judgment of learning was made immediately after studying

an item-pair (immediate JOL). In a second condition, the judgments of learning were made after studying all item-pairs (delayed JOL). The JOLs were analyzed by multivariate analyses of variance. Generally, delayed judgments of learning were more accurate than immediate judgments of learning. This delayed JOL-effect indicates that retarded children possess at least basic monitoring skills. Memory performance was overestimated in both experimental conditions. In the immediate JOL-condition the nonretarded fourth graders outperformed the two other groups in the accuracy of JOL. However, contrary to our hypothesis, in the delayed JOL-condition, the accuracy of judgments was similar in nonretarded and retarded children. This finding indicates that retarded children are able to monitor learning processes as effectively as nonretarded children under some circumstances.

H11 *Catching View-Turns - A methodological approach to research on learning*
Kicki Ahlberg, Gothenburg University, Sweden

In the author's doctoral study university students narrated experiences of learning. The participants described what they meant had constituted a shift in their way to experience something during their educational practice. The narratives consisted of detailed and situated descriptions of experiences of learning as a change in one's way to experience something, a View-Turn. The results were analysed into two qualitatively different main categories of Restructuring of Awareness and Addition of Something New. Methodological issues are discussed in this paper. The aim is to reach understanding of why methods used in the study offered possibilities for the students to describe such transitory processes as experienced shifts of their own awareness. Methodological and epistemological implications are discussed, arising from the ontological premise in Phenomenography and Variation Theory of Learning, that the phenomenon a person experiences and her experiencing of it co-constitute each other. The interview question in the study offered the participants to focus simultaneously on two separate experienced aspects of a phenomenon. What was within the dual-focussed interview question, that made it possible to reveal also the own experiencing is discussed. Based on the discussion, a methodological model for research on experienced learning is suggested.

H12 *Age-related changes in self-regulated learning: a study of 10-20-year-old hungarians*
Eva Molnar, University of Szeged, Hungary

The developmental level of self-regulated learning is crucial in the realisation of

life-long learning. In Hungary the area of self-regulated learning has received little attention; the research presented aimed at describing the Hungarian situation in this regard. Two studies are presented. The purpose was to draw a detailed picture of the developmental levels of self-regulated learning and to examine its role in academic achievement in the context of other abilities. This necessiated the inclusion of a wide age spectrum in the sample and a thorough investigation of background factors.

H13   What is the role of self-efficacy on self-regulated learning in multimedia learning environments?

Stevka Peters, University of Dresden, Germany
Susanne Narciss, University of Dresden, Germany
Caroline Dupeyrat, University of Toulouse 2, France
Hermann Koerndle, University of Dresden, Germany
Claudette Marine, University of Toulouse 2, France

Self-efficacy has been demonstrated as an important factor in self-regulated learning. Yet self-efficacy has received attention only in a few studies on multimedia learning. Therefore the aim of the present study is to contribute findings to the following research questions: 1) Is learning behaviour in a multimedia learning environment influenced by learners' self-efficacy?, and 2) Does self-efficacy change while learning in a multimedia learning environment?

190 German university students studied four sessions with a multimedia learning environment called Studierplatz (working space for learning and studying) which complemented an introductory psychology lecture on the topic of Behaviourist Theories of Learning. This innovative multimedia learning environment offers a variety of learning materials (e.g., texts, videos, etc.) and tools (e.g., highlighting, note taking, self-monitoring and self-evaluation tools, etc.), as well as exercises of various stages of complexity together with informative tutoring feedback (http://studierplatz2000.tu-dresden.de). Before and after each sessions, participants were asked to complete questionnaires measuring three types of self-efficacy: self-efficacy related to self-regulated learning, to learning in multimedia learning environments, and to knowledge about Behaviourist theories of learning. In the first session participants' initial knowledge was measured by a pre-test, and in the last session their acquired knowledge was evaluated by a post-test. Their learning behaviour was measured by the actual use of the learning materials and tools of the multimedia learning environment, and their knowledge acquisition was measured by the difference between the number of correct answers in the post-test and the pre-test.

Rsults revealed that self-efficacy increased from the first to the third session but decreased significantly before the post-test in the fourth session. However, learners' self-efficacy was not strongly releated to learning behaviour in the multimedia learning environment.

H14   ECOL: Ecology for collaboration with pedagogical structuring and self-regulated learning: individual and group-level perspectives

Paivi Hakkinen, University of Jyvaskyla, Finland
Sanna Jarvela, University of Oulu, Finland
Maarit Arvaja, University of Jyvaskyla, Finland
Johanna Bluemink, University of Oulu, Finland
Raija Hamalainen, University of Jyvaskyla, Finland
Hanna Jarvenoja, University of Oulu, Finland
Piritta Leinonen, University of Oulu, Finland
Kati Makitalo, University of Jyvaskyla, Finland
Hanna Salovaara, University of Oulu, Finland

The origin of this research derives from empirical findings showing that collaboration is not a spontaneous phenomenon in educational settings. Students have problems in engaging themselves in socially shared and goal-oriented learning process. When collaborative learning is virtual or computer-supported, also other kinds of problems appear, such as grounding the communication and problems in reaching a reciprocal cognitive understanding. The main objective of the ECOL research project is to explore how different ways of pedagogical structuring of collaboration process effect on self-regulation and learning in an individual and group levels in different face-to-face and virtual settings. The subjects of the study were altogether 300 higher education students studying social sciences. Before the actual data collection a set of background information of the subjects were gathered (achievement scores, motivational orientation, self-regulatory skills and conceptions of learning), and on the basis of this information, the students were addressed into two uniform groups: an intervention group of 150 students and a comparison group of 150 students. During the first empirical study year the intervention group was divided into three intervention groups of 50 students. Each of the three groups participated in different set of interventions, representing different ways of structuring and supporting collaboration. Intensive qualitative data collection (dynamic questionnaire, video-tapings and group-level interviews) were conducted focusing on individual and group level processes. The first set of data collection of this longitudinal research project has been conducted, and in this poster presentation we will especially

discuss the relationship between pedagogical structuring of collaboration process and individual and group self-regulated learning. The results of the study contribute to developing a set of structured pedagogical designs that aim at increasing the effectiveness of learning environments, with and without technology (e.g. in virtual university courses and school networks), in terms of learning, motivation, collaboration and self-regulation.

H15   Self-Regulated Learning – An Intervention Study
Corinne Tiaden, University of Basel, Switzerland
Sandra Grieder, University of Basel, Switzerland
Astrid Elke, University of Basel, Switzerland
Gerhard Steiner, University of Basel, Switzerland

The research project Supporting Learning Strategies in Vocational Education, funded by the Swiss Federal Office for Vocational Education and Technology (BBT), focuses on the encouragement of self-regulated learning in vocational students. Three types of learning strategies are important for self-regulated learning: metacognitive, cognitive and resource management strategies (Pintrich et al., 1993; Wild & Schiefele, 1994). Not only the mentioned learning strategies are crucial for self-regulated learning but also optimal motivational beliefs are essential to start and maintain the learning process (Wolters, 2003). We assume that an adequate use of learning strategies has positive effects on motivational beliefs, and motivational beliefs support the adequate use of learning strategies. Approximately 600 Swiss vocational students took part in our study and were trained in the adequate use of learning strategies. During a year their teachers taught them self-regulated learning techniques integrated into the normal class lessons. The vocational students were tested three times: before, during and after the training phase. They filled out the questionnaire Wie lernen Sie? (How do you study?) that was especially developed for this research project following the work of Metzger et al. (1995), Wild and Schiefele (1994), Pintrich et al. (1991) and Elliot and McGregor (2001). Furthermore an additional qualitative measurement method was used besides the mentioned self-report questionnaire in order to assess the vocational students' learning strategies closer to the learning activity itself. The data analysis shows the development of the learning strategies of the experimental group compared to the control group (without training). The results also demonstrate under which circumstances a learning strategy training can also enhance motivational beliefs which in turn might influence the usage of learning strategies. Path analysis explains the interrelations between different learning strategies, motivational variables and academic achieve-

ment over time.

Higher education
Discussant: Jan Vermunt, University of Utrecht, The Netherlands

H16   Primary school children self-reported stress and on-task behaviour by gender

Jesus Miranda, University of Malaga, Spain
Angela Munoz, University of Malaga, Spain
Lidia Hierrezuelo, University of Malaga, Spain
Javier Fernandez, University of Malaga, Spain
Ma. Victoria Trianes Torres, University of Malaga, Spain

Findings from an epidemiological research carried out by the group HUM 378 (PAI, Junta de Andalucia – Spain) in collaboration with Comisiones Obreras Trade Union and sponsored by the Boeringher Ingelheim Pharmaton (Switzerland) are presented. Participants are 7045 Andalusian schoolchildren (3432 girls and 3613 boys) from 8 to 12 years, from 117 schools from Andalusia. On the one hand, they have to answer the Child Inventory of Self-Reported Stress (CISS), consisting of 50 items in which the child answers whether if the event has happened to him/her or not (potencial stressors frequency). On the other hand, data have been extracted from the teacher using an instrument to collect sociodemographical data from schoolchildren and their school context and to assess Children's behaviour on the task. In relation to the assessment by the teacher, participants were 6312 children. CISS means are presented referred to the four categories derived from teacher assessment and also nesting gender within each one of categories. ANOVA analysis has also been carried out taking the total score of the CISS as dependent variable and gender and categories from teacher assessment as independent variables. The gender does not present significant effects in its interaction with teacher assessment. The four teacher categories differ among them (F=146.15; p<.000). Students catalogued as being nervous and collaborative differ significatively from the other categories, composing two opposite extremes. Unruly and passive children differ significatively from these two extremes, although they do not differ from each other. Therefore, students catalogued as being passive, unruly or nervious appear to be more stressed than those catalogued as being collaborative.   Discussion asserts the need to know the impact of the children level of stress on his/her behaviour on the task and the need to know effective methods for the teacher to help the stressed child.

H17   Training of young researchers between apprenticeship and scholastic learning

Annette Kolmos, Aalborg University, Denmark
Lise Kolmos, Aalborg University, Denmark

Training of young researchers has gradually changed in Denmark. Previously a PhD thesis was an individual project, based on individual interest, and the supervisor was an acknowledged expert in the field of research. Responsibility for the progress of the project remained primarily with the candidate and the supervisor. It was more or less an apprenticeship model. Nowadays, most PhD students enrol in a PhD program where they have to submit their thesis but at the same time join PhD courses within their domain as well as general courses. The time for the PhD thesis is quite limited, and many PhD students do not continue into an academic career. So the challenges and the expectations that the supervisor have to meet have changed as supervisors are responsible for a variety of different tasks, from being domain experts, as well as a facilitator and mental coach for the broader scientific work to support development of the PhD student's process competencies. Many of the supervisors find themselves lacking in some of the necessary skills. The International Doctoral School of Technology and Science at Aalborg University decided to develop a compulsory training program for new PhD.-supervisors with the objective to improve the quality of Ph.D. supervision. In this paper, we will present: 1)Objectives for training of young researchers, 2)The theoretical understanding of PhD-supervision and the learning processes, 3) Results of qualitative empirical investigation encompassing interviews with PhD-supervisors and interviews with PhD-students about their problems concerning supervision during their Ph.D. process. The main conclusion is that in order to improve the outcome of the meeting between supervisors and PhD students, training of core competencies are necessary.

H18   Medical expertise and biomedical knowledge

Remy Rikers, Erasmus University Rotterdam, Netherlands
Sofie Loyens, Erasmus University Rotterdam, Netherlands
Henk Schmidt, Erasmus University Rotterdam, Netherlands

The present study investigated the role of biomedical knowledge in clinical case representations of experienced family physicians and advanced medical students. Two views on the role of biomedical knowledge were compared: The knowledge encapsulation and the two-worlds view. According to the knowledge encapsula-

tion view, biomedical knowledge still plays a role in the physician's clinical case representation, whereas the two-worlds view assumes that it does not. In order to investigate this issue, participants were instructed to carefully study a short case description that was associated with a particular disease. Subsequently, medical students and family physicians were instructed to judge whether or not a presented target item was related to the case description. Targets were biomedical or diagnostic items that were either related or unrelated to the case. Findings were more in line with the knowledge encapsulation than with the two-worlds view, in that physicians judged related biomedical items faster than unrelated items, and physicians outperformed medical students in judging related biomedical and diagnostic items.

H19   Bio-pshychosocial problems and academic achievment in university students

Leonor Lencastre, University of Porto, Portugal
Marina Guerra, University of Porto, Portugal
Marina Lemos, University of Porto, Portugal
Duarte Pereira, University of Porto, Portugal

This study explores the evolution of bio-psychosocial problems and their relations with academic achievement in a follow-up study of five years (1998-2003). The participants are university students of the Faculty of Science of Porto University. Specifically this study has two main goals: (1) To analyse the relations between bio-psychosocial problems and academic achievement in their 1st year at university, and by the end of their degrees/majors (2) to analyse whether or not, and in what extent, students' bio-psychosocial problems predicted students' academic achievement, in their 1st year at the university and by the end of their degrees/majors. Data analysis suggests that the number of the bio-psychosocial problems felt in 2003 is negatively correlated with academic achievement at the end of the degree. However the number of the bio-psychosocial problems expressed in 1998 does not correlate with academic achievement in 1998, which may indicate that the bio-psychosocial problems referred by freshmen seems to be different from those felt five years later. Study difficulties is the only significant predictor of the academic achievement in 2003, when a multiple regression analysis is conducted with a group of potential bio-psychosocial problems as independent variables. Regarding the same model applied during the first year at the university (1998) the bio-psychosocial problems that predict the academic achievement, are depression and drug abuse. These data suggest that, during the first year at the university, students must be experiencing life transitions which in turn characterize different problems, more typical of late

adolescence than adulthood, such as drug abuse.

H20   Challenges and constraints in Learning Anatomy
Parvaneh Sharafi, Karolinska Institute, Sweden
Anna Josephson, Karolinska Institute, Sweden
Kirsti Lonka, Karolinska Institute, Sweden

To be skillful in anatomy is recognized as being crucial on both pre-clinical and clinical level in medical education. Its importance has been explained in terms of the effect it has on high quality learning in clinical areas, on medical training, and especially on surgical specialties. The purpose of this paper is to find out about the characteristics of high quality learning anatomy in terms of students' experienced challenges, and learning strategies. Seventy-one first year students who just passed their anatomy exam, responded on a sex-point Likert scale to the statements presented about their anatomy learning, deep learning approach, mindfulness, lack of regulation, exhaustion and their socio-demographic background. The results show that the constructed instrument assesses characteristics of the involving factors in learning anatomy. Two distinct underlying factors with satisfactory reliability were identified: challenging constraints and learning strategies. The internal consistency reliability (Cronbach alpha) for both subscales was higher than 0.60. Students' responses to challenging constraints showed negative and significance correlation with deep-learning and mindfulness and negative and significance correlation with lack of regulation. The scores for learning strategies correlated significantly and positively with expressed level of exhaustion. The preliminary results indicate variations among students in association with the assessed variables. Significant differences were found in relationship to gender, ethnicity, examination results and admission types. It is suggested that learning and teaching anatomy should be considered in relationship to challenges and constraints of learning anatomy and to students' psychological and social characteristics.

H21   When the culture is not your own: The effect of context on teacher thinking and practice in higher education
Allan Walker, Chinese University of Hong Kong, Hong Kong
Peter Bodycott, Hong Kong Institute of Education, Hong Kong

The internationalisation of higher education in countries such as Australia and the UK has resulted in increased numbers of South-East Asia students in higher education classrooms. While considerable attention has been given to exploring the im-

plications of internationalisation on students in 'Western' university contexts, less attention is given to researching the effects on teachers of higher education, and in particular those employed to teach in countries culturally foreign to their own. This aims to initiate such discussion through an exploration of the current results of an ongoing ethnographic study of two teaching academics working in Hong Kong. Issues that will be addressed include language and communication, social and cultural distance and the effect of hierarchy and related teaching strategies developed to meet the inter-cultural learning needs of themselves and their students. The authors argue that the development of inter-cultural understandings must permeate the curricula and be a shared goal and responsibility of both teachers and students.

H22   What can multiple perspectives tell us about research?
Margaret Kiley, The Australian National University, Australia

During the period 1994-2002 over 400 interviews were undertaken with international and Australian research students, Australian-based research supervisors and academics, and international and Australian research (Masters and Doctoral) graduates. An analysis of these interviews provides a rich and complex insight into the interviewees' understandings of research; what it meant for them, what they think it meant for the academy and the discipline, and what they suggest it meant for the community (whether it be in social, economic or capacity building terms). The analysis allows for the examination of the results by gender, position e.g. student or supervisor, local or international, and by discipline. It also allows for comparison with other, related studies, some of which have been based on surveys and quantitative analysis and others on qualitative work (Kiley and Mullins 2001; Meyer 2001; Meyer, Shanahan et al. 2001; Kiley and Mullins 2003; Kiley and Mullins In press). The results suggest that student motivation for undertaking a research degree and previous experience of being a research student are two of the critical indicators of conception of research. From the perspective of the academic and research supervisor the main discipline variation relates to the transformational aspects of a research degree. The varied views reported by the interviews provide insights into the research experience and what this means for students, academics and institutions.

H23 Motivation, study behavior, and academic success in university students: A follow-up study

Marina Serra de Lemos, University of Porto, Portugal
Leonor Lencastre, University of Porto, Portugal
Marina Guerra, University of Porto, Portugal
Duarte Pereira, University of Porto, Portugal

This study is part of the efforts to further understanding why university students' academic achievement is not according to expectations, through examining students' motivation and study habits. Both students' willingness to engage (motivation) and students' actual engagement (study behaviors) in course materials and activities have been related to academic success. In addition, lack of motivation might also be one important reason for the use of inefficacious study habits. The study had 3 main goals: (1) to characterize the evolution of study strategies and their relations to academic achievement at 1st year at university, and by the end of their degrees, (2) to examine the relative role of previous academic achievement, and present study behaviors and motivation, in affecting subsequent achievement, and (3) to examine the strength of the relations between motivation, engagement, and actual school performance, in 1st year university students, and by the end of their degrees. We assessed student's beliefs in their capacity to exert effort, student's level of interest, student's use of 8 study behaviors, and student's academic performance (grades across subject-matters). In this presentation we report on a two-wave follow-up of a sample of 178 1st year university students who were tested again 5 years later. Descriptive, inferential, and regression were performed on these data. Preliminary analysis suggested (a) that some study strategies were significantly more used by finalist students than by freshman (b) an important role of contemporaneous motivation and study variables in predicting present school performance, comparatively to previous school performance, (c) stronger links between motivation, engagement and school performance at the end of students' degrees, than at their first year at University. These findings could have important implications for the design of the curriculum and of the larger agenda of the university.

H24 The epistemological location of knowledge domains

Jeroen S. Rozendaal, Leiden University, Netherlands
Cornelis de Brabander, Leiden University, Netherlands

One of the key conceptual issues in research on epistemological beliefs is whether and how these beliefs differ between domains (Hofer & Pintrich, 1997). In the

process of settling this issue, it is important to determine which epistemological differences between domain specific knowledge may cause these hypothesized domain specific epistemological beliefs. In a preparatory study, researchers in personal epistemology were asked to rank order domains on the four dimensions of epistemological beliefs as proposed by Hofer and Pintrich. The results showed that almost none of the researchers ventured into such rank orderings, since they argued that eventually all knowledge is provisory. We agree with this assertion, but still we believe that there are relative differences between domains in methods of justification, validity, value, and difficulty. In the current study, an attempt is undertaken to find empirical evidence for these relative differences between domains by conducting a similar investigation among domain experts. Using an online questionnaire, experts in seven domains were asked to judge their similarity by means of paired comparisons. Furthermore they were asked to rate the domains on a number of Likert scales e.g., with respect to methods of justification, validity, value, and difficulty. Subsequently, they were asked to ground their comparisons by means of open questions. At the moment these data are gathered. By means of multidimensional scaling a model of the relationships between domains will be constructed. In a second stage of the analysis the judgment scale will be fitted in this model of domain differences using property fitting. A model as proposed may provide a more founded interpretation of past, present, and future research results concerning the domain generality and/or specificity of epistemological beliefs. It may also guide hypotheses about domain differences in future research in this area.

H25 Accessible higher education for all - instruction and mediating tools for learning
Katarina Schenker, Malmo University, Sweden
Jonte Bernhard, Linkoping University, Sweden

According to the legislation in Sweden, universities should actively work for a broader recruiting of students and support equal rights for all students in higher education and work against discrimination on the grounds of sex, ethnicity, religion or any other belief, sexual preference or disability. In this paper, findings from a study regarding 28 students with diagnosed reading and writing difficulties are presented and discussed based on the mission of broadened recruitment and on the level of equal treatment of students at universities. Based on the study, It is possible to state that, for most students interviewed, it works well for them to study at the university level, but for a few it does not work at all. The students would benefit from more guidance on the use of available educational and IT supports. An emergent issue

is how to increase lecturers' knowledge about how they can avoid discriminating behaviour and instead be more supportive towards students. If everyone, despite their backgrounds, is to be welcomed into higher education, it must be more accessible and open for those who may encounter problems and risk being excluded. More knowledge is needed about how supportive tools can be made available to all students and be integrated as pedagogical mediating tools in higher education.

H26   Graphicacy: The University students' skills to translate information
Maria-Puy Perez-Echeverria, Institution Universidad Autonoma de Madrid, Spain
Ana Pecharroman, Institution Universidad Autonoma de Madrid, Spain
Yolanda Postigo, Institution Universidad Autonoma de Madrid, Spain

Like other notation systems, graphics have their own syntaxes and restrictions and the graphic reader or constructor has to know them in order to understand it. The fundamental aim of this poster presentation is to show a research about the skills to translate mathematical information into different notation formats: algebraic, graphical and verbal formats. In other words, we studied how university students read graphic information and express it in verbal and algebraic format and, vice versa, how students construct graphic representations starting from verbal or algebraic information. Two groups of university student completed a paper and pencil task with three different problems. Each task showed a function between two variables and was presented in different formats: graphic, algebraic and verbal. The students had to translate the information into the other two formats and ask six questions about the problem. Two of these six questions were concerned with explicit information (What is the higher point in abscise axis?), other two were concerned with the form of relationship expressed (what kind of relationship is there between variables: continuous-discontinuous; growing-decreasing, etc) and the other one asked about the content of function, for instance about the possibility of generalization of the relation under other circumstances. There were two kinds of relationships represented in the tasks. We are analysing the results at the moment. However, we can advance some outcomes. As expected, the most difficult function was U inverted shape function and he easiest was the growing linear function. The translation of verbal format to graphic notation was easier than the other translations, and the most difficult translation was the change of algebraic expression to verbal format. The questions about generalizations were more difficult than other kind of questions.

Motivation
Discussant: Panikos Stavrinides, University of Cyprus

H27   Why Am I in This German Class?: Reasons for Course Selection in Relation to Motivation and Achievement

Katherine Fiori, University of Michigan, United States
Joanne Smith-Darden, University of Michigan, United States
Kai S. Cortina, University of Michigan, United States
Medha Tare, University of Michigan, United States

In this longitudinal study, we examine university students' actual reasons for taking a language course, an relatively unexplored aspect of students' motives for language learning. We were particularly interested in how different reasons might map onto different types of motivation including those specific to foreign language (instrumental and integrative), as well as the more general intrinsic and extrinsic motives. We were also interested in the relation of reasons (versus motivations) to achievement. Our participants consisted of undergraduate students enrolled in introductory and intermediate German language courses (N = 214 at Wave 1; N = 148 at Wave 2) at a large midwestern university in the United States. A questionnaire was administered and achievement data was collected twice throughout the semester. The questionnaire combined adapted versions of the MSLQ (Pintrich et al., 1993) and the most current version of the Attitude/Motivation Test Battery (AMTB, Gardner et al., 1997). In addition to age, gender, and major, we asked students to choose from a list of reasons (all that applied) for taking the German course. T-tests and regressions revealed that the reasons were differentially related to particular motivation subscales; e.g., students who checked I have a German heritage scored significantly higher on integrative motive than those who didn't check that reason. Controlling for age, gender, major, and Wave 1 achievement, one reason (German will be useful for my future career) significantly and positively predicted achievement at Wave 2, whereas none of the four motives did. These results are interpreted in light of Eccles' et al. (1983) expectancy value model and Deci and Ryan's (1980) self-determination theory. Examining reasons in the context of foreign language offers a window onto the usefulness of this construct for motivation, and hence, learning and teaching.

H28   A longitudinal study of student's conception of intelligence and achievement goals

Carole Vezeau, University of Quebec at Montreal, Canada
Roch Chouinard, Universtity of Montreal, Canada
Therese Bouffard, University of Quebec at Montreal, Canada

According to Dweck, students' conception of intelligence determines the type of achievement goals they strive for: an incremental conception would lead students to stronger willingness to endorse learning goals that focus on developing and mastering new skills and knowledge whereas an entity conception would lead students to worry more about performance goal because the level of achieved performance should reflect their level of competence. The aim of the present 3-year longitudinal study was to examine the developmental trend of student's conception of intelligence, the existence of gender difference and Dweck's hypothesis as to the links between students' conception and achievement goals. Participants were 670 junior high school students who filled out questionnaires assessing their conception of intelligence and the type of goals they pursued. Results indicate that although scores of incremental conception were systematically higher than those of entity conception, girls' scores on these are always lower than those of boys at each year of the study. For all students, both conceptions seem to become more differentiated as suggested by their increased negative relationship. The hypothesis that students' conception of intelligence is linked to achievement goals is partially supported. Although relatively weak, correlations between incremental conception and learning goals are positive at each year of measurement. The expected relations between entity conception and performance goal are not found but relations between entity conception and work avoidance goal are observed. All relations are similar for both boys and girls. This suggests that Dweck's hypothesis relating performance goal and entity conception of intelligence should be reformulated to take into account different types of performance goals.

H29   Changes in the relations between action-control beliefs and academic performance in adolescence

Marina Serra de Lemos, University of Porto, Portugal
Teresa Goncalves, College of Education of the Polytechnic Institute, Portugal
Luis Paulo Rodrigues, College of Education of the Polytechnic Institute, Portugal

Research based on an action-theoretical framework has evidenced that agency beliefs for ability, effort, luck and others, and also general control beliefs are strongly

and systematically related to students' school performance. Moreover, these beliefs-performance relations change as a function of both individual developmental factors, and of contextual influences. In the present study we try to examine the changes in the strength of these relations, from 8th to 9th grades, in Portuguese students. Our previous longitudinal studies revealed that the mean levels of agency and control beliefs were relatively steadily high from 6th grade on, but they significantly declined by 9th grade. Moreover, in the Portuguese education system, the transition to 9th grade is marked by a shift from informative to more evaluative teacher's ratings, which might contribute to changes in self-appraisals and in actual level of performance. Consequently, we expected differences in the strength of the beliefs-performance relations from 8th to 9th grade. Moreover, our second goal was to examine whether students' beliefs-performance discrepancies also change from 8th to 9th grade, to better understand the processes involved in relations between perceived and actual competence. In the present study we report on two waves (8th and 9th grades) from a longitudinal sample of 253 Portuguese students. Action-control beliefs were assessed using the Portuguese reduced version of the CAMI instrument. School grades for Mathematics and Portuguese Language were averaged as an index of academic performance. Multiple-group mean and covariance structures analyses (MACS) were used to evaluate the longitudinal invariance of the relation between agency and control beliefs and Academic Achievement from grades 8 to 9. Preliminary analysis evidenced differences between 8th and 9th grades, suggesting the importance of extending the focus of inquiry beyond middle childhood to include adolescence.

H30   Differences in self-reported stress in 8-12 years old students regarding the type of school, academic year and number of extracurricular activities
Ma. Victoria Trianes Torres, University of Malaga, Spain
Jesus Miranda, University of Malaga, Spain
Ana Florin, University of Malaga, Spain
Javier Fernandez, University of Malaga, Spain
Milagros Escobar, University of Malaga, Spain

This research belongs to a wider epidemiological research in which the level of self-reported daily stress has been assessed in 7045 Andalusian schoolchildren aged from 8 to 12 years-old. (Primary 4 to Primary 7). Used instruments have been as followed: 1) The Child Inventory of Self-Reported Stress (CISS), in which the child answers whether if the event has happened to him/her or not (potential stressors frequency) and 2) Instrument for the teacher to collect sociodemographical data on

students and their school context and to assess Children's behaviour on task. Prevalence data are presented, and average differences in the total C.I.S.S. score, are analysed through ANOVAs. These differences are explored in relation to: a) type of state school: rural school, urban school, early-opening urban school, compensatory urban school, early-opening rural school, compensatory rural school, and early-opening compensatory urban school; b) academic year: from Primary 4 to Primary 7; and c) the number of extracurricular activities carried out by the schoolchildren. Results show that compensatory urban school show a higher level of stress than the other types. Those who belong to yr. 4 and yr. 5 also show a higher level of stress than students from yr.6 and yr.7. And those involved in two or three extracurricular activities show a significatively higher CISS score than those with normal schedule or one extracurricular activities. The value of results is emphasized in order to get to know the level of daily stress and it is discussed in relation to educational conditions for the healthy development of children.

H31   *Bullying in a rural school: the role of the home, school and community*

Carrie Myers, University of Surrey, United Kingdom

This paper describes the findings of research carried out for a thesis entitled A Qualitative Analysis of the Social Regulation of Violence in a Cornish School, 1999 –2003. It was a case study that demonstrated the day-to-day experiences of victimisation and opinions about crime as they were encountered by a group of pupils in a rural school at one particular point in time.

H32   *Teachers and students' judgements of usefulness of motivational strategies*

Melina Mc Intyre, University of Quebec in Montreal, Canada
Carole Vezeau, College of Joliette, Canada
Therese Bouffard, University of Quebec in Montreal, Canada
Mathieu Roy, University of Quebec in Montreal, Canada
Monique Brodeur, University of Quebec in Montreal, Canada

Studies interested in the Children's judgement on strategies that teachers use to stimulate and maintain their motivation are scarce. This study aims to examine teachers' and students' evaluation of relative usefulness of motivational strategies and students' perception of these strategies according to gender, school level and appreciation of school. The sample comprised 1536 French-speaking children in second, fourth and sixth grade and their 94 teachers. Their judgement on the effectiveness of motivational strategies were assessed by questionnaire. This instrument

includes eight broad categories of strategy to which subjects evaluate their usefulness using a Likert scale from 1 (very harmful) to 5 (very useful). Additionally, teachers had to respond on each strategy separately for students who like school or for those who do not like it, whereas students had to classify themselves in either a group of students who like school or in the group of those who do not like it. Results allow to observe that 1) teachers' and students' share similar judgements as to the relative efficacy of strategies; 2) students who like school differ from those who do not on the strength of their judgement for each strategy, but all agreed on which are the most and the less useful; 3) for most of the strategies but one, older students have lower judgements than their younger peers; 4) boys and girls share similar judgements. According to McCombs and Lauer (1997), the way children perceive and interpret teachers' interventions and attitudes is likely the mechanism through which teachers influence the quality of Children's school engagement and achievement. Findings of this study stress the importance for teachers to take into account students' grade level and their liking of school when they use strategies aiming to increase their motivation. However, examination of this issue requires more research effort.

H33 *Motivating students to learn with understanding*
Pfaffman Jay, University of Tennessee, United States

Educators have long been interested in instilling in their students the same love for learning that they have, but have few tools that directly address that goal. This paper describes a study that follows up survey research that looked at what makes hobbies engaging. The surveys showed that creation, customization and sharing were features that significantly contributed to what makes hobbies appealing in adults and similarly contributes to high school students enjoyment of their favorite classes and favorite non-academic activities. The study used a within-subject design to see how varying the opportunities for creation, customization and sharing in three different instructional activities affected student engagement. Middle school students worked with a computer ecosystem simulations. Engagement was measured using (1) a survey after they had seen all instructional materials, (2) Engagement Sampling (periodically asking students whether they wanted to keep doing the activity), and (3) the number and types of resources they accessed in trying to compete the activity. Results showed that students did report preferring the activities with increased opportunities to create, customize and share. Similarly, students accessed resources more often in the more engaging activities. The means of the engagement sampling measure, however, were not statistically different between the different

interventions. The variance was different across conditions, suggesting that highly engaging activities provide larger swings of frustration and satisfaction.

H34   Incentives, engagement and intentional learning environments through multiple perspectives
Marina Michael, University of Cyprus, Cyprus
Steve Zuiker, University of Georgia, United States
Daniel Hickey, University of Georgia, United States

Many of the enduring debates in education can be understood as reflecting different views of learning and engagement.   This paper explores new ground in the enduring debate over extrinsic incentives in classrooms. In the context of formative assessment and iterative cycles of design research, three strands of a research project used different perspectives on engagement (behavioral, cognitive, and cultural) to study the consequences of a modest extrinsic incentive (public recognition of self-assessed proficiency). Ninth grade life science students (N=61) participated in a three-week introductory genetics unit and completed self-report trait- and state-oriented motivation questionnaires. A subset (N=24) was videotaped during formative feedback activities. The cognitive strand documented gains in perceived competence [F(1,60)=11.67, p=.001] and no negative consequences, but the behavioral strand documented decreased on-task engagement after the incentive was removed [F(1,20)=44, p<.001]. The sociocultural strand attempted an independent analysis of engaged participation and tried to reconcile the competing behavioral and cognitive conclusions. This examined whether a dialectical approach could reconcile the competing findings better than the prevailing aggregative approach. According to this approach cognition and behavior can only be understood in terms of the physical and social constraints and affordances that frame activity within the context that it occurs. The sociocultural analysis provided dramatic evidence of the way that summative functions of assessment can undermine formative intent. While this emphasis on sociocultural engagement has proven essential in refining our assessment practices and improving specific learning environments, we struggle to link these findings to extrinsic incentives. This effort however, has led us to think much more deeply about the entire issue of reconciliation. Studying learning environments from multiple perspectives brings to the fore this issue that educational (and motivation) researchers must address. We therefore expect that our effort will bring together interested audience members.

Motivational social and affective processes

H35 Confirmatory factor analysis of the self-perception profile for adolescents and the children's self-efficacy scale: are self-esteem and self-efficacy empirically distinct?
Amanda Hughes, Staffordshire University, United Kingdom
David Galbraith, Staffordshire University, United Kingdom
Jeremy Miles, University of York, United Kingdom
Mark Torrance, Staffordshire University, United Kingdom
David White, Staffordshire University, United Kingdom

There is considerable debate over the extent to which a distinction between self-esteem and self-concept is theoretically sustainable. Very few studies have explored the extent to which these dimensions are empirically distinct. We first report a confirmatory factor analysis examining the dimensionality of Harter's Self-Perception Profile for Adolescents (SPPA: 1988) and Bandura's Children's Self-efficacy Scale (CSS: 2001). Both have putative nine factor structures, with separate components relating to different domains (social, academic and so forth). In subsequent research the factor structure of the SPPA has been questioned. However, the factor structure of the CSS has not been widely examined. We will then, describe analyses that test alternative models suggested by recent research, in which self-efficacy (CSS) and self-esteem (SPPA) items map onto the same domain-specific constructs, and in which at a global level self-efficacy and self esteem are embraced by a single factor. Data were collected from 1400 adolescent students studying ten urban secondary schools in the UK who each completed both the SPPA and the CSS. Analyses involved structural equation modelling using methods that controlled for the clustered nature of the sample.

H36 'Feeling bad' and 'feeling good': how do children differentiate them?
Daniela Raccanello, Universita' di Padova, Italy
Camilla Gobbo, Universita' di Padova, Italy

The aim was to investigate some aspects of Children's conceptualization of feeling good (well-being) and feeling bad (discomfort) as states implied in either positive or negative events in their daily life. Our interest was to observe whether positive and negative internal states are represented as symmetrical or asymmetrical concepts and the relationship between the two types of states. In the first study we addressed this issue by examining how children aged 5, 7 and 9 narrated personal events as-

sociated with either positive or negative internal states. In this paper, we analysed Children's narratives in terms of looking at whether internal states made reference to the physical or the psychological domain. While older children, compared to younger, characterized feeling bad in psychological terms vs. physical, at all ages children characterized feeling good mostly in psychological terms. In the second study, the interest was to further explore Children's representation by proposing a task based on a more abstract kind of knowledge. To fulfil this goal, we investigated Children's ability to define general linguistic expressions referring either to positive or to negative internal states. We found that only for feeling bad, but not for feeling good, age influenced children ability to introduce elements belonging to both physical and psychological domains. Results were discussed in terms both of dimensions underlying discomfort and well-being.

H37   Distinguishing between knowledge and beliefs: students' epistemological standards for differentiating
Angela Boldrin, University of Padua, Italy
Lucia Mason, University of Padua, Italy

The role of knowledge and beliefs in learning processes is widely recognized. However, the influence of the two constructs may not be the same. Several definitions of knowledge and beliefs have been proposed although the distinction needs further clarification. When the terms are not conceived as synonyms, knowledge is conceptualized as more certain, objective, and justified than beliefs. Do students perceive their conceptualizations are knowledge or beliefs? On what basis do they distinguish the two constructs? Does the tendency not to alter one's own knowledge and beliefs depend on the epistemological standards used to distinguish between them? The purpose of this study was to assess the conceptual differentiation between knowledge and beliefs in students of different school levels, by integrating the methodologies used in the very few previous investigations. To this aim the definitions of the two constructs and the epistemological criteria used for justification by 219 students in 8th and 13th grades were examined. Qualitative and quantitative analyses revealed that the younger students are also able to distinguish the two constructs, to verbalize their distinction, and justify the perceived relationships between knowledge and beliefs. As hypothesized, school grade significantly differentiated the epistemological standards used to distinguish the two constructs. Although both 8th and 13th graders were more certain of, and committed to, knowledge than beliefs, 13th graders attributed a lower epistemological status to beliefs than knowledge. Furthermore, all participants, but mainly 13th graders, recognized

personal ideas as the basis of beliefs but information learned at school as the source of knowledge. For 13th graders the media were also perceived as influential sources for the latter, while family and friends for 8th graders. Gender did not significantly differentiate participants' performance. The study indicates the educational importance of considering both the knowledge and beliefs that students bring to the learning situation.

H38   What to learn from feelings about engagement? The part of young students' emotions in religious education
Theo Van der Zee, Radboud University Nijmegen, Netherlands
Chris Hermans, Radboud University Nijmegen, Netherlands
Cor Aarnoutse, Radboud University Nijmegen, Netherlands

Characterizing students' learning as a form of engagement acknowledges the central role of affective factors, emotions especially. Meaningful learning practices firstly involve realistic content and learning tasks and are expected to be considerably emotional evocative. Secondly, students' beliefs about knowledge, knowing and learning are expected to be influential factors determining affective processes. Thirdly, Seegers and Boekaerts (1993) state that this influence is mediated through task specific perceptions. Empirical evidence is scarce with respect to the development of emotions in meaningful learning practices, the influence of metacognitive beliefs on the development of emotions, and the moderating influence of the learning environment on the impact of beliefs.
We have these research questions:
(1) What types of emotions are involved in the learning process?
(2) Does an intervention influence the development of emotions?
(3) Is there a difference between meaningful and non-meaningful learning tasks regarding the development of emotions?
(4) How do metacognitive beliefs about religious education contribute to the development of emotions when a student is performing meaningful learning tasks?
(5) Does an intervention of non-meaningful learning tasks make a difference?
In our intervention study, 289 students of the fifth and sixth grade were involved (age 10-12). The first experimental group (n=149) dealt with meaningful learning tasks, the second experimental group (n=140) with non-meaningful tasks.
Empirical evidence is provided that an intervention influences the development of emotions. Results indicate that meaningful learning tasks differ from non-meaningful regarding the influence on the development of emotions, and regarding the contribution of metacognitive beliefs to this development. We can interpret the

findings of this study and speculate about implications when perceiving emotions as an act of participating or engaging in learning practices.

H39   The relationship between emotion and reason in the use of information/ communication technologies in education
Zembylas Michalinos, CARDET - Intercollege, Cyprus
Charalambos Vrasidas, CARDET - Intercollege, Cyprus

In this paper, the authors work across issues of information and communication technologies (ICT) in education to explore the meaning of emotional experience in the context of online learning. In light of the increasing role of ICT in education, it is argued that educators need to rethink, modify, or extend some of the assumptions made about the relationship between emotion and reason (e.g. as these assumptions are expressed in the traditional binaries between body and mind, and emotion and reason). The argument put forward is that opportunities and consequent decisions and actions about particular pedagogical practices and philosophies must engage with an analysis of the meaning and implications of these assumptions for learning and learners. The analysis here suggests that the use of ICT in education may produce a blurred but intense emotional experience. This would constitute a topic of research of primary importance for students and teachers in learning environments. In a world undergoing processes of globalization, educators should take advantage of all the ways in which social interaction is manifested and manifests individuals. Educators need to explore the opportunities offered by the Internet, multimedia, and virtual reality to create the kind of new knowledge needed in contemporary society. In this information society, learning should be oriented towards critical communicative competence that does not ignore the conjunction of emotion and reason and emphasizes transformation, flexibility and complexity.

H40   Emotional experiences and engagement of the Self in the development of interest in history: An intervention study
Laura Del Favero, University of Padua, Italy
Pietro Boscolo, University of Padua, Italy

This study aimed at investigating the role of positive emotions and the Self in the process of becoming interested in a discipline. Over the past two decades several studies have shown the importance of stimulating situational interest for both its cognitive and motivational effects. In the classroom, situational interest can be stimulated by using new and moderately complex instructional materials and tasks,

which are likely to elicit surprise and will to understand. Situational interest can also be maintained for longer periods by having students deal with topics and activities that are relevant for their lives, either because they deal with pre-existing interests, or because students are able to link new contents to well-developed interests, that are part of their Selves. Seventy-nine 8th graders, divided into three conditions, participated in the study. In one group a two-months-long intervention was implemented in order to have the students positively interact with history (positive engagement condition). In a second group a different intervention was implemented to help students link history with themselves (personalization condition). In the third group (control) historical topics were presented by traditional lecturing. All participants were administered measures of learning, interest, value and self-perception of competence in studying history before and after the intervention. An emotions' card was filled several times during the intervention. Multivariate analyses (MANCOVAs) showed that personalization and positive engagement conditions were similar in effects and superior to the control condition in learning and in interest in history. Students in the personalization condition assigned more value to history after the intervention. Negative emotions were more frequently experienced in the control group. Both interventions led to satisfaction in understanding, but personalization led to greater relevance of history.

H41   Japanese Educational Reform and Transition of Motivation
Koyo Yamamori, National Institute for Educational Policy Research, Japan
Yasuhito Hagiwara, National Institute for Educational Policy Research, Japan

The purpose of this study is to investigate the transition of motivation related to the Japanese national curriculum standard reform. The reform yielded to allocate 105 school hours to teach English in one academic year to scrape the hours for new subjects, i.e. the period for integrated study and the optional courses, although the previous standard yielded to allocate140 school hours to teach English. Thus the hours for English class have reduced by one hour per a week. The ministry of Education, Culture, Science, Sports, and Technology intends that the reform could make students have high motivation. Hence this study shall discuss the relationship between the transition of motivation and the reduction of school hours for English class and confirm the reform works well with latent growth curve modeling. The result supports that the Japanese educational standard reform that allows students to collect optional classes as their preference works not to decrease the will to learn for the students who think the size of class hours is too much. However, the result also indicated that taking optional class doesn't work not to decrease their will for

the students who think the size of class hours is enough or not enough. It should be a problem to be solved that how to cope with these students to keep their motivation. In addition, we Japanese educational policy makers have to formulate a policy to enhance the students' will to learn to accomplish the objective of the reform.

H42   Emotional aspects in lifelong self-regulated learning – A longitudinal study
Sandra Grieder, University of Basel, Switzerland
Corinne Tiaden, University of Basel, Switzerland
Astrid Elke, University of Basel, Switzerland
Gerhard Steiner, University of Basel, Switzerland

Our research project Supporting Learning Strategies in Vocational Education includes the analysis of cognitive, metacognitive, motivational and emotional domains in self-regulated learning. The central goal of this longitudinal study is to promote lifelong self-regulated learning by optimizing the apprentices' learning strategies. 27 vocational school teachers with their 45 classes are participating. The vocational students who completed the questionnaire Wie lernen Sie (How do you study?) at three different measuring times work in a variety of professions and the corresponding schools are located in two different regions of Switzerland. Results confirm significant causal relations between the cognitive, metacognitive and resource management strategies and learning-related emotions (enjoyment, anger, anxiety and boredom), which implies that learning-related emotions are able to refer to the distinctive learning strategies and therefore to self-regulated learning. Further analysis includes learning environmental factors such as the teachers' direct and indirect influence on learning-related emotions in the path model. In addition expected longitudinal changes in the learning-related emotions and self-regulated learning before, during and after intervention are presented with the help of variance analytic methods. The outcomes support our assumptions and highlight the importance of including emotional facets in self-regulated learning.

Teacher education
Discussant: Mary Koutselini, University of Cyprus

H43   An Internship in teaching - a reflective looking
Ditza Maskit, Ministry of Education, Israel

The teaching internship program stated as an experimental model for four years.

This essay is based on the research carried out during three years. This essay is based on the records of 50 diaries, written in the teachers year of internship.   Another source of information for the essay was a set of interviews held with the interns, recording their impressions. The main issue this essay addresses is the intern's evaluation point of his or her own work during the year of the internship. This issue attends two minor ones. The first, supported by the research's bibliography, deals with the problems a new teacher is facing at his first strides at work, and the importance of evaluation of this process. The second is the reasoning of the internship program, in which the evaluation of the intern's work is one of the most recent and leading elements. This research shows that the interns evaluate the work in the following fields: instruction, class management, educational roles, and integration in school's life and responsibility. Further findings suggests that at the beginning of their internship the interns revealed antagonism and concerns as to the evaluation processes that took place during the year of the internship. While later on in that year the importance of the evaluation processes for the interns emphasized their professional development. As to the personal evaluation, it was found that the interns evaluated themselves objectively and critically. These findings show that interns can take an active role in the process of evaluation of their own work and thus, strengthen the assumption that they ought to be a part of their own evaluation. Self evaluation may help them derive a reflective quality, which is fundamental to their professional development and abilities.

H44   Middle school teachers' beliefs about teaching and their perception of initial teacher education
Tea Pavin, Institute for Social Research - Zagreb, Croatia
Vlasta Vizek-Vidovic, Department of Psychology, Faculty of Philosophy, Croatia

The aim of the research was to examine middle school teachers' perception and satisfaction with some aspects of their initial teacher education (ITE), as well as their beliefs about teaching considering the duration of their teaching practice and subject area they teach. This research was conducted on representative sample of 2134 primary school subject teachers from 15% of primary schools in Croatia, applying the questionnaire specifically developed for this study. Results indicate that teachers' satisfaction with the level of acquired professional competences during ITE is, in general, quite low, especially when it comes to teacher-beginners and those who teach humanities and social sciences. Considering organizational aspects of ITE, teachers-beginners' satisfaction is also lower in comparison to their mature colleagues. Teachers' beliefs about teaching indicate that the teachers, in general,

express more student-oriented than teacher-oriented attitude, regardless to teaching experience or subject area they teach. Obtained results suggest the need for changes in curriculum for middle school teachers' initial education with the emphasis on professional competences necessary for teaching profession, since most of the teachers, especially less experienced ones, evaluate the level of specific competences acquired as not satisfying. These results indicate that there is the need for new and improved programme in educational sciences that should provide primary school subject teachers specific professional competences necessary for better understanding and addressing the learning needs and capabilities of students aged 11 to 14. Some organizational aspects of ITE should also be improved in order to provide more stimulating learning environment for prospective teachers.

H45   The Relationships between Teachers' General Beliefs about Teaching and Learning and their Domain Specific Curricular Beliefs
Jan Van Driel, Leiden University, Netherlands
Astrid Bulte, Utrecht University, Netherlands
Nico Verloop, Leiden University, Netherlands

Little is known about teachers' domain specific beliefs, for instance, about the importance of teaching specific topics or curricular goals, and the relation of such domain specific beliefs with general educational beliefs about teaching and learning. This study explored such relationships with respect to a particular curriculum, that is, the chemistry curriculum for upper secondary education in The Netherlands. The study was conducted in the context of a revision of this curriculum, and was based on the idea that a thorough understanding of the content and the structure of teachers' beliefs is necessary for a curriculum innovation to be successful. A questionnaire survey was conducted among the whole of the population of Dutch chemistry teachers (n = 966). The useful response was 348 (36%). On the basis of factor analysis, two distinct and independent belief patterns were found: (1) a belief which combines the curriculum emphasis Fundamental Chemistry with a subject-matter oriented educational belief, and (2) a belief which combines the curriculum emphasis Chemistry, Technology and Society with a learner-centred educational belief. Through cluster analysis, four subgroups were identified. The belief patterns of these subgroups were further analysed with PRINCALS, which revealed that the two largest subgroups combined elements of the two belief patterns. However, two relatively small subgroups were identified whose beliefs could be described in terms of one of these two belief structures. The overall strong support for a learner-centred orientation implies that the design of the new curriculum should focus on

activities which value the input from students.

H46   Three portrayals of teachers reflected by student of education:the ideal teacher, the teachers' teacher and the student himself as a teacher
Nirit Reichel, Ohalo College, Israel
Sara Arnon, Tel-Hai Academic College, Israel

This research deals with three portrayals of teachers as seen through the eyes of students of education: the ideal teacher, the teacher's teacher and the portrayal of the student of education as a teacher; opposite the reviews of different images of a teacher in research literature and philosophy. The study compared the perception of these three figures by two sub groups of students of education: education-cadets in an academic college for teachers and student-teachers completing their bachelor's degree in a teacher's college. The research data was collected from 89 students in two colleges using a questionnaire that included multiple-choice questions and open questions employing qualitative content analysis. Among the finding two central meta-categories were established in the perception of a teacher's portrayal by students of education: 1) personal traits, 2) disciplinary and didactic knowledge. The education-cadet perceives the personal trait meta-category as being more salient. General knowledge and education is a lesser salient trait of the ideal teacher. The characteristics of the ideal teacher as a social agent promoting social causes is not mentioned at all. Students claimed that during their training, they improved their skills as empathetic and attentive teachers, having knowledge in teaching methods and leadership but few improved their disciplinary and general knowledge.

The comparison between the perceptions of the two groups of students revealed three differences: the student-teachers gave equal importance to two meta-categories of the ideal teacher. The cadets valued his personal traits and his knowledge more; The self-evaluation as cadets of teaching was higher than the teacher-students and presented them as closer to the ideal teacher; The student-teachers, more than the cadets, emphasized the importance of the teachers' teacher's knowledge.

H47   Training mentors to coach prospective teachers inductively towards activating teaching
Wouter Schelfhout, University of Leuven, Belgium
Filip Dochy, University of Leuven, Belgium
Steven Janssens, University of Leuven, Belgium
Elke Londers, University of Leuven, Belgium

In this research we investigate what kind of feasible training program can be es-

tablished in a teacher training institution, with which mentors can be encouraged to coach in a more inductive rather than transmissive way, thereby giving more feedback on activating teaching. Three training schemes were proposed to mentors who were going to coach a third year prospective teacher in economics. Our schemes (and research settings) were: (a) A four hour, rather theoretical, training. (b) Setting (a) followed by a four hour inductive training (practicing an inductive conversation, reflecting on activating learning environments). (c) Setting (a) and (b) followed by a period of coaching on which feedback was given. A possible influence of the training was showed by means of gathering data during the first mentorship after the training. In settings (a) and (b) this was done by means of interviews with the mentor and the mentee, after the coaching process. Setting (c) was used as an in-depth case: the degree of inductive approach and the content of the conversations has been observed. Further, the mentee was asked for details on the mentoring relationship and the mentor was asked for the impact of different variables on her way of coaching. Analysis shows that even a short inductive training (setting b and c) has an effect, especially on the way in which coaching conversations will be held more inductively and on the degree in which attention is paid to activating teaching. However, there are variables that mediate this influence, such as former experience with teaching and mentoring and the disposition towards activating teaching. An inductive training approach seems a correct method, but for unexperienced and/or strongly transmissive-oriented teachers it will be necessary to extend the training. Successful experiences with activating teaching and with inductive coaching should be established.

H48   Linking an instructor to a teacher – A factor causing a feeling of incapability instead of motivating towards change
Sara Kleeman, Oranim Academic College of Teacher Education, Israel
Miriam (Miri) Harel, Oranim Academic College of Teacher Education, Israel

This paper examines the extent that instruction of teachers by expert peers increases motivation, as reflected in cases reported by the instructors themselves. The research presented here based on the instructors' case studies. In analysing the studies, it was found in many cases that the instructed teacher often interpreted the linked instructor as a hint that he/she was not good enough. In other cases, the instruction caused a feeling of incapability and/or the development of dependency. Based on the instructors' testimonies, the instruction was intended to increase motivation towards change and improvement but the opposite results were obtained.

H49   Images of novices' learning to teach
Loucia Constantinou, University of Michigan, Cyprus

In this PowerPoint presentation I display about 95 still images from
fieldwork I conducted for my dissertation study, which aimed to shed light
at how intern teachers learn to pay attention to students' thinking and
reasoning that I have documented through extensive videotaping of the intern
teachers' teaching and with recorded conversations about their practice. The
images are illustrated in a PowerPoint presentation and they aim to engage
participants in thinking about current images of schooling and novices'
learning to teach. Traditional images of schooling and classrooms portray a
passive environment, in which adults are directing classroom activities and
children are the passive recipients of someone else's work. Throughout these
images, as well as a brief videotape selection of segments from life at
school, participants are given the opportunity to experience intern teachers
and children at work: being engaged with subject matter, collecting and
displaying information, discussing findings and debating with each other,
chasing after their thinking and reasoning, articulating their
understandings. In the midst of all this activity, intern teachers are
present and equally curious, puzzled, overwhelmed, and overjoyed by the work
along with the children. This PowerPoint presentation illustrates
constructivism in practice and it demythologizes literature on learning to
teach that portrays novices' teaching in traditional ways.

Learning and instructional technology
Discussant: Erno Lehtinen, University of Turku, Finland

H50   The failure of eLearning - Rethinking the use of technology for learning
Fritz Scheuermann, Institute for Future Studies, Austria
Nick Kearney, Florida University, Valencia, Spain

There is a current misunderstanding of the potential of technology for supporting
learning which is due to a misconception relating to what is usually called eL-
earning. Current trends and initiatives support this misconception that elearning is
about providing content. After some years take-up of eLearning is not living up to
expectations. This is because the popular view of eLearning does not understand the
real nature of learning. What is needed is a change of emphasis. More care needs
to be taken to provide flexible learning arrangements that adapt to the actual needs

of the learners rather than adapting the learners to the technology, and it should be recognised that learning can take place in a wide range of contexts. This issue is of considerable importance with regard to learning in small organisations. In this context the perceived relevance of the proposed learning initiative is a key issue and many workers in smaller organisations are resistant to conventional course based approaches because of a perceived lack of relevance for them. Much of the learning that takes place is therefore of an informal nature. It goes unrecognised, unmonitored, and is rarely structured. This paper outlines three action research experiences in which technology was used with a focus on the learning process. The case involved

1) the use of mobile technology to provide on-site learning in a secondary school history class

2) on-demand asynchrounous provision of language training the context of a small Spanish-wine export company

3) the use of simple ubiquitous communication technologies to enable the integration of immigrants.

H51   Disappearing technology, emerging interactivity: designing ubiquitous computing to enhance Children's learning in museums
Tony Hall, University of Limerick, Ireland
Liam Bannon, University of Limerick, Ireland

The research reported in this paper set out to explore novel, interactive techniques to stimulate active participation, involvement and learning by children visiting a museum, using ubiquitous computer technology. The research places the Hunt Museum implementation in the context of similar developments internationally. The exploration of Scenario Based Design, Design Based Research and a number of technology probes leads on to the selection, design and implementation of Re-Tracing the Past in the Hunt Museum in Limerick, Ireland. The Re-Tracing the Past learning environment, with a focus on history and material culture, is described in detail and evaluated. The evaluation takes a case-based approach using video recording of the activities, discussion, reaction and questioning by the children, both as individual participants and in interactive groups. The data derived from these video recordings is the subject of careful analysis. The overall project is an articulation and exploration of a series of outline design guidelines or design heuristics relating twelve experiential criteria to five supporting design informants and resources. These guidelines could be adapted to other learning environments. This together with very detailed description of the Scenario Based Design and Design

Based Research in action constitute the major contributions of the research.

H52   The effects of interactive visualisation techniques on queries in structured information pools
Hermann Korndle, TU Dresden, Germany
Ruediger Krausse, TU Dresden, Germany

Successful and efficient querying of information in electronic information pools is becoming increasingly important in today's information society. At the same time the quantity of existing information grows continually. Querying scientific literature and selecting relevant hits are typical examples for this. BARNER & CHEN (2002) present possibilities to visually display structured information pools which simplify querying and selection processes. However, current interaction possibilities are limited to the manipulation of hit images (cutting out, zooming, rotating). The structure features of the underlying information pool remain unconsidered. The objective of our experimental investigation was to determine the efficiency of interactive visualisation techniques which incorporate such structure features into the interaction process by means of the mathematical procedure known as formal concept analysis. Psychology students were made to perform various query tasks with the PsycInfo literature database. One group worked with the usual PsycInfo interface. The other group worked with a graphic user interface with which structure information for query and selection process could be considered (JADE-PsycInfo). The query results articulate a clear advantage for utilising interactive visualisation techniques in regard to the common parameters of query tasks, precision and recall.

H53   What counts as knowledge? - The tension between students' everyday and institutional categories in computer environments
Anniken Larsen Furberg, University of Oslo, InterMedia, Norway
Sten Ludvigsen, University of Oslo, InterMedia, Norway

In this paper we explore how students are engaged in sense making with categories given by a computer environment. In the DoCTA project (Design and Use of Collaborative Telelearning Artifacts, Natural Science Studios) students working on the topic gene technology were exposed to categories from the philosophy of science (e.g. problem, tentative working theory, reliable knowledge, uncertain knowledge, comment, summary), and a set of different learning resources. Categories are simultaneously grounded in a historical evolution of conceptual tools and they are part of moment-by-moment interaction of the participants in social institu-

tions like schools. Further, raising the question what counts as knowledge makes us aware of how and what kind of knowledge is seen as valuable, or, alternatively, what becomes invisible knowledge in schools. This challenge makes us sensitive to changes in how knowledge is negotiated and treated' in the institutional practice. The aim for the research is to improve our understanding of how the students use different resources provided in the design – and how they use categories to collaboratively build new understanding in the knowledge domain gene technology. By comparing the students' end product and the reasoning processes that actually takes place in their learning trajectory, we show that it is not sufficient to study students' end products to be able to understand cognition related complex knowledge domains. In our study we identify tensions between the students' everyday and institutional categories. Our analyses also show that the students' accountability shifts from being oriented towards the knowledge domain towards what they interpret as the institutions or the teachers' demands or expectations. In other words: what that counts as knowledge in this particular school-setting. These aspects seem to have great importance for understanding students' construction of knowledge and task outcomes.

H54   Progressive inquiry in university forum: an analysis proposal
Ilaria Mancini, University of Rome La Sapienza, Italy
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Since we use forum in university courses to support collaborative learning, we would like to evaluate when students' discussion was productive to build knowledge. In our previous researches has been used steps of Progressive Inquiry Model (Muukkonen, Hakkarainen, Lakkala, 1999) as categories for the analysis of students' notes. Assigning one category for each note (e.g. My working theory, Deepening knowledge, etc.), we had a general description for the development of discussion. Applying this system of categories little by little we became aware of loosing information about discussion. To analyse progressive inquiry process, we have created a model (Martini, Cesareni, 2004) that considers two important factors: time and note's complexity. In fact, we can examine the products of interaction among students as texts distributed over time. Moving from the Progressive Inquiry Model, we developed a proposal for a new model to analyse notes of a forum with university students. The model steps are:
a) to arrange threaded discussion notes in chronological order b) to segment notes c) to analyse text of the message by a double system of categories: Content Category (to analyse progressive inquiry) and a Relation Category (to analyse discourse in interaction when note is linked to an other one). The aim of this study is to present

this model and to evaluate its efficacy describing students' processes of knowledge building.

H55   The online teacher:role characteristics and required competencies
Ofra Nir-Gal, Achva-College of Education, Israel
Rafi Gilbart, Achva-College of Education, Israel
Roni Oren, Achva-College of Education, Israel
Rinat Oren, Achva-College of Education, Israel
Roni Reingold, Achva-College of Education, Israel

Online courses in general and the online instructor's role in particular are the target of extensive research in higher education institutes around the world. Rumble (2001) presents the current stage of online learning systems as the post modernist stage in which the student is centrally located within the dynamics of the online learning. His claim emphasizes the substantial change required during the transition from the traditional teacher's role to the online one (Dabbagh, 2002; Easton, 2003; Fitzpatrick, 2001). The current research took place in teacher education institutes and focuses on roles and competencies required by the online teacher for the purpose of effective online instruction. The research population included 20 instructors and 110 students of higher education online courses. Analysis of the research data produced 5 categories of the roles required by the online educator: pedagogical, interpersonal, cognitive and meta-cognitive, technological and social. In addition, 10 competencies were identified: feedback, writing, forum management, planning, evaluation, interpersonal communication, questioning and presentation skills; knowledge of subject matter and a basic understanding of technology. The conclusion that is drawn from overall research results is that in order to allow efficient distance learning, certain roles, outputs and competencies are required of the online instructor. In addition, data collected shows that students of online courses are influenced by the teaching methods used and thus acquire a deeper understanding of the online teacher's role. In light of the above, it seems that the inclusion of online courses as an integral part of teacher education is highly recommended. These online courses provide the student-teacher with authentic online experience, which is crucial for the integration of online teaching and learning in their future.

H56   Mediation in net based studies, theory and experience
Raija Latva-Karjanmaa, University of Helsinki, Finland

The research explores the meaning of mediation as means of improving the learning

experience in net based studies. Mediation is analysed based on the explanations of Vygotsky, Feuerstein and Peirce and criteria of mediation are developed for net based studies. The researcher acts as a net tutor in a net course using a learning assistant (IQ FORM) to develop their learning skills in a polytechnic. IQ FORM is a net based learning tool developed for the Finnish virtual(www.virtualuniversity.fi). The students in the course are first year students of the Business study programme of Northern Carelia polytechnic. A semi-structured interview is conducted to the students after completing the IQ FORM course based on the criteria of mediation. The results indicate that there are elements of mediation in this kind of learning tool (IQ FORM). A typology of mediation in net based studies is suggested.

H57   E-learning or lectures? - Research outcomes of the EU funded SteelCAL project
Gordon Joyes, University of Nottingham, United Kingdom

The EU funded SteelCAL project has involved higher education lecturers across Europe in the development of computer based materials to support the teaching of structural steel design. A participative design approach was used in order to engage the academics, unused to e-learning design, in developing innovative materials. The project outcome is a bespoke virtual learning environment containing prototype teaching and learning materials designed to be able to be used flexibly by lecturers. The learning materials are sets of animations and interactive elements including a virtual laboratory where steel beams can be tested. Learning is supported by features such as objective tests and an avatar that offers ongoing procedural help. The funders were interested in whether the SteelCAL materials could teach the area as well as lectures and therefore be a replacement for them. An experimental pre, post and delayed post test design approach was employed with groups of representative students in three European countries in order to compare learning improvements due the software against a traditional lecture approach. In addition qualitative data was collected through the use of focus groups in each country. The results indicate that the software is at least as effective as the lecture in providing basic factual information as measured by improvements in performance by the pre and post tests. However the delayed post test revealed significantly higher levels of performance for the students who used the SteelCAL software compared to those who attended the traditional lecture. It is concluded that a deeper understanding of complex steel design concepts was facilitated by the SteelCAL materials when compared to traditional lectures.

H58   Building the mosaic of knowledge: Looking on different perspectives on

modern learning environments. The role of Information Communication Technology (ICT) policy in the construction of 'ICT in teaching and learning' in schools
Christina Hadjithoma, University of Bristol, United Kingdom

Beyond doubts the attempts for introducing ICT in European educational systems have been increasingly taking place because: 'Information and communication technologies are not only having an impact now but will affect the structure of human societies even more so in the future. They are having an accelerating impact on the way we learn, live, work, consume, express and entertain ourselves.' (European Commission, 2000, p. 3) The importance of technology is crucial in our every-day life and thus, it is neither limited nor absorbed in education; thus a holistic view of ICT in society is required for educational research: one that includes ICT policy and implementation, school and home use of ICT and other perspectives on ICT. This paper will claim that the study of the new learning environments that arise with the introduction of new technologies in education, should take into consideration the relevant policies not only at a national, but also at an international level, since these play a significant role in the construction of the new learning spaces. In order to support this claim, this presentation will communicate selected results of a policy-oriented research, conducted in Cyprus. These illustrate that the construction of 'ICT in teaching and learning', is indeed taking place at a national level through policy initiatives and policy formulation that are driven rather than are untouched by national, international and global forces. A discussion on Cypriot and EU policy documents, accompanied by information gathered through interviews with ministerial employees (ICT advisors) in Cyprus will support this argument.

Special education
Discussant: Gwen Wolters, Leiden University, The Netherlands

H59   Autism and Teachers' Coping with Options
Amos Fleischmann, Achva Coll. of Education, Israel
Tamar Sivan, University of Derby, Israel
Dalid Weinberg, Achva Coll. of Education, Israel
Ruth Rosen, Achva Coll. of Education, Israel

The Options methodology opposes enforcing a particular kind of behavior on the child, or structured goal setting. This paper examines how treatment staff – pedagogic counselors, teachers and teachers' assistants – cope with treatment of children with autism in a program that seeks to integrate the Options methodology within

a conventional school with a regular special ed curriculum. The research is based on focused guided interviews and analysis of documentation. The work applies grounded theory developed by Glaser and Strauss (Glaser and Strauss 1967) for gathering, findings. The teaching assistants whose roles focused on working with the children, viewed the Options as an avenue for personal autonomy – for themselves and for the children in their care, and therefore they considered it an enhancement in the treatment regime; the teachers and the pedagogic counselor, whose roles involved both managerial and educational functions, believed that the Options method is detrimental to realizing organizational and educational objectives, and therefore impacts negatively on the treatment regime. The freedom of choice afforded teacher's aids under the Options regime conflicts with the ability of the teachers to function as educators and managers; Therefore teachers chose to leave the discussed institute after two years with the pilot that they themselves judged to be successful. The findings suggest that there is a need for caution in attempting to integrate educational concepts – such as Options which champions maximum free choice for both staff and children – that are in conflict with the worldview espoused by the established school system that demand organization and achievement of traditional educational objectives.

H60   Improving theory of mind abilities in children with high functioning autism: two single subject experiments (n=1)
Erica Santelli, University of Parma - Department of Psychology, Italy
Chiara Trubini, University of Parma - Department of Psychology, Italy
Marina Pinelli, University of Parma - Department of Psychology, Italy
Silvia Perini, University of Parma - Department of Psychology, Italy

Even if nowadays the biological bases of Autistic Spectrum Disorders are fully demonstrated and their neuropsychological correlates are no more contested, the debate on which mechanisms are involved in the particular manifestations of this syndrome it's still open. A promising hypothesis suggests that autistic children can not develop their Theory of Mind (ToM) abilities: they seem to be blind to other's mental states. Aim of this research was to improve ToM abilities in two children with a diagnosis of High Functioning (HF) Autism. We used two different trainings according to the more compromised ability of each child. The younger child was seven years old and the older one was nine years old. We analysed our data with the Von Neumann's C test, a statistical instrument that can be used for the analysis of Single Subject Experiments data. The younger child reached ceiling effect at the Understanding Emotions in schematic faces task and at the Understanding Emo-

tions caused by desires task. He improved his comprehension of the First Order False Belief task and, only in the follow-up phase, his scores at the Understanding Emotions caused by situations task and at the Deception task. The older child obtained the ceiling effect at the Understanding Emotions in schematic faces, at the First Order False Belief task and at the Understanding Emotions caused by situations task; he obtained settled scores at the Deception task but improved his comprehension of the Emotions caused by desires. These results show how a detailed evaluation, a right chose of educative instruments and a continuous monitoring of child's performances, by using a valid statistical instrument, are all basic steps in an educative project aimed to improve the understanding other's minds ability in children with HF Autism.

H61   Gender and evaluation of occupational competence by hearing and hearing impaired adolescents
Amatzia Weisel, Tel Aviv University, Israel
Rachel Gali Cinamon, Tel Aviv University, Israel

The present study examined the evaluations of the occupational competence and expectations (EOCE) of Deaf persons that were made by 74 hearing impaired (HI) and 91 hearing (H) high school students. The participants were asked to indicate if each of 25 occupations was suitable for a Deaf Man and for a Deaf Woman. The 25 occupations varied according to the level of communication required and by their prestige. The results showed that occupations that required intensive level of communication, regardless of their prestige, were seen as much less suitable for deaf individuals than those that required less communication. HI adolescents did not find occupations with high prestige as suitable for deaf men and women even when communication barriers were not relevant. Both HI and hearing participants expressed biased evaluations of deaf women's competence but no evidence for more stereotypic attitudes of HI participants was found. Higher educational aspirations of hearing participants, especially hearing males, were associated with higher EOCE of Deaf Man and Deaf Woman. No such associations were found for the HI participants. No effect of participants' gender on the EOCE was found. The perceptions and attitudes of Deaf people by hearing and HI adolescents and the implications of the results for career development, especially for females, were discussed.

*H62   What do teachers, special educators and headmasters think about integra-
tion /inclusion in primary school: case study*
Majda Schmidt, University of Maribor, Slovenia

Our paper presents a case of perception of the integration/inclusion of three hearing-impaired children which took place within the framework of the project Integration of Deaf and Hearing-impaired Children among Their Hearing Peers in the school year 1997/1998. The project resulted from the cooperation of a regular Primary school and the Centre for Hearing and Speech and was supported by The Slovene Ministry of Education and Sport. The present qualitative research study began in April 2004 after seven years of involvement into the integration project. Our main goal was to study the perception of the integration/inclusion process at the regular Primary school within our group of participants: teachers, headmasters and special educators. The findings show many similarities but also some differences among the opinions of the participants. The groups unanimously put forward academic achievements or learning progress of the hearing-impaired children. Likewise, they confirm positive effects of the model in the social and emotional-motivational area with a different focus in motivation, self-control and self-esteem of the three children. All the groups also noticed the willingness of the parents of the children with special needs to cooperate with the school. Similarly, the teachers and the special educators also assess the academic achievements and the social integration of their peers as successful. Along with the positive effects of the integration model the participants also emphasized some negative effects, problems and difficulties that were perceived in hearing-impaired children, their peers, parents and co-workers.

H63   Reading competences in deaf children
Isabel Garcia Gomez, University of Seville, Spain
Maria Koutsoubou, Institute of Education-University Of London, United Kingdom

Within the context of a broader research on reading and deaf children (Garcia & Morgan, 2004) the aim of this presentation is to analyse the relationship between some specific variables that are usually relevant in reading research, such as Phonological Awareness, Vocabulary, Word Recognition and Sentences Comprehension. Sixteen prelingually deaf children, from eight to twelve years old, who use Spanish Sign Language as the everyday language at school were tested on these variables. We conclude that a general knowledge of signed Vocabulary might be the base for reading in deaf children. Another specific knowledge such as Phonological Aware-

ness could be not so important.

Teaching and instructional design
Discussant: Zacharias Zacharia, University of Cyprus

H64   Young children's mathematical development in japanese preschool: the role of preschool teachers' mathematical support
Tomomi Sakakibara, The University Of The Air, Japan

The mathematics achievement of young as well as older children in East Asian countries including Japan is known to be more advanced than that of their counterparts in the Western countries (Ginsburg et al., 1997). As one explanation for this superior math competence of Japanese young children, it has been proposed that Japanese preschool teachers play an important role in facilitating Children's mathematical development (Hatano & Inagaki, 1999). In this study, to examine the effect of Japanese preschool teachers' support on Children's mathematical development, I compared the mathematical competence of children attending classrooms with different levels of mathematical support provided by their teachers. 130 children (61 3-years-olds and 69 4-years-olds) from 14 classrooms of 7 private preschools in Japan participated in this study. Child Math Assessment (CMA) (Klein et al., 2002) was administered to individual children twice: once at the beginning of the preschool year and once towards the end of it. CMA consists of a wide range of 17 tasks from five areas of mathematics: numbers, arithmetic, space & geometry, measurement, and pattern. In addition, the preschool activities of the participating Children's classrooms were observed for a total of 70 days during one preschool year. When the math performance of the children attending classrooms with three different levels of mathematical support (low, moderate, high) provided by their teachers was compared, the effect of the teachers' mathematical support was found for both age levels, although no such effect on overall math competence was found. The effect was marginally significant for the 3-year-olds, and highly significant for the 4-year-olds with the children receiving high support scoring significantly higher than those with moderate and low support. It was revealed that Japanese preschool teachers play a facilitative role in young Children's mathematical development, especially in their number competence, without relying on systematic teaching.

H65   The school as a community of learners for students and teachers: a conceptual framework
Annoesjka Boersma, University of Amsterdam, ILO, Netherlands
Anne Toorenaar, University of Amsterdam, ILO, Netherlands
Karen Krol, University of Amsterdam, SCO-Kohnstamm Institute, Netherlands
Geert ten Dam, University of Amsterdam, ILO, Netherlands
Gert Rijlaarsdam, University of Amsterdam, ILO, Netherlands
Monique Volman, Free University, Netherlands
Wim Wardekker, Free University, Netherlands
Peter Sleegers, University of Amsterdam, SCO-Kohnstamm Institute, Netherlands

Pre-vocational education in the Netherlands deals with students with motivational problems. The number of dropouts is relatively high. This situation calls for a re-conceptualization of the instructional design. In the present study, we pursue three aims: (phase 1, one year) conceptualization of the concept of communities of learners at the level of the classroom and the school, empirical validation of the operationalization of the classroom and the school as a community of learners for students and teachers, (phase 2, two years) and the development and evaluation of an instructional design for pre-vocational education. The general research questions that guide the first phase concern: (1) How may the classroom be designed as a community of learners to optimize student learning and (2) how may the school constitute a meaningful and supportive context in which the classroom as a community of learners may be realized? This poster presents the conceptual framework and results of case studies undertaken in three schools in the vocational subjects and Dutch language (phase 1). These results provide empirical validation of the operationalization of this framework. They also provide insight into how the classroom and the school as a community of learners has already taken shape in the three schools for pre-vocational education. The results pointed to issues regarding the learning activities of students, the instructional behaviors of teachers, and the personal, interpersonal and organizational capacities that need to be attended to in order to transform the school and the classroom into a community of learners for students and teachers. This information provides the starting point for joint development of the instructional design (phase 2).

H66   Discourse analysis in university physics class. Strategies for the improvement of educational practice

Thamara Fagandez Zambrano, Universidad de Carabobo, Venezuela
Marina Castells Llavanera, Universitat de Barcelona, Spain

This study aims at identifying rhetorical and argumentative characteristics in the discourse of experienced university lecturers in physics-related subjects, and is based on their explanations during not special classes of physics. It was carried out at the School of Engineering at the University of Carabobo, Venezuela. It is a qualitative research. Educational discourse incorporates verbal and non verbal language, with the purpose of constructing meaning. The analyses in this research involve the application of several theoretical approaches in the field of rhetoric, communication, and of the discourse analysis. The theoretical frame is structured on The Theory of the Argumentation by Perelman and Olbrechts-Tyteca; contributions by other authors on the multimodal vision of the communication and the explanations in science classes. This communication summarizes the argumentative rhetorical elements characteristic of the didactic discourse used for the teaching-learning of the topical Kinematics of Transferring and the analysis of corpus focuses on the application of the referring theoretical contributed by the work of Perelman y Olbrechts-Tyteca.

H67   Cooperative Learning in Elementary Schools: Teaching Maths by Using the Jigsaw Method

Elmar Souvignier, University of Frankfurt/Main, Germany
Daniela Glueck, University of Frankfurt/Main, Germany
Julia Kronenberger, University of Frankfurt/Main, Germany

In order to compare the effects of jigsaw - a cooperative learning method including self-regulated learning and reciprocal teaching - with the effects of teacher-guided instruction, we assessed development of knowledge and learning motivation under both conditions. Furthermore, we observed if a long-term implementation of jigsaw in elementary geometric classes promotes an increase of cooperative competence. A total of 225 fourth graders in four elementary schools worked on three six-hour geometry units. Before and after working on these units, students' academic self-concept, interest and level of self-determination in class as well as their cooperative competence and social self integration were assessed. Verbal and mathematical competence were measured prior to the project. Specific geometry tests, assessing factual knowledge and comprehension, were given before and af-

ter each unit. Besides, observers in the jigsaw-classes rated students' cooperative skills and quantified teachers' interventions. Seven classes acquired the geometry units using the jigsaw-method. Before the jigsaw students started working together they participated in a 3-hour training on cooperation. After each geometry unit the jigsaw-students were asked to reflect on on-going group processes. In each school, one teacher-guided class studied the same material for an equal duration of time. Students in cooperative classes learned moderately more than students in traditional classes. Verbal competence was identified as a significant precondition of mutual teaching. Jigsaw and traditionally taught students did not differ in self-concept and interest, whereas jigsaw-students indicated a significant higher level of social self-integration as well as cooperative competence and experienced learning as more self-determined after having worked in teams. Observations revealed an increase in cooperative competence within the jigsaw-environment. Students' experience of group interaction quality correlated positively with the level of observed cooperative competence. Additionally, a negative correlation between the frequency of invasive teacher intervention and level of cooperation was observed.

H68   Effects of group composition on cooperative learning processes
Eddie Denessen, Radboud University Niijmegen, Netherlands
Simon Veenman, Radboud University Nijmegen, Netherlands

Over the past decades, research has demonstrated the potential of cooperative learning (CL) to enhance students' academic achievement and social relations. However, much of what is learned appears to depend on just how the students interact during cooperative work. Students who construct elaborations have been found to learn more than students who simply tell classmates the solution. The focus of this paper is on examining the effects of student ability and gender on student participation, the provision of (accuracy of) elaborations during help seeking and help giving, and achievement in cooperative learning groups. The following research question was addressed: Does the composition of the small group in terms of gender and ability affect student participation, the provision of (accurate) elaborations during a cooperative learning activity and individual performance? Participants were 48 sixth grade students from seven primary schools, randomly selected from sixth-grade classrooms. All of the students were divided per classroom into three levels of mathematics ability (low, medium, and high). Within each of the classrooms a low-ability student was next paired randomly with a medium-ability student and a medium-ability student paired randomly with a high-ability student. The student dyads were asked to solve a math task on balance-beam problems. All sessions were

videotaped and later transcribed. A coding scheme was used to analyze the verbal interactions of the students. The main finding of the study is that, when working cooperatively in dyads, students with the highest level of ability within a coopera-tive group learn more than students with the lowest level of ability within the group. That is, higher-ability students in the dyad participated more, provided more (ac-curate) elaborations, and achieved more than lower-ability students. Higher-ability students profited more from the cooperation than the lower-ability students, i.e., the rich gets richer and the poor gets poorer.

H69   The structuration of group interaction and its effects on the co-construction of knowledge
Wouter van Diggelen, Utrecht University, Netherlands
Maarten Overdijk, Utrecht University, Netherlands
Jerry Andriessen, Utrecht University, Netherlands

The notion of 'structure' is a central concept of social constructivist perspectives on learning. Structures arise and evolve from the symbolic, tool mediated discourse within a student group and give meaning and direction to that discourse. The objec-tive of our study is to investigate how structures emerge during face-to-face and tool mediated communication within student groups and how these structures shape the co-construction of knowlegde. In this paper we built upon the concept of 'structure' by referring to structuration theory (Giddens, 1986) as it has been applied in group dynamics. Structures – which consist of rules and resources - are produced and reproduced during group interaction and guide subsequent interactions. To examine how structures emerge and influence the co-construction of knowledge, we analysed the students' (inter)actions on a mirco-level. The research has been carried out at a secondary school with a 5th grade class of 21 students. Our focus is on student face-to-face and computer mediated interaction while engaged in small-group discussion about solutions for a societal problem. A process analysis of students' participation has shown that, in contrast to oral, face-to-face communication, the computer me-diated interaction is less constrained to one dominant course of action. A content analysis showed that all student computer mediated contributions were related to the co-construction of knowledge. An analysis of face-to-face interactions revealed that this mode was mainly used for the planning of the task, providing support or telling jokes. We can also conclude that the computer mediated communication was mainly used to remove uncertainty caused by ignorance or imprecision of a shared interpretation of the situation. The communicative acts were directed at acquiring new information that enables the students to form a precise interpretation. Negotia-

tions that are triggered by conflicting viewpoints were rare, and if they occur they were never properly completed.

H70   Developing an instrument meant to analyse an instructional process and to reveal the components promoting the acquisition of the learners' competences
Leopold Paquay, University of Louvain, Belgium
Ghislain Carlier, University of Louvain, Belgium
Jean-Louis Dufays, University of Louvain, Belgium
Jean-Louis Jadoulle, University of Louvain, Belgium
Francine Thyrion, University of Louvain, Belgium
Jim Plumat, University of Louvain, Belgium
Philippe Parmentier, University of Louvain, Belgium

This paper presents the construction of a generic tool (the Compas) which aims at analysing instructional situations to reveal characteristics which support the acquisition of competences. According to the literature, the acquisition of competences requires in-depth learning of the concepts and other knowledge, which facilitates their transfer to new situations. Moreover, to learn how to transfer and to mobilize their resources, the learners must be confronted with complex, authentic and significant situations. On the basis of works related to the conditions favourable to the acquisition of competences, we retained ten categories of learner's activities likely to contribute to the development of competences: (1) to face problem-situations (complex, authentic, new situations...) ; (2) to use multiple resources ; (3) to act (produce, communicate) and... (4) to interact ; (5) to reflect and... 6) to co-evaluate (about the processes and the products obtained); (7) to structure and consolidate the acquired knowledge (8) to integrate the new and previous knowledge ; (9) to build the meaning (insert the learning in a project) and... (10) to prepare the transfer towards situations of mobilization. For each dimension, we distinguished the indicators relating to the learner's activities and those relating to the teacher's activities. An eleventh dimension takes into account the degree of support, by the teacher, of the learning progression (among others, the activities of modelling, coaching, scaffolding and fading). This tool is in a process of internal validation. Our further prospect is to carry out an external validation. Diverse uses in research are envisaged. Currently, the tool can be used by teachers, trainers, teacher students and teacher educators to give a progress report on their schemes and to analyse their practices (like using a compass which constantly makes possible to hold one's course in a school oriented towards the construction of competences).

H71   International perspectives on competence: defining and assessing competencies in the context of an international comparative study
Frank Achtenhagen, University of Goettingen, Germany
Lena Arends, University of Goettingen, Germany

The poster presents a design and first results of a feasibility study for a large-scale assessment: How should an international comparative study on vocational and occupational education and training be conducted? We can call this a PISA-survey of VET. The focus of our project, like in the PISA-study, is the problem of how to assess the relevant occupational competences in an objective, reliable and valid way – and thereby, to bring together relevant macro- and micro-structural aspects of vocational and occupational education and training. With regard to ongoing political and academic debates, we have to consider three different aspects: Firstly, the concept of competence in the PISA study is discussed controversial. Therefore, it is important to clarify the goals and objectives of vocational education and training as well as the concept of competences. Secondly, there is no doubt about the relevance of institutional frameworks in international research on VET. Nevertheless, a variety of competing typologies and variables exist. The development of a concept, which includes the most important variables more stringently, will be a point of discussion. Thirdly, the individual development of competences for social placement on the one hand and certificates on the other hand increasingly gain importance in all industrial countries. The discussion is favouring a design that will not only measure subjective potentials but objective frameworks, too. A design that incorporates both aspects is another important part of the feasibility study. The poster will present a model of how to measure competencies in VET, which will be compared with distinguished approaches developed in different European countries.

H72   Pilot implementation of a methodology proposed for evaluating environmental education programs
Anastasios Hovardas, University of Thessaloniki, Greece
Kostantinos Korfiatis, University of Cyprus, Cyprus

We present a pilot implementation of a methodology proposed for evaluating environmental education programs. Our study was conducted within the frame of the project 'ICAROS: History and Training – Human Order and Ecological Formations'. The objective of the project was to engage participants into a collaborative learning process that would cause measurable changes in participants' conceptual representations of nature, as well as significant changes in pro-environmental be-

havior intentions. Learners established working parties of approximately 5 partici-
pants each. Working parties used educational material available online, under the
coordination of project instructors and prepared an oral presentation on a specific
topic. Presentations were made and topics were discussed by all working parties.
Every participant completed a questionnaire one week before and one week after
participating in the project. In total, 160 usable questionnaires were selected. The
questionnaire involved a word association task, behaviour intention items, a mul-
tiple-choice section addressing environmental knowledge, and a pro-environmental
behaviour scale. The results of the present study showed that the course caused
changes in the structure and narrative schemes of participants representations of
nature, led to significant changes in participants' pro-environmental behavior inten-
tions, and that different parts of the educational material revealed different assimi-
lation rates within participants' cognitive structures. The methodology employed
provides reliable data to monitor changes implied by the educational intervention,
on one hand, and, on the other, to allow the evaluation of the educational material.

Writing
Discussant: Pietro Boscolo, Padua University, Italy

*H73   Effective learning environments: students as participants and observers
while defining text quality criteria*
Martine Braaksma, University of Amsterdam, Netherlands
Gert Rijlaarsdam, University of Amsterdam, Netherlands

In our study, we focus on the acquisition of pragmalinguistic knowledge: knowl-
edge about text features that make a text effective. Assumed is that acquisition of
such knowledge is enhanced by experiencing texts as means of communication
and by observing this communication process. We developed a lesson series in
which we tried to cover all roles from our student participation model: students as
participants in communication and students as observers. Students (N=19, seventh
grade) wrote a request to the fictitious Yummy Yummy company to be qualified
for a special reward, although they didn't fulfill the conditions. We gathered the
letters the students wrote and divided the class into two parts: a management team
of the Yummy Yummy company (participants), and a research team (observers).
The management team had to select two letters that were qualified for the reward;
the research team observed the management to find out which criteria were used to
select the winning letters. Afterwards, the research team reported their results in a
plenary setting, and the management team presented their selection of winning let-

ters. Finally, all students revised their letters and filled in an evaluation form.
Research questions
- To which extent are changes between the two versions indications of pragmalinguistic knowledge?
- Is there a different learning effect between the two different learning activities: participants and observers?
- How do students experience the active way of learning?
First, we found a significant increase in text quality when we compared the first version of the letters with the second version. The four pragmalinguistic items of our scoring system were the most sensitive for the difference between the two versions of the letters. Second, we found a significant effect of learning activity: the observers gained more than the participants. Third, high appreciation scores were found.

H74   Children's use of mind maps to plan narrative writing: the roles of task and map structure
Elaine Cockburn, Nottingham University, United Kingdom
Colin Harrison, Nottingham university, United Kingdom
Shaaron Ainsworth, Nottingham University, United Kingdom

Over the course of one academic year two classes of primary aged children, 35 8-9 year olds and 38 9-10 year olds, were introduced to the technique of mind mapping. This study focuses on the use of maps as planning tools for narrative writing. The children produced a variety of maps which were quantitively analysed and classified qualitatively, then compared to the pieces of writing produced. The nature of the writing task had an influence on the kinds of maps created, greater than the age or ability of the children producing them. Furthermore, this influenced the relationship between mind map and subsequent written work – for the first task, more structured mind maps were associated with better texts but the reverse was true for the second task. However, irrespective of the structural form, those children who included more connections and words on maps also created better texts. This suggests that mind maps could be suited to certain genres of writing, or to definable parts of the planning process. This kind of planning tool is not well suited to writing where chronology is an important feature. Further research is investigating the writing task best suited to this kind of planning and if intervening to improve the structure, number of words or links on the maps can have a beneficial effect on the writing process.

H75   The role of students' classroom contributions on the construction of an object to be taught: the example of the argumentative text in French L1 secondary classes
Marianne Jacquin, University of Geneva, Switzerland
Glais Sales-Cordeiro, University of Geneva, Switzerland

The aim of our presentation is to examine the transformations between the intended and the enacted object (Marton, 2004) engendered by students' participation. We focus on two types of students' contributions: 1) critical contributions related to the learning environment (mesogenetic and topogenetic analysis) created by the teacher and/or to concepts/notions he presents; 2) moments of comprehension problems related to some dimensions of the learning object. Four transcribed sequences (set of lessons) on argumentative texts will be analysed. We have the following research questions: 1. What kind of students' contributions do we find in the sequences (typology)?

2. How does the teacher deal with students' contributions and representations concerning the learning object?

3. What are the specific contexts that favour the emergence of contributions or comprehension problems?

A three step analysis of our data will be developed as follows:

1. Selection of significant students' contributions based on a first reading of the transcripts.

2. Based on a formerly elaborated synopsis (Cordeiro & Schneuwly, in print; Schneuwly & Cordeiro, in print) of the teaching sequences, each selected extract is analysed in order to situate: a) the importance level (broad or local) of a contribution to the development of a lesson or the teaching sequence; b) to what dimensions of the object a contribution or a misunderstanding is related to; c) what kind of environment or social learning situations provoke students' contributions.

3. Case analysis of the most significant extracts of each sequence and comparison. First results show that students' contributions may slightly influence teachers' actions with no fundamental environment reorganization (Schubauer-Leoni, 1991; Maulini, 2004).

1. This contribution is part of a project financed by the SNF # 12114-068110

2. A chronological and hierarchical outline that synthesises the contents, the main actions and the organized learning environment.

H76   Explaining the differences in the development of reading and spelling in a transparent orthography: Evidence from Greek

Athanasios Aidinis, Aristotle University of Thessaloniki, Greece
Chrysa Dalakli, Aristotle University of Thessaloniki, Greece

Whereas a number of children and adults can read words that they cannot spell the opposite situation is rarely found. This observation leads to the question of the relation between reading and spelling. The development of reading and spelling skills were investigated in 148 first and second grade Greek children. Greek is an asymmetrical transparent orthography and as a consequence discrepancies between reading and spelling are expected. The children participated in the study had to read and spell a list of 30 words of different level of difficulty including multiple relations between phonemes and graphemes. A battery of phonological and morphosyntactic awareness tasks were also given to children. As it was expected reading is easier than spelling and is acquired at an earlier age even in a transparent orthography. Greek children use a phonological strategy in the first stages of reading and spelling development. However, this strategy is not yet fully acquired causing problems in reading and much more problems in spelling. A visual strategy might be used in reading but this cannot be clearly sustained from the present results. However, a visual strategy is clearly used in spelling because word specific information is necessary for the correct spelling in Greek. It might be that visuo-perceptual coding of word forms proceeds more efficiently than does the visuo-motor coding of the same forms. More research is needed in order this claim to be put forward. A morphological strategy is also evident in spelling and the employment of this strategy reduces the errors in the suffixes. Lastly, different types of metalinguistic abilities are important for reading and spelling. Results were interpreted in the context of a theory that considers reading and spelling as non parallel processes indicating a partial independence of the two systems.

H77   The role of phonology in spelling acquisition: a different conception from a study on dyslexia-dysgraphia

Catherine Martinet, University Of Geneva, Switzerland
Sylviane Valdois, University Pierre Mendes France - Grenoble Ii, France
Michel Fayol, University Blaise Pascal - Clermont-ferrand Ii, France

The purpose of this poster is to investigate, on one hand, metaphonological abilities, and on the other hand, alphabetical and orthographic competencies in spelling, in patients presenting a developmental dyslexia-dysgraphia. Thus the role of phono-

logical abilities (metaphonological and alphabetical) in spelling development will be newly questioned. Twenty-four participants were tested on these three abilities and two correlation analyses showed that the metaphonological abilities are significantly related to alphabetical abilities while these competencies are not related to orthographic abilities. Another analysis showed that very contrasted levels of metaphonological abilities tended to lead to very contrasted levels of alphabetical spelling but not to contrasted levels of orthographic spelling. These results are discussed according to classical stage-based or item-based spelling and reading models and to an alternative model, which postulates a co-development of the two main spelling procedures (alphabetical and orthographic).

H78   Writing and the conceptual coherence of thought
David Galbraith, Staffordshire University, United Kingdom
Mark Torrance, Staffordshire University, United Kingdom
Jenny Hallam, Staffordshire University, United Kingdom

This paper will describes the results of two experiments designed to test the claim that spontaneous text production leads to an increase in the coherence of thought, and that this effect is reduced when text production is planned or directed towards external rhetorical goals. Two groups of low and high self-monitors were randomly allocated to three writing conditions: unplanned writing, in which participants had to write down their thoughts spontaneously; planned writing, in which they had to construct an outline before writing well organized and rhetorically appropriate text; and a control condition, which involved writing about a different topic. To measure conceptual coherence, participants were asked to rate the degree of consistency between 15 statements about the experimental topic, presented randomly in all possible pairings, before and after writing. These ratings were used to calculate a measure of harmony, and a measure of the extent which novel relationships had been discovered during writing. Subjective ratings of knowledge were also collected before and after writing. The results show, first, that writers' thought increased in coherence after unplanned writing but not after planned writing. Second, low self-monitors discovered more new relationships after unplanned writing than high self-monitors, but there was no difference in the planned condition. Third, low self-monitors experienced subjective increases in knowledge after unplanned writing but not after planned writing, whereas high self-monitors experienced increases in knowledge after planned writing but not unplanned writing. Finally, although there were no relationships between increases in conceptual coherence and subjective increases in knowledge, there was a strong positive relationship between the

discovery of novel relationships and increases in subjective knowledge for the low self-monitors, but the same relationship was strongly negative for the high self-monitors. We will argue that these results provide strong support for a dual process model of writing.

H79   Is subjective familiarity a better predictor of word recognition latency than objective frequency in children?
M. Emma Garcia, Pontifical University of Salamanca (Spain), Spain
Jesus Martinez, Pontifical University of Salamanca, Spain
Orrantia Jose, University of Salamanca, Spain

In the last years, many researchers have considered which variable, subjective familiarity or lexical frequency, better explains the reaction times in naming and lexical decisi?n tasks. In this study we compare the effect of the subjective familiarity to the objective or printed frequency in tasks of lexical processing with children. Concretely, we try to verify which of the variables better predicts the scores of reading as far as time and errors. The results demonstrate that, in students of sixth course of Primary School, the subjective familiarity has a significant effect in reaction time in naming words. The reaction times decreased as rated familiarity increased. We also find a significant effect when the dependent variable is the proportion of correct responses. Once again, the proportion of correct responses decreased as rated familiarity increased. This effect was obtained for the case of low frequency words and levels subjective familiarity (low, medium and high levels subjective familiarity). The naming experiment showed familiarity effects. Other authors found similar results in english language and with adult population (Gernsbacher, 1985, Kreuz, 1987; Connine, Mullennix, Shernoff y Yelen, 1990). Consequently, the relevance of this work resides in the type of population employed for this study. Unlike all the previous works that employed adult population, we carried it out with child population.

25 August 2005   12:30 - 13:30 Conference Center   Room A

Keynote Address

Chair: Beno Csapo, University of Szeged, Hungary

International comparisons of student achievements: Why do we need them? Or do we? The case of Israel
David Nevo, Tel Aviv University, Israel

This presentation will comprise three parts. The first part will present a review of major studies on international comparisons of student achievements (e.g., PIRLS, TIMSS, PISA, including the claims made by the organizations conducting such studies (IEA, OECD, etc.) regarding the functions of international studies and the potential benefits for participating countries. The second part will discuss major criticisms of international studies from a methodological and an educational perspective, challenging their research quality and their pedagogical and socio-political significance. The third part will describe the case of Israel with its long history of participation in the various international comparison studies of IEA, OECD and ETS, the achievements of its students and the reactions of the educational system as well as the public at large to the findings of this type of studies. There will be a special focus on recent years (2001-2004) when Israel's relative achievements dropped to the bottom of the international league tables in more than one study and the Israeli educational system went into an unprecedented reform (the Dovrat Task Force), still underway. The presentation will conclude with what can be learned from the Israeli experience, suggesting implications for the international educational research community, as well as educational administrators, parents and the public at large in other countries around the world.

25 August 2005   12:30 - 13:30   Conference Center Room B

Keynote Address

Chair: Wolfgang Schnotz, University of Koblenz-Landau, Germany

Cognition in flux: Towards a coordinated treatment of culture and the individual in mathematical thought
Geoffrey Saxe, University of California, Berkeley, United States

How do collective systems of representation in mathematics emerge in the social history of human communities? How do individuals come to use and alter collective representations in everyday practices, seeding new collective developments? I present a framework for exploring interplay between collective and individual activity in the creation of mathematical representations, with a focus on social history of communities. As an illustrative case, I present fieldwork on mathematics in Oksapmin, communities that are located in a remote highland area in central New Guinea. The Oksapmin, like their neighboring Mountain-Ok groups to the West, traditionally use a 27-body-part counting system for number (see Figure), and there is no evidence that Oksapmin used arithmetic in pre-history. Based upon field studies completed in 1978, 1980, and 2001, I analyze a change from a subsistence-oriented to a cash-oriented economy in which arithmetical activities are increasingly important, and the accompanying (and remarkable) shift in functions of a word form related to these activities. The word form has shifted from its use as an intensive quantifier that means 'a complete group of plenty' to one that means double the value of a body part. I show how the analytic framework affords a multi-level inquiry into genetic processes of change in the Oksapmin case and argue that the approach is useful for understanding the interplay between cultural and developmental processes in cognition more generally. As a second case, I illustrate the use of this framework in the analysis of schooling in Oksapmin communities, showing how the 27-body part non-base system is shifting over the social history of schooling such that the body system more closely aligned with the structure of Western base-structured systems. Like the case of 'doubling', the historical processes that have given rise to the shift in the body system are largely invisible to participants.

25 August 2005   12:30 - 13:30   Conference Center   Room C

Keynote Address

Chair: Erik De Corte, University of Leuven, Belgium

The contested nature of scientific educational research: a guide for the perplexed
Denis Philips, Stanford University, United States

Since its inception, empirical research on educational phenomena has come under attack, although there has been no general consensus about the grounds for these attacks, and indeed, sometimes the attacks have been contradictory. Over the past decade or so there has been a new wave of criticisms, fired by the increasing institutional and political pressures to strengthen the quality of educational research – to mention just two, there is pressure arising from the now internationally widespread practice of basing university funding on research quality audits, and there is pressure from political decision makers who claim that they need reliable public policy advice (comparable to that which they say they receive from medical researchers) about what programs work in solving pressing educational problems. These (and other) factors have made life difficult for many educational researchers, but the situation has been complexified even more by an accompanying rising tide of criticism of the scientific quality of research. Recently in the USA there have been efforts by Congress and the Executive Branch to impose randomized controlled experimentation as the so-called gold standard in terms of which the rigor – the scientific quality – of individual items of research should be judged. But the debates about the scientific quality of research are widespread and wide-ranging – witness the interest (traceable in international journals) in the scientific status of so-called design experiments or design research, in the criteria appropriate for judging the validity of qualitative inquiry, and in assessing narrative research. And there are even more radical forces at work: postmodern critics raise general skeptical doubts about the scientific pretensions of much social science research, and stress the political underpinnings of much so-called objective research. There are those who wish to see the writing of a novel count as rigorous research.

Symposium
Learning and Instructional Technology

CONSTRUCTING AND SHARING MATHEMATICAL IDEAS: SOME FINDINGS FROM THE WEBLABS PROJECT

Chair: Richard Noss, Institute of Education, University of London,
                United Kingdom
Organiser: Richard Noss, Institute of Education, University of London,
                United Kingdom
Discussant: Celia Hoyles, Institute of Education, University of London,
                United Kingdom

This symposium will report the findings of the WebLabs project, a three-year research study funded by the European Union, investigating students' modelling of mathematical and scientific ideas. The fundamental idea of the project is twofold. First, to design and build transparent modules (TMs), carefully packaged sets of tools with which students could construct working models of their evolving knowledge in the specific domains chosen. TMs are modules in the sense that each has embedded within it a set of mathematical ideas that are operationalised, that is, the ideas are made to do work by producing something useful or interesting enough to merit further exploration and discussion. They are transparent in the sense that it is relatively straightforward to inspect the mechanism that makes the modules work, to manipulate and change them, and to rebuild them as necessary. Second, we have designed a WebReport system, which serves both as the collaboratively-constructed, public record of the evolving understandings of a knowledge domain among the community, and as the final product of the community's work. The idea is therefore that the WebReports serve as process and product, the way to share working models built with the TMs that would frame the discussion, provide the language by which conflicts could be resolved, and ultimately lead to a co-constructed and consensually validated group report. The knowledge domains that are the focus of study for our student group – aged between 13 and 15 years are: Infinity, Sequences, Randomness, Fibonacci, 1-D Collisions, Eco-modelling, and Force & Acceleration. In the symposium, each of the partners in the project will describe their approach, and report their findings. The symposium will end with an overview that attempts to draw theoretical and practical lessons from the project.

Exploring Infinite Sequences

Yishay Mor, Institute of Education, University of London, United Kingdom
Ana Isabel Sacristan, Cinvestav, Mexico City University, Mexico
Jenny Sendova, CIST, University of Sofia, Bulgaria
Richard Noss, Institute of Education, University of London, United Kingdom
Ken Kahn, Institute of Education, University of London, United Kingdom

This paper describes one of the activities – on the convergence or divergence of infinite number sequences – from the WebLabs project. We built a series of tools in the programming system ToonTalk to generate and investigate infinite number sequences (a topic which is absent from the curriculum for this age-group). One of the advantages of Toontalk is that computational processes and their data are tangible and manipulable (in ToonTalk children enter an animated world full of tools and objects that they can pick up and use in a game-like manner.) Another advantage of this system is that it uses exact arithmetic instead of floating point numbers (used by most other computer environments), allowing for as-precise-as-desired numerical investigations such as that of the convergence of the series $1/2+1/4+1/8+\ldots$ (with floating point numbers, the sequence of partial sums of the terms of $1/2^n$ prematurely converges to 1 after 55 iterations). Using this tool, students investigated questions such as whether a sequence can get smaller and smaller and never reach 0. While the ToonTalk-based toolset proved adequate for generating and observing the sequence as a process, it became clear that it would be useful for students to be able to visualize its characteristics as an object. Adding another representational system would raise, we hoped, structures invisible in the first representation. This would allow them to consider other questions such as the rate-of-change of the sequence and the relationship between the convergence of a sequence and that of its corresponding series. We thus complemented the Toontalk explorations with a graphing tool (Excel) for plotting the data generated in the first representation. In our first trial we found that students were surprisingly competent in switching between the different environments, using each according to the advantages it provides.

Modelling 1-D Collisions: Content and process outcomes

Marios Papaevripidou, Dept of Educational Science, University of Cyprus, Cyprus
Gordon Simpson, Institute of Education, University of London, United Kingdom
Costas Constantinou, Dept of Educational Science, University of Cyprus, Cyprus
Celia Hoyles, Institute of Education, University of London, United Kingdom
Richard Noss, Institute of Education, University of London, United Kingdom

Collisions are among the most basic phenomena in which a quantity remains invariant, and conservation theorems play a fundamental role in physics. Identifying invariants is crucial to the modelling process in both mathematics and physics, while application of the conservation laws is fundamental in learning and doing physics. Research on students' understandings of collisions has shown that students tend not to appreciate that they can simply apply conservation principles to the initial and final states of the interacting system, rather than necessarily analyse the micro-interactions involved during the collision. Conservation laws are often presented in a didactic manner with the result that students identify them as meaningless mathematical algorithms to be applied when working out the solution to the outcome of a collision. We present work carried out in two sites, Nicosia (Cyprus) and London. Both sites were committed to having students complete a common sequence of activities, which focused on model-building in the context of 1-D collisions. Through collaboration, students actively engaged in a combined inquiry and modelling approach involving the creation, testing, refinement, and validation of models in ToonTalk for the different observed classes of collisions, without applying any mathematical formulae. The Cypriot group focused on evaluating learning outcomes in terms of specifically developed pre- and post-tests covering three distinct areas: conceptual understanding, modelling skills and epistemological awareness. The London group gave primary importance to the process of modelling, the mediating role of tools, and students' opinions expressed through written reports and group discussions. We present the results and highlight the similarities and differences in approach, and finally seek to demonstrate how they can be pulled together in ways that transcend the limitations of each.

Exploring randomness via studying, building and sharing models
Michele Cerulli, Institute for Educational Technology, Genoa, Italy
Jakob Tholander, KTH, University of Stockholm, Sweden
Augusto Chioccariello, Institute for Educational Technology, Genoa, Italy
Ylva Fernaeus, KTH, University of Stockholm, Sweden
Enrica Lemut, Institute for Educational Technology, Genoa, Italy

This research focuses on the idea of introducing pupils to randomness in terms of studying, building and sharing models that represent different aspects of the knowledge domain. The modelling environment we use includes programmable ToonTalk microworlds, LEGO robots, and cardboard toys. The use of tangible models allows students to construct and manipulate random variables with their fingers, thereby embodying highly abstract concepts. Probability is a young mathematical discipline; randomness, one of its basic concepts, is still under debate. One reason for this ambiguity is that mathematical formalizations of randomness are based either on common sense or on ideas derived from different scientific contexts. Attempts at formalization include notions like: unpredictability, lawlessness, incomputability, incompressibility, indeterminism, etc. These are not competing notions. Each one characterises one of the key aspects of randomness. The models built, shared and discussed by students are designed to illuminate these various facets. Randomness plays a key role in some dynamic systems. Modelling such systems provides motivation for using randomness as a system component and a conceptual tool. We have designed activities, and a set of tools to support them, in which students model dynamic systems, specifically ecological systems. This activity also raises specific questions about computer modelling of dynamic systems. The modelling activity is complemented by collaborative authoring of a WebLabsPedia: an online glossary of terms related to randomness. This verbalization activity aims to help students transform their intuitions into more articulated concepts. Here we describe the educational approach and activity sequence that we set up, and provide examples to discuss findings in terms of how the employed technology contributed to reach our educational goals.

Mathematical discovery in the context of number sequences
Nicholas Mousoulides, Department of Education, University of Cyprus, Cyprus
George Philippou, Department of Education, University of Cyprus, Cyprus
Celia Hoyles, Institute of Education, University of London, United Kingdom

We start from the assumption that students learn best when they actively construct

personal understandings of mathematical concepts and relationships. Problem solving is a central learning activity in mathematics education. In the study of number sequences, students are frequently diverted by visible elements and miss the structural properties, which form the core idea in sequences, even if they might be under the surface. In this study, we sought to understand how students investigate relationships and discover properties in number sequences. To this end, two mathematical tasks on Fibonacci sequences were provided to twenty elementary students with prior experience in using ToonTalk and Webreports. Students were provided not only with data to confirm or reject a conjecture, but also with ideas and representations to gain insights into the different properties of the Fibonacci sequences. In this paper we present results of the work of two students while engaged in these explorations. To identify how the environment facilitated students to model and explore sequences' properties we used mainly field notes, students' models and video records. From the analysis of the data, we found that the environment played a primary role in engendering problem solving and discovering properties of number sequences. The environment enabled students to construct models for exploring sequences' properties and solve related problems, to share and discuss their models with other fellow-students across other countries and finally to improve their models and solutions. The WebLabs systems prompted and motivated students to explore several possible solutions to a problem by making connections between the different modes of representations, to seek justifications for their conjectures, and to generalize their findings.

Childrens' learning as participation in web-based communities of practice
Joao Filipe Matos, Faculty of Science, University of Lisbon, Portugal
Madalena Santos, Faculty of Science, University of Lisbon, Portugal
Yishay Mor, Institute of Education, University of London, United Kingdom

Assuming learning as participation in communities of practice, and taking a situated perspective on learning, we studied Children's practice within WebLabs activities. The data collected was video recordings of groups of children in selected sessions and material they published in their WebReports. Data analysis enabled us to describe Children's practice in the project and find evidence of learning in the following categories:
(i) The emergence of a shared repertoire, including:
  - vocabulary instantiated in their ways of approaching problems, questions, demands, challenges (using technology, programming and modelling), representing and sharing ideas (describing their work, ideas and thinking, commenting on other

peoples' work and ideas, building on others' ideas to further their own, e.g. constructing the Randomness WebLabspaedia)

  - an emerging valuing of crossing boundaries (both cultural as well as in specific knowledge domains, e.g. on Numbers);

(ii) The co-definition of mutual engagement. This is visible through:

  - an emerging acceptance of the partiality of knowledge as a positive contribution to the knowledge of the community as a whole group and not as a sign of 'not knowing' things (e.g. the exchange of modes of proving that a certain ToonTalk robot produces a certain sequence in the Guess My Robot activity);

  - an emerging sense of responsibility for the overall achievement, i.e. the joint enterprise where children feel that they have a voice (e.g. by contributing to the improvement of the software, children experience a strong sense of belonging to a project team);

  - an emerging sense of ability and pleasure in going deeper into their ideas and products (a kind of localized depth) by way of a set of conditions, namely: interaction with powerful computational tools, interaction with teachers and researchers who help sustain collaboration (acting as peers in the exchanges within their specific tasks) and possibilities for innovative representations.

I 2   25 August 2005   14:30 - 16:30   Room E003

Symposium
Emotion

DEVELOPMENT OF MOTIVATION AND EMOTION IN THE COURSE OF THE LEARNING PROCESS

Chair: Doris Lewalter, RWTH Aachen, Germany
               Marold Wosnitza, University of Koblenz-Landau, Germany
Organiser: Marold Wosnitza, University of Koblenz-Landau, Germany
               Doris Lewalter, RWTH Aachen, Germany
Discussant: Karabenick Stuart, University of Michigan, United States

This symposium addresses the topic of conceptual and methodological challenges in research on the development of motivation and emotion in varying learning contexts and learning situations. A range of methods has been designed to collect data on motivation and emotions related to learning. There is a number of instruments that are available to measure motivation and emotion before or after the learning

process, respectively motivation and emotion that is unlinked to a specific learning process. Research on situated learning or socio-cognitive research has shown the importance of data collected in the specific context and in the course of the learning process. The number of researchers that are focusing on this type of data is growing. Furthermore there is a demand for information about developmental aspects of motivation and emotion in such contexts. The specific aim of this symposium is to introduce a broad spectrum of new accesses to investigate the development of motivation and/or emotions in this field. The presented research focuses on how changes of motivation and emotions can be investigated during a teaching and learning process, in a variety of learning environments and on the main factors impacting on motivation and emotions within the situation. Furthermore the relation between motivational and emotional processes is taken into account.

Graham et al. report results of a study with Grade 9 students on changes of motivational and emotional variables during different kinds of reading tasks. Niemivirta focuses on the impact of motivational tendencies of Grade 9 students and the kind of task on their experience of the learning situation. The studies of Lewalter and Wosnitza are conducted in the context of university courses. They focus on the relation between different types of learning situations and the motivational as well as the emotional development during the learning process.

Staying with the text: Gender, motivation and emotion as factors influencing students' responses to narrative texts

Jedda Graham, University of Melbourne, Australia
Ruth Tisher, University of Melbourne, Australia
Mary   Ainley, University of Melbourne, Australia
Gregor Kennedy, University of Melbourne, Australia

It has been argued that educators need to provide more interesting and stimulating programs to engage boys in reading and improve literacy levels. We are addressing this issue by investigating the way boys and girls vary in their responses while reading narrative texts. Two narrative texts chosen to represent either typically male or female reading interests were presented to142 Grade 9 and 10 students and their reactions were monitored. Using BTL software, we measured a range of indicators including the achievement motivation students brought to the task and specific reactions triggered by the topics of the narrative texts. On-task affective reactions were monitored, reading times recorded, and students' entered answers to multiple-choice questions and an extended answer question for each text. The findings indicated that gender and achievement motivation were significant predictors of students' initial

response to the texts. Patterns of activation were significantly different for boys and girls, both at the level of what was initially triggered by the narrative text topic, and in terms of responsiveness to the text during the reading process. For example, boys reported a moderate level of interest to the male preference topic but this declined as soon as they started to read the text. Girls reported lower levels of topic interest to this same text but by the end of the first section of the text their interest has risen. Findings from the time records and the responses to the questions on text content will be reported to illustrate these differential patterns of responsiveness to the narrative texts. Our findings suggest that further investigations into the development of motivation and emotional factors within the course of the learning process will add to our understanding of the way boys and girls respond to text material.

Motivational mind-sets and task engagement: the influence of achievement goal orientations and task type on students' situation-specific self-appraisals
Markku Niemivirta, University of Helsinki, Finland

The aim of this study was to examine (1) whether students with different motivational tendencies experience task situations differently; (2) whether the effects of those experiences on task performance and post-task attributions are invariant across the students; and, (3) whether the type of task used influences those experiences. All participants (963 girls and 980 boys from the ninth-grade) took part in two tasks: one mathematical task dealing with arithmetic operations and one verbal task focusing on conceptual analogues. After receiving task instructions and working through some example items, but before starting to work on the actual task, the students responded to a short pre-task questionnaire focusing on situational appraisals (i.e., anticipated interest; self-efficacy, and claimed self-handicapping). Immediately after the task, the students completed another short questionnaire on post-task attributions (e.g., perceptions of comprehension, effort, and success). Based on their responses to a motivational questionnaire completed before the experiment, the students were first classified into five groups with distinct achievement goal profiles. A series of multisample covariance structures analysis was then performed in order examine (1) latent mean differences in all measures across the different goal orientation groups; (2) the sequential relationships between pre-task appraisals, task performance, and post-task attributions, and, (3) the degree of equivalence of those relationships across the goal orientation groups. The predictive effects observed were theoretically meaningful and rather unanimous across the two tasks. Regarding latent mean differences, the results showed systematic group differences, which were independent of the task type. The results suggest that students with differ-

ent achievement goal preferences enter a task situation with different motivational mind-sets. General tendencies seem to be predictive of the patterning of situational self-appraisals, while individual differences within the patterning of those appraisals bear an independent influence on actual task engagement.

Impact of training courses on emotional experiences and the development of motivational variables
Doris Lewalter, RWTH Aachen, Germany
Claudia Geyer, RWTH Aachen, Germany

With regard to continuous changes and developments in the professional demands, a central aim of university courses is to promote the development of a long-term learning motivation. Empirical results from different research fields show that a self-determined and interest based learning motivation provides an optimal condition for life-long learning and the readiness for further education (Krapp, 2000). Based on previous work concerning the development of students' learning motivation and interest, the research project examines possibilities for fostering the motivational conditions for professional further education of student teachers. The theoretical background is formed by different educational-psychological motivation theories: self-determination theory (Deci & Ryan, 2002) and person-object-theory of interest (Krapp, 1999, 2002). Using an experimental research design, we have explored the effects of three types of training courses about how to cope with conflict situations in class on the development of content-specific learning motivation of student teachers. The content of the courses was constant, but the teaching strategy varied. The action based courses included role-playing; in the case based seminars case studies were discussed, while the theoretically based seminars were only based on theoretical texts and presentations. Each course (duration 1½ days) was taught three times, varying the three trainers systematically. During the field experiment at the University of Munich the three types of training courses were compared with respect to different motivational outcomes. Based on questionnaires, which were reapplied, the results indicate differences between the 3 types of training courses with respect to the development of self-determined motivation, thematic interest, motivation for further education and to the emotional experience during the trainings. Furthermore the results indicate a significant relation between these motivational variables and the emotional experience in the course of the trainings. The findings of the study are discussed with regard to their theoretical and practical impact.

The influence of environmental conditions on the development of emotions. A case

study
Marold Wosnitza, University of Koblenz-Landau, Germany

This paper focuses on the development of positive and negative emotions during a typical teaching-learning situation at a university (lecture) and the environmental aspects that have influenced the arousal of these emotions. To measure the development during a learning situation an experience and time–sampling measurement was used. Students received a short questionnaire and were asked to rate their emotional state and to explain the reasons for these emotions. One lecture on Assessment in Schools visited by 55 students was analyzed to answer the following research questions: 1) How is the development of emotions during the observed lesson? 2) Which environmental conditions are influencing the development of the emotions? Overall, the results showed ongoing changes over time depending on what has happened during the lesson. This was specifically the case for the emotions boredom, anger, interest and happiness. Furthermore we found different clusters of students based on different types of emotional development. Those clusters could be characterized as highly interested students, bored students and those students that are just present. The main influence on the emotional development of students is connected to the teacher and the way he/ she is teaching (Micro-level). In addition to those reasons, a lot of environmental conditions existed that were not directly linked to the actual learning-situation. They were linked to aspects outside the specific unit.

I 3   25 August 2005   14:30 - 16:30   Room A007

Symposium
Student Learning in Higher Education

STUDENT LEARNING IN PROBLEM-BASED LEARNING

Chair: Herma Roebertsen, Maastricht University, Netherlands
Organiser: Astrid Visschers-Pleijers, Maastricht University, Netherlands
              Herma Roebertsen, Maastricht University, Netherlands
Discussant: J.D.H.M. Vermunt, Utrecht University, Netherlands

Contemporary constructivist approaches to learning and instruction emphasize learners constructing their own knowledge and stress the importance of self-directed and collaborative learning (Ertmer & Newby, 1993; Harris & Alexander, 1998; Simons, 2000). Problem-based learning (PBL) is built on these principles

and is consistent with the constructivist view on human learning. PBL has gained a foothold within many schools in higher education. In this symposium, several studies on student learning in PBL are presented. Central element in the papers is to explore from different perspectives, how constructivist theories can be used to stimulate student learning in PBL. Visschers-Pleijers' observational study was conducted from a collaborative learning perspective and was aimed at providing more insight into the interaction processes occurring in a PBL environment, especially interactions that promote deep learning. Lycke described and compared students' self-regulated learning strategies and learning outcomes in a PBL curriculum with those acquired by students in a more conventional curriculum. Roebertsen conducted a study in which two learning environments were compared on achievement and appreciation of students: traditional PBL and an alternative environment that should foster self-directed learning: PBL with study teams. Lonka investigated the effects of a comprehensive PBL curriclum compared to a traditional curriculum and a parallel PBL track and followed students' study success for several years (from entrance examination to the clinical phase). Petit's study focused on the evaluation of two curriculum innovations at a Belgian university: the introduction of multi-disciplinary curriculum units in a PBL setting and project work, together called competency-based education. These studies provide us with better insights into constructivist learning environments in general and the processes of student learning in PBL in particular, based on which suggestions can be drawn for improving these environments.

Learning-oriented interactions in the problem-based tutorial group
Astrid Visschers-Pleijers, Maastricht University, Netherlands
Diana Dolmans, Maastricht University, Netherlands
Ineke Wolfhagen, Maastricht University, Netherlands
Cees van der Vleuten, Maastricht University, Netherlands

Collaborative learning, including PBL, is a powerful learning method. Group interaction plays a crucial role in stimulating learning. However, in medical education, there are few studies focusing on the actual interaction process. Available studies on the collaboration process in PBL are nearly all based on self-report data, and not on observations. The present study investigated different interaction types in the tutorial group: exploratory questioning, cumulative reasoning and handling conflicts on knowledge (together called learning-oriented interactions), and procedural and irrelevant/off-task interactions. Central question was: How much time is spent on those different interaction types during a tutorial and how are these types spread

over the tutorial? Four second-year tutorial groups in the problem-based medical curriculum of Maastricht University were observed, videotaped and analysed during one reporting phase. A coding scheme based on Van Boxtel (2000) and Mercer (1996) was used. Analyses show that 80% of the time in the reporting phase is spent on learning-oriented interactions. Of this percentage, cumulative reasoning accounts for about 63%, exploratory questioning for 10% and handling conflicts for 7%. For one tutorial group, the distribution of the different interaction types in time is presented. Exploratory questioning often precedes cumulative reasoning. Both types were present during the whole meeting; handling conflicts mainly after the first twenty minutes. Obviously, the tutorial groups have a high task-involvement. All learning-oriented interaction types occur, however, relatively little time is spent on exploratory questioning and handling conflicts. In PBL training, special attention should be paid to stimulating handling conflicts on knowledge.

Student strategies and learning outcomes in problem-based and traditional curricula in medicine
Kirsten Hofgaard Lycke, University of Oslo, Norway
Helge Stromso, University of Oslo, Norway
Per Grottum, University of Oslo, Norway

Kelson and Distlehorst (2000) point out that PBL outcomes should be discussed on a broad basis including a) a flexible, useable knowledge base, b) skill at problem solving or reasoning, c)skills in self-directed learning, and d)collaboration. These outcomes may not necessarily result in better results on knowledge measures, but they may be important in becoming a professional medical practitioner. The present research compares students' self-regulated learning in a PBL curricula with those acquired by students in a more conventional curricula. Student knowledge in the two student groups is also measured. Student learning strategies were measured for students on the PBL track (N=61) and the traditional track (N=69) in 2001. A Norwegian version of Vermunt's (1994) Inventory of learning styles and a questionnaire to assess students' perceptions of student or tutor regulation, and students' use of sources was used. Student learning outcomes were measured for students on the PBL track (N=35) and the traditional track (N=65) in 2002. A test of medical knowledge developed for graduates from abroad seeking licence to work as doctors in Norway was used. Preliminary findings indicate significant differences in regulation strategies. No significant differences in learning outcomes as measured by the knowledge test were found between the two groups. This research confirms variability in student learning strategies related to the effect of the curricula similar

to that found in other studies (Vermetten 1999). The findings also confirm research that indicates that there are no significant differences in knowledge between traditional and PBL students at the time they graduate (Albanese 2000, Colliver 2000, Norman & Schmidt 2000, Wiers-Jensen & Aasland 2004). The curricular influence on students' learning strategies challenges educators to design approaches that promote lifelong learning skills as well as disciplinary knowledge.

Comparing traditional PBL and PBL with study teams: some results
Herma Roebertsen, Maastricht University, Netherlands
Jos Moust, Maastricht University, Netherlands

In problem-based learning (PBL) students are actively engaged with psychological learning principles as activation of prior knowledge, elaboration and organization of knowledge. In their tutorial groups, however, students do not always apply these principles when working with a procedure like the 'Seven-Jump' method. To stimulate students to use these principles more often, they were offered another format within a PBL context: PBL with study teams. In this context students work, during the period of self-study, on a regular basis, in so called study teams, small groups of 3-4 persons. In these groups they explain to each other their learning outcomes, clarify for each other their problems while studying texts and organize their knowledge to present this to the members of other study teams in their tutorial group. Previous research showed that students spent more time on self-study in a PBL-with study team condition than in a traditional PBL-context. In this study the achievements as well as appreciation of students participating in a PBL with study teams environment are compared with students working in a traditional PBL environment. The results of a test at the end of the curriculum unit as well as concepts maps developed by the students are compared. Concepts maps designed by the students in both conditions, two weeks after the end of the unit, are also assessed. The results show no differences in achievement. Students in the PBL with studyteams environment, however, were more positive about the quality of the information exchange in the integration phase of their discussion as well as about this new approach of learning in total.

Effects of problem-based learning in medicine
Kirsti Lonka, Karolinska Institute, Stockholm, Sweden
Juha Nieminen, University of Helsinki, Finland
Frank Sjoblom, University of Helsinki, Finland
Patrik Scheinin, University of Helsinki, Finland

In a recent meta-analysis Dochy et al. (2003) presented a robust positive effect of problem-based learning (PBL) on students' clinical skills. No study reported negative effects on clinical reasoning. A tendency to negative results in learning factual knowledge was found, but this result was not robust. Meta-analyses tend to show publication bias as studies showing no differences between curricula are less often reported. More evidence on the effects of PBL on student learning is therefore called for. Another problem is that the strengths of PBL may not be captured by the current examination practices. In this study of students at the University of Helsinki, Faculty of Medicine, their study success was followed from entrance examination to the clinical phase for those who started their studies during the years 1994-2001. It was possible to compare students who attended a) a traditional curriculum, b) a parallel PBL track, and c) a comprehensive PBL curriculum. The data showed no differences between groups (traditional, parallel track, PBL) in the preclinical exam that measured accumulation of factual knowledge. However, PBL students outperformed students from the traditional curricula in tasks calling for clinical reasoning (after 3-4 years). Academic ability was a moderate predictor of success in undergraduate medical training regardless of the form of training. The effect became weaker during later years of study.

I 4   25 August 2005   14:30 - 16:30   Room A112

Symposium
Learning and Cognitive Science

CONDITIONS AND CHALLENGES FOR STRATEGIC KNOWLEDGE

Chair: Carles Monereo, Autonomous University of Barcelona, Spain
Organiser: Carles Monereo, Autonomous University of Barcelona, Spain
                Montserrat Castello, Ramon Llull University, Spain
Discussant: Montserrat Castello, Ramon Llull University, Spain

In the educational context of the 21st century, there is a debate on what teaching and learning mean, with the purpose of bringing education closer to society's needs. Within this debate, there is a quite widely held agreement that students have to learn to learn. This statement, which has already become a clich?, emphasises that students have to learn strategies that allow them to be autonomous in their learning process. This kind of autonomous learning is linked to what is called conditional or strategic knowledge (Monereo et al., 1994; Paris, Lipson, & Wixson, 1983). Promoting the construction of this strategic knowledge in the classroom involves teaching students to consciously analyse the characteristics or conditions of those problems posed and the decisions they make to adjust and proceed in the most appropriate way. From this agreement, those works that will be presented in this symposium and their discussion are intended to focus on what we have called conditions for the construction of strategic knowledge and challenges for its achievement. Conditions refer to students' conceptions with regard to learning. We understand that knowing what the students' concepts about learning are is a previous essential condition that will have an influence on the success of any strategy. In this sense, in this symposium two research works on the conceptions that secondary and university education students have in connection with learning in different domains will be presented. Challenges refer to the teaching methods that may enhance this learning and to an evaluation approach coherent with strategic knowledge construction-centred teaching. In connection with teaching methods, there is a work on the use of metacognitive discussion to learn study strategies and, with regard to evaluation, there is a research on concepts and characteristics of the so-called authentic evaluation.

Children's implicit theories of learning to write
Nora Scheuer, Comahue National University, Argentina
Montserrat De la Cruz, Comahue National University, Argentina
Maria Faustina Huarte, Comahue National University, Argentina

Though the cognitive processes and the socio-cultural contexts intervening in learning to write have deserved plenty of attention, very little is known about how children who are going through this complex process conceive it. Getting to know conceptions of learning is very important for educational research, planning and intervention, since such implicit representations have a pervasive influence on learning itself. Here we explore how children developing in different socio-cultural environments conceive their own learning to write and how such conceptions change in the course of initial and basic education. The participants were 80 chil-

dren from two public schools in Bariloche, Argentina. One school was attended by children living in extreme poverty; the other, by children from middle socio-cultural environments. In each school, we interviewed individually ten children attending Kindergarten, first, fourth and seventh grade respectively. Here we focus on the analysis of Children's responses to a key sequence of open questions regarding the ways whereby they learn to write and they become aware of their progress. The lexicometric method to the complete textual transcriptions of responses revealed four lexical groups. The first axis in the factorial plane adopts a clear educational/developmental significance; socio-cultural environment is contributive to the third one. The analysis of these groups supports an interpretation in terms of implicit theories of learning. In correspondence with a direct implicit theory of learning, preschoolers focused on additive learning products resulting from external conditions. Most children in first grade were beginning to integrate some aspects of the principle of agency inherent to an interpretative theory of learning. This principle became stronger in fourth grade, mainly in relation to writing procedures. Most seventh-graders revealed an advanced interpretative theory. Socio-cultural differences engaged both agency and the appreciation of the own writing competence.

The university students' representations of learning objects
Maria Puy, Autonomous University of Madrid, Spain
Juan-Ignacio Pozo, Autonomous University of Madrid, Spain
Ana Pecharroman, Autonomous University of Madrid, Spain
Alfredo Bautista, Autonomous University of Madrid, Spain

Our main objective is to analyse the way in which university students with different levels of instruction about psychological processes categorise different learning results and to study whether these categorizations are connected to strategic learners' characteristics. Strategic learning is possible only when people can previously analyse and determine the characteristics of learning objects. Furthermore, that kind of analysis is related to the subject conception of learning between other factors. We have done two similar studies (interview tasks, paper-pencil tasks). Both of them were based on the methodology used by Chi, Feltovich & Glaser (1981). The participants of each study were 100 university students divided into three groups according to their instruction level on psychological processes. These students made two tasks. In the first task, they had to categorize 20 learning results according with the things they did to learn them. The learning results are of different kind of knowledge (facts, concepts, technical procedures and strategic procedures) and they belonged to five different academic subjects. There were two versions of that

task. In one version, the contents belonged to typical Secondary School subjects. In another the contents are Psychological Subjects. The second task consisted in the recognition of two classifications; one of them was based on a subject differentiation, whereas the other one was based on a kind of knowledge differentiation. We didn't find significant statistical differences among groups neither between content versions of tasks in quantitative measures. However, the most important differences were about the approach used by students to made classifications. The two groups with lower instruction made classification based in subject differences, whereas the higher instruction group used a process approach. There were also significant differences in the recognition task that point to the idea that process approach is near of Zone of Proximal Development of medium instruction group.

Develop Strategic Knowledge in different schools contexts
Ana Margarida Veiga, University of Lisbon, Portugal

One of fundamental tasks of schools is to endow students with strategies, which enable them to re-elaborate, to transform, to contrast and critically rebuild knowledge, that is develop strategic knowledge. That's why one of today's key lines in educational research is help teachers developing structures to help students learn, and learn how to learn. It is therefore essential to develop learning environments which allow students to construct knowledge and mobilise resources in order to self-regulate their learning. Due to the importance of this issue, we decided to carryout a research project on learning strategies. The research time, that is coordination by Lopes Silva, and Veiga Simao, have the collaboration of Dias and Duarte. This article aims at a critical account review on three case studies which can be placed in a continuity line of a previous project of study strategies. The three case studies, which we are going to submit to your attention, have the particular interest of stemming from a set of general principles and common assumptions adjusted, in an autonomous way, to different situations and professional contexts. All these cases used action research as a strategy for the reflective training of teachers. We have come to the conclusion that the research attitude led to a different configuration of strategic knowledge. In methodological terms, we have opted in all the three studies for a qualitative methodology of case studies and we have adopted a quasi-learning experimental design, in order to evaluate the intervention carried out. So we reflect in these three studies how self-regulated learning can be translated into classroom practices and how to put into the classroom practice according the principles of self-regulated learning and of the learning strategies, which imply consciousness, intentionality, and sensitivity to the context, control and activities regulation.

Strategic teaching and learning through classroom discourse
Eva Liesa, Ramon Llull University, Spain
Montserrat Castello, Ramon Llull University, Spain

This research is a microgenetic study that analyses different sequences in a 2nd grade Compulsory Secondary Education classroom where a teacher specialised in learning strategies promotes, through the metacognitive discussion method, that students state what they understand by studying texts and the type of study procedure they use. The analysis focuses on activity blocks, actions and discursive strategies that arise in the different recorded sessions. This study points to the following conclusions: (a) During the metacognitive discussion sessions, students showed difficulties understanding that the study of a text can be dealt with from different objectives, and that, according to these objectives, some study procedures can help them to solve certain tasks better. (b) The discursive strategies that the teacher and students used in the metacognitive discussion situations under analysis were different. While the teacher focused on posing questions to help students state or elaborate their ideas, on synthesising, re-elaborating or repeating students' contributions; the students focused on reflecting about study procedures (at different levels) or on answering questions that the teacher had posed. (c) The predominant interaction pattern throughout the different sessions was the responsive pattern. Therefore, students participated actively in the discussions, but in general they appeared much focused on their positioning, without taking into account other students' interventions in order to enlarge, clarify or reformulate the ideas exposed by them all. This role was accomplished by the classroom teacher.(d) The emergence of a kind of interaction pattern can be linked to a kind of discursive strategies particular to the teacher and students. Probably, if students had used some strategies that only appeared in the teacher, for instance, the synthesis of other students' contributions, the elaboration of summaries or asking for clarifications, more sequences with the elaborative pattern could have appeared.

The assessment of strategic knowledge by means of authenticated schools tasks
Montserrat Castello, Ramon Llull University, Spain
Carles Monereo, Autonomous University of Barcelona, Spain

Strategic Knowledge (SK) is at the basis of learning strategies and its acquisition increases the possibilities of helping learners become more autonomous and self-regulated, probably the most important educational goal in this Knowledge Society. Because of the importance of SK, finding efficient instruments that allow for its

reliable and valid evaluation has become one of researchers' crucial objectives. The main objective of this study was to identify some school tasks that were usually used for teachers in mathematics, social and science secondary classes to evaluate the level of SK of their students and, if necessary, to modify them in order to make them more authentic. Our hypothesis was that some global tasks, suitably analysed and authenticated could be very useful to evaluate the strategic knowledge in a reliable and valid way. In order to authenticate the school tasks previously identified, we introduced four changes by: 1- improving the meaning and the sense of the task presentation.2- analyzing the different routes to solve the task, this involved identifying the several itineraries of decisions that may be taken by the student and to fix the most suitable ones (strategic routes). 3- introducing a change in a task condition in order to check the students' self-regulated competence (self-regulation). 4- incorporating a personal report protocol about the mental process followed at the end of the task for students to prove their awareness of that same process (self-awareness). In order to validate the different authenticated tasks, we used two systems: an external validation (the teacher's scoring every student's learning autonomy level) and a construct validation (correlation between the collected data). The results of this research confirmed, although with some nuance, the question posed: proper school tasks with minor changes can be an excellent way to evaluate the SK.

I 5   25 August 2005   14:30 - 16:30   Room E009

Symposium
Reading

PERSPECTIVES ON APPROACHES TO IMPROVING READING AND LANGUAGE SKILLS

Chair: Cordula Artelt, Max Planck Institute for Human Development, Germany
Organiser: Cordula Artelt, Max Planck Institute for Human Development, Germany
               Petra Stanat, Max Planck Institute for Human Development, Germany
Discussant: Christina Van Kraayenoord, University of Queensland, Australia

The symposium entitled Perspectives on approaches to improving reading and language skills brings together research on the issue from three different countries.

Organized by Cordula Artelt and Petra Stanat from the Max Planck Institute for Human Development in Berlin, Germany, it involves five presentations.

The first paper is presented by Franzke, Kintsch, and Kintsch (University of Colorado, USA) who will describe an approach to improving reading based on latent semantic analysis and user-interface supported feedback. The second contribution by Leutner and Leopold (University of Duisburg-Essen) presents two experiments evaluating a combined training of learning strategies and self-regulation for improving reading among high school students. In the third paper by McElvany and Artelt (Max-Planck-Institute for Human Development, Berlin, Germany), the authors describe a parent-child-reading program and the results of its evaluation. This program aims at direct reading training and implicit strategy training among elementary school children. The fourth paper by Stanat and Mueller (Max-Planck-Institute for Human Development, Berlin, Germany) concentrates on language skills among immigrant students and presents the results of an experimental study evaluating a summer learning program targeted specifically at this student group. The fifth contribution by Bertschi-Kaufmann and Schneider from Switzerland (Paedagogische Hochschule Aargau), finally, compares the effectiveness of two approaches to improving reading, namely motivation-oriented classroom settings and skill-based training methods. The papers will be discussed by Christa van Kraayenoord from the University of Queensland, Australia. The symposium covers reading and language interventions from elementary school to high school. The evaluation approaches used in the studies are longitudinal and experimental in nature and thus provide important insights for educational design and teaching.

Direct reading training and implicit strategy training in a parent-child reading program for elementary school children
Cordula Artelt, Max-Planck-Institute for Human Development, Germany
Nele McElvany, Max-Planck-Institute for Human Development, Germany

Large-scale studies have identified serious deficiencies in students' reading skills, highlighting the need to focus on effective and theoretically grounded approaches to their improvement (Mullis et al., 2003; OECD, 2000). Theoretical and empirical evidence has shown the family background to be an important factor for school achievement (Elley, 1994; Helmke & Weinert, 1997). A parent-child reading program was therefore developed based on the works of Vygotsky (1978) and sociocultural theory, giving children the opportunity to master their zone of proximal development through active co-construction of meaning in the social reading context. The present study investigates whether this parent-child reading program can help

improve the reading skills of elementary school students. It is hypothesized that the program (1) has a significant effect on reading skills and (2) can be implemented successfully within families. In August 2003 and January 2004, standardized tests were used to collect data on the reading skills of 548 fourth grade students in Germany; 118 of them participated in the program. The participating students' and parents' evaluations of reading progress and of program implementation were collected in self-report questionnaires. The first hypothesis was examined in a MANOVA. Additionally, the descriptive data from the questionnaires were analyzed to investigate both hypotheses. Results showed that while the program succeeds in increasing student vocabulary, an essential prerequisite of successful reading, text comprehension did not improve. Nevertheless, many positive changes were perceived by both parents and children. The data also strongly support the hypothesis that – with some concessions in its time-frame – the parent-child program can be successfully implemented within the family context. In summary, these results indicate that the theoretical assumptions of socio-cultural theory are a promising basis for designing effective and implementable reading programs to foster the reading skills of younger students beyond the regular school context.

Improving reading through combined training of learning strategies and self-regulation
Detlev Leutner, Duisburg-Essen University, Germany
Claudia Leopold, Duisburg-Essen University, Germany

In two experiments, grade 10 students participated in a training program on self-regulated learning from texts. In experiment 1 (76 students), they were taught a learning strategy helping them to identify and highlight the important information in an instructional text; in experiment 2 (84 students), they learned a strategy helping them to organize the information provided in a text into a coherent map. Both experiments followed a 2x2x2 design + control group, with the between-subjects experimental factors training content (learning strategy with self-regulation of strategy use vs. learning strategy only), training format (computer-based vs. teacher-based), and student gender (male vs. female). Following training, students applied their strategic knowledge when reading an instructional text on water molecules and their chemical bonds. The extent of strategy application was assessed, and the amount of knowledge students acquired from the text was measured. In both experiments, students in the learning strategy with self-regulation condition outperformed their counterparts in the learning strategy only condition. Even three months later, the text comprehension scores of the learning strategy with self-regulation students

were higher than those of the control students (effect size d=0.65), whereas there was no statistically significant difference between learning strategy only students and controls. In one of the experiments, the computer-based training group outperformed the teacher-based training group; in both experiments, there was a statistically significant interaction of training format and gender. Male students profited from the computer-based format; female students from the teacher-based format. The results are in line with recent process-oriented instructional theories which state that, in addition to teaching students learning strategies, it is worth training them in the metacognitive control of strategy use on a micro-level, i.e., teaching students to apply a learning strategy in such a way that the specific goals of the strategy are achieved.

Using Summary Street® to improve reading and writing instruction
Marita Franzke, University of Colorado, United States
Eileen Kintsch, University of Colorado, United States
Walter Kintsch, University of Colorado, United States

Summary Street® is an Internet-based tutor designed to help children develop better reading comprehension and writing skills. It is based on Latent Semantic Analysis (LSA), a mathematical technique that enables the computation of the meaning of any given text, and thus comparisons of the semantic similarity of two texts can be derived (e.g., Landauer, et al. 1998). In Summary Street, LSA is used to compare the semantic content of the source text that the children read with their submitted summaries, and provide us with a numeric evaluation of how well any given summary represents the gist of the original text. Students receive feedback on their work almost instantaneously, and are encouraged to edit and improve their work until their summaries match previously defined thresholds. Summary Street was developed with the help of teachers and students at a middle school in Boulder, Colorado, and has undergone a number of revisions since its first prototype (E. Kintsch, et al. 2000). The proposed presentation starts with a description of the Educational Philosophy of Summary Street as well as a User Interface (UI) and the possibilities of Classroom Use. Afterwards Evaluation trials will be presented: At present, Summary Street is being used in 25 classrooms (7 schools) in urban, suburban and rural school districts. Most of the classrooms are at the level of middle schools (6, 7, and 8th grade), where summary writing is practiced most often, but a few high-schools as well as elementary schools are using it as well. Findings of the experimental studies to date show that: Summary Street is motivating, Summary Street use leads to better summaries, Summary Street helps especially in challenging situations and

Summary Street appears to improve students' performance on specific items of an independent comprehension test.

Improving language skills of immigrant students: A summer learning program
Petra Stanat, Max Planck Institute for Human Development, Germany
Andrea G. Mueller, Max Planck Institute for Human Development, Germany

Children from immigrant families are considerably less successful in the German school system than their peers without an immigration background. One of the most important determinants of this disparity seems to be immigrant students' lack of academic proficiency in the language of instruction. At the same time, little is known about the effectiveness of measures designed to support learning of immigrant students in German schools. Therefore, a program designed to promote German language skills was developed and evaluated. Based on findings on summer setback and summer learning, the program was implemented over the summer break. The study involved an experimental study design with pre- and post-tests. Elementary schools with high proportions of immigrant students in the city of Bremen were asked to encourage third-graders to apply for the summer camp. Of the 251 applicants, 150 were allocated at random to a treatment group and 101 to a control group. The children in the treatment group were then randomly assigned to one of two conditions: All children selected for the summer program participated in an implicit language support component (theatre activities). In addition, about 90 of these students also received systematic instruction in German as a Second Language. The performance levels and psychosocial development of the children in the treatment and control groups were assessed using tests and questionnaires shortly before the summer vacation, directly after the summer vacation, and about three months after the end of the camp. Data from the first two assessment points indicate that the explicit language support did have the expected effects on Children's use of grammatical structures that tend to be particularly difficult for immigrant students (e.g., verbs and prepositions). Overall, the pattern of findings suggests that systematic instruction in German as a Second Language can help immigrant students to attain academic language proficiency.

Improving reading: Motivation-oriented classroom settings versus skill-based training
Andrea Bertschi-Kaufmann, Paedagogische Hochschule Aargau (FHA), Switzerland

After the PISA 2000 results on reading literacy had been published, two main approaches to improving reading have been developed in Switzerland: (1) Open methods aiming at individualized reading in classrooms. These include free choices of texts and free reading time during regular reading lessons as well as various measures designed to bring reading materials closer to the individual readers. (2) Cognitive training methods for reading strategies and skills similar to the ones necessary for scoring the PISA reading tests. In a first study investigating the effects of open approaches to promoting reading and writing in multi-media environments, evidence for the importance of motivational aspects were found. More specifically, differential relationships were identified between motivation on the one hand and self-perceived competence in reading and writing on the other. Among female adolescents, a high level of motivation in reading lessons at school seems to enhance self-perceived competence in reading (path coefficient = .30) and writing (path coefficients = .34). Among male adolescents, writing experiences outside school seem to be particularly important for their motivation in writing lessons at school (path coefficient = .28). In a second research project, we are exploring the effects of the two different teaching programs mentioned above. Using a quasi-experimental intervention design, the two teaching methods are compared for primary school pupils in grades 3 and 4 (42 classes, 840 pupils) and for secondary school pupils in grades 7 and 8 (19 classes, 290 pupils). The project involves two experimental groups (interventions with open methods vs. skill-based training) and one control group (no interventions, conventional methods). Over a period of two school years, data are collected at three points in time. Findings on the relationships between the teaching approaches, students' literacy practices, motivation and self-perceived as well as actual competences in reading and writing are presented.

I 6   25 August 2005   14:30 - 16:30   Room E005

Symposium
Assessment methods

QUALITY CRITERIA IN ASSESSMENT METHODS

Chair: Theo Bastiaens, Open University of the Netherlands, Netherlands
Organiser: Liesbeth Baartman, Open University of the Netherlands, Nether
                lands
                Jim Ridgway, University of Durham, United Kingdom
                Judith Gulikers, Open University of the Netherlands, Netherlands
                Andreas Lund, University of Oslo, Norway
                Sarah Gielen, University of Leuven, Belgium
Discussant: Klaus-Peter Wild, University of Regensburg, Germany

In the transition of education towards an assessment culture, many new and different assessment methods have emerged. For the more traditional assessment methods many guidelines and criteria have been developed, but for newer forms this is not the case. This symposium focuses on a variety of assessment modes and particularly the question of quality criteria in such assessment. What quality criteria are particularly useful here and which criteria are lacking. The symposium starts with a general framework for (competency) assessment programmes involving ten quality criteria which has recently been validated in an experiment involving 12 international assessment experts. The criteria are: authenticity, cognitive complexity, meaningfulness, fairness, educational consequences, directness, cost and efficiency, reproducibility of decisions and comparability. After this, three presentations detail specific quality criteria. Educational consequences is elaborated on in light of the influence of authentic assessment tasks on the learning results of students. Fairness is worked out in the project on the impact of e-assessment with respect to gender. Cost and Efficiency is a criterion in the project on the electronic support of collective cognition in assessments. The final presentation elaborates on the development, implementation and evaluation of an Assessment and Development Centre as a complete and integrative framework in institutions for social work education.
The scientific significance of the symposium lies in a further elaboration of the theoretical foundations of new assessment forms and sharing empirical data on assessment research which is not commonly available. The educational significance is obvious in the rules and guidelines that the researchers have established for their

specific settings. Others can learn from their experiences and know how and try to improve the alignment between instruction and assessment.

Quality Criteria for Competency Assessment Programmes
Liesbeth Baartman, Open University of the Netherlands, Netherlands
Theo Bastiaens, Open University of the Netherlands, Netherlands
Paul Kirschner, Open University of the Netherlands, Netherlands

Assessment is linked to instruction and learning. Now instruction and learning are increasingly based on competencies, a call is growing for the development of assessment methods that can adequately determine the acquisition of those competencies. Using one single method of assessment is not sufficient to determine a competency. Therefore we argue for a Competency Assessment Programme (CAP) consisting of a combination of different methods of assessment, including more classical methods and recently developed methods of assessment. For classical assessment methods many quality criteria have been developed, but it is not clear to what quality criteria a CAP should comply. A model of ten quality criteria is proposed: authenticity, cognitive complexity, meaningfulness, transparency, fairness, transparency, directness, educational consequences, cost & efficiency, reproducibility of decisions and comparability. This model was validated in an expert meeting with twelve international experts. A Group Support System was used to guarantee individual and anonymous input from all experts. All quality criteria were considered to be important by the experts and some additional criteria were proposed: robustness, acceptability, accessibility and capability of evaluation. Secondly, the importance of the criteria in two different situations was investigated, contrasting a situation in which students continue going to school at a higher level or finish education and start working. Educational consequences and cognitive complexity were found to be most important in the first situation, while authenticity, meaningfulness, comparability and directness were more important in the second. Finally, procedures were formulated to comply with the criteria and the model was placed in a broader framework within the current assessment paradigm, linking the criteria to some topical problems in the field of assessment.

Sex and the Computer
Jim Ridgway, University of Durham, United Kingdom
Sean Mccluster, University of Durham, United Kingdom

Increasingly, computer-based assessment (CA) is being used to administer and

score tests (Ridgway, McCusker and Pead (2004)). It is easy to administer multiple choice tests via CA, and tasks with a strong spatial and numerical component; both of these factors are likely to favour of boys. This paper examines evidence of sex bias in some large-scale, CA designed to identify high attaining students in problem solving in science, mathematics and technology. Raw data showed no significant differences in the performance of girls and boys at age 9, but significant differences in 3 of the 4 tests at age 13 (consistent with common findings on the emergence of sex differences at puberty). Tests were taken on a voluntary basis, and there was no control over the student sample. When the effects of sample composition and school effects were removed, the pattern of apparent sex bias changed considerably, but still favoured boys. When performance on CA was compared with performance on analogous (though complementary) paper-based tests, no effects of test medium were found. A number of explanations are offered. Paper tests may be biased in favour of boys; sex differences in performance on CA may be attributable to the superior performance of boys in the general domain of problem solving. The paper reviews (and deconstructs) the literature on sex bias on CA. New techniques for analysing sex differences in performance, are described and illustrated using live test data. Far more work theorising the cognitive demands of CA is needed. The educational significance of this study is that it may be appropriate to create learning environments for girls that emphasise problem solving activities, and the use of spatial tasks.

The impact of perceptions of authentic assessment on student learning
Judith Gulikers, Open University of the Netherlands, Netherlands
Theo Bastiaens, Open University of the Netherlands, Netherlands
Paul Kirschner, Open University of the Netherlands, Netherlands

Authenticity is one of the crucial elements of new assessments that focus on assessing competencies. Furthermore, in the context of vocational education, where learning and working are alternated on a regular basis, developing assessments that resemble professional practice is important. However, research has shown that it is not the assessment itself, but students' perceptions of assessment characteristics that determine their learning. This study focuses on the effects of students' perceptions of authentic assessment on their learning outcome, and on examining if these effects are direct or indirect through their study approach. An additional independent variable is students' perception of alignment between instruction and assessment, since it is expected to be of significant relevance that assessment and instruction are both perceived as authentic and as focusing on the same kind of learning. The context

of this study was an authentic assessment in a vocational college for social work. Questionnaires measured students' (N = 118) perceptions of authenticity of various assessment elements, their study approach and qualitative learning outcome. The final grade was used as the quantitative learning outcome. Correlations and structural equation modelling (SEM) were used to model the direct and indirect relationships between the perception variables; deep and surface study approach and learning outcome. Results showed that perceptions of an authentic assessment task, form, and physical context positively influenced deep learning, meaning that when students perceived these characteristics to be more related to professional practice, they employed more deep learning activities. Furthermore, the SEM model showed that most influences of perceptions on the learning outcome were indirect, through (deep) study approach, and that perception of alignment had a direct positive impact on the learning outcome, while it did not significantly influence their study approaches.

Assessment made visible: individual and collaborative practices
Andreas Lund, University of Oslo, Norway

Assessment of exam papers is a highly skilled but traditionally a solitary and opaque practice. At the same time, assessors, students and institutions depend on practices that share a set of criteria and develop intersubjectivity in its application of such criteria. The present paper examines some of the processes involved in assessment. It does so by observing student teachers who assess exam papers by Norwegian Upper Secondary learners of English as a Foreign Language (EFL). The use of a Learning Management System (LMS) is used to make assessment visible and to support the students in their work. First, student teachers were asked to post their individual assessment of an exam paper to a discussion forum. Next, they formed small groups in which they had to agree on the final grade. This involved a process of collective cognition in which the many-to-many genre offered by the LMS afforded a process of negotiation and developing intersubjectivity. Collective cognition is seen operationalized in this interactive online genre referred to as the multilogue as well as in the intersubjectivity that follows. Findings suggest that the multilogue and the LMS can be used to support and track collective cognitive processes where higher order skills, such as assessment, are crucial. However, in the empirical material these processes are sometimes found in embryonic form and sometimes more fully developed. In students' reflection notes, written six months after the assessment task, we find indications of assessment as a shared and collective competence. The implication is that we need to develop CSCL systems that are

particularly sensitive to and provide support for multilogue modes. Such work must be accompanied by a refined notion of what collective cognition is, how practices conducive to such processes can be designed and, ultimately, reflected in curricula, teacher education, and in classroom practices.

Assessing professional competency by means of an Assessment & Development
Sara Gielen, University of Leuven, Belgium
Filip Dochy, University of Leuven, Belgium

Assessing professional competency is a great challenge in higher education. Teachers are expected to exceed mere knowledge testing, to assess complex integrations of knowledge, skills and attitudes characterising professional competency. This study examines an approach for assessing competency, borrowed from HRM practices and applied to Social Work Education: the assessment center method. However, the method is adapted to educational needs, by adding a developmental focus to the assessment. An Assessment and Development Center (ADC) was developed, to fulfill formative and summative purposes. In various authentic tasks, the competency of students as social workers is measured through behavioural observations by practitioners and teachers. The ADC is tried-out in a case-study within four institutions for Social Work Education in the Netherlands, with students participating voluntarily. The assessments' validity and consequential validity are investigated by questionnaires to examine assessors' (N=30) and students' (N=91) experiences and perceptions, and by analysing the score-profiles of students using gamma-coefficients and factor-analysis. Results indicate that assessors and students generally perceive the defined competences and tasks as valid, and the judgements as fair. Although, analysis of associations between scores shows an important problem concerning the judgements: competency appears not to be measured task-independently. Moreover, a factor-analysis of the scores reveals an underlying pattern of different measurement tasks instead of different competences, posing a threat for the validity of the assessment. With regard to the consequential validity, students and assessors are convinced that the ADC is a good instrument for feedback. Nevertheless, the 'feedforward' was slightly negative: some students experienced stress, due to a lack of transparency. But most students felt encouraged to 'deep learning' by the challenging tasks. However, one major challenge for future appeared to be a better alignment between instruction and assessment. Solutions to the reported difficulties, as well as implications for implementation, will be discussed.

Symposium
Computer-supported Learning Environments

CONCEPT MAPS AS COGNITIVE TOOLS FOR THE VISUALIZATION OF KNOWLEDGE AND KNOWLEDGE RESOURCES

Chair: Sigmar-Olaf Tergan, Knowledge Media Research Center, Germany
Organiser: Sigmar-Olaf Tergan, Knowledge Media Research Center, Germany
                Tanja Keller, Knowledge Media Research Center, Germany
Discussant: Heinz Mandl, Ludwig-Maximilian-Universitet - Lehrstuhl fuer
                Empi, Germany

Students studying self-regulated in resource-based learning scenarios are often overwhelmed by complex and ill-structured subject matters. In order to help students studying effectively information and knowledge has to be structured and visualised task-appropriately. Researchers in both research fields information visualisation and knowledge visualisation are trying to develop and use technologies for fostering the representation, access and use of information and knowledge. Although there are common interest there are hardly any attempts to search for synergies in a mutual effort. In the field of information visualisation one central approach is to develop models and electronic devices for structuring large and complex information sets. Until recently, research and development of information visualisations is driven by technical questions. The focus is on enhancing accessibility of information in large information bases and the usability of the visual interface. However, it is now recognised that information visualisation and information access may be improved by taking into account aspects of knowledge visualisation and knowledge management. In the field of knowledge visualisation the focus is on the visualization of individual knowledge structures for supplementing cognitive processes and memory functions and helping students in generating, representing, diagnosing, structuring and restructuring, retrieving, sharing, and using knowledge. Advanced Concept Mapping tools not only allow the mapping of abstract concepts but also the comprehensive representation of content knowledge (e.g. annotations, personal text documents, visual images, mental models, examples) as well as related information resources. They may be used for both managing knowledge and information. The symposium is intended to bring together researchers from both research fields to present synergistic approaches aiming at both visualising and making accessi-

ble domain knowledge and subject matter information by means of concept maps and capitalising on the potentials of concept maps for supporting self-regulated resource-based learning and knowledge management.

Visualizing structures of knowledge and information: Searching for synergies for fostering resource-based learning
Sigmar-Olaf Tergan, Knowledge Media Research Center, Germany
Tanja Keller, Knowledge Media Research Center, Germany

Students studying self-regulated in resource-based learning scenarios are often overwhelmed by complex and ill-structured subject matters. In order to help students studying effectively, information and knowledge have to be structured and visualized task-appropriately. Researchers in the both research fields information visualization and knowledge visualization are trying to develop and use technologies for fostering the representation, access, and use of information and knowledge. Although there are common interests there are hardly any attempts to search for synergies in a mutual effort. In the field of information visualization one central approach is to develop models and electronic devices for structuring large and complex information sets. Until recently, research and development of information visualizations is driven by technical questions. The focus is on enhancing accessibility of information in large information bases and the usability of the visual interface. However, it is now recognized that information visualization and information access may be improved by taking into account aspects of knowledge visualization and knowledge management. In the field of knowledge visualization the focus is on the visualization of individual knowledge structures for supplementing cognitive processes and memory functions as well as helping students in generating, representing, diagnosing, structuring and restructuring, retrieving, sharing, and using knowledge. Advanced Concept Mapping tools not only allow the mapping of abstract concepts but also the comprehensive representation of content knowledge (e.g., annotations, personal text documents, visual images, mental models, examples) as well as related information resources. They may be used for both managing knowledge and information. The symposium is intended to bring together researchers from both research fields to present synergistic approaches aiming at both visualizing and making accessible domain knowledge and subject matter information by means of concept maps and capitalizing on the potentials of concept maps for supporting self-regulated resource-based learning and knowledge management.

The role of content representations in hypermedia learning: Effects of task and learner variables

Jean-Francois Rouet, Laboratoire Langage et Cognition, CNRS and Univers, France
Herve Potelle, Laboratoire Langage et Cognition, CNRS and Univers, France
Antonine Antonine Goumi, Laboratoire Langage et Cognition, CNRS and Univers, France

Content representations play an essential role in hypermedia usability. In this presentation, we discuss the role of various types of content representations in hypermedia-based learning. Content representations include local devices, for instance, headings, introductions, and connectors, and more global ones, for instance, topic lists, outlines, and concept maps. The effects of global content representations in hypermedia learning vary according to individual and situation variables. We review empirical studies investigating different types of global representations in the context of comprehension and information search tasks. Concept maps are increasingly popular, but their effectiveness seems to vary according to user and task variables. In two empirical studies, we investigated the role of concept maps in comprehension and information search tasks, respectively. The evidence suggests that networked concept maps, despite their popularity, are not always the most effective way to represent contents in hypermedia documents. For tasks that involve browsing and comprehending the document contents, concept maps are useful only to the extent that the user can interpret the symbols used to represent different types of information units and different types of links. As a consequence, simple menu lists or hierarchical diagrams often prove more productive for inexpert users. Concept maps also seem better suited to exploratory learning tasks than to directed search tasks. Most learned tend to have an analytic approach when searching for specific information. As a result, alphabetic lists may allow faster access to relevant contents than more elaborate representations. However, the evidence available so far concerns only a limited range of materials, students, and tasks. Thus, no universal design standards can be drawn from it.

A concept map-centered learning environment

Alberto   Canas, Institute for Human & Machine Cognition, United States
Joseph Novak, Institute for Human & Machine Cognition, United States

Learning involves a variety of activities, independent of the age of the learner. Among these, without trying to be exhaustive we can cite lesson assignments, pre-

testing, readings, class discussions, practice or exercises, collaborative/cooperative work, comparing and contrasting views, research work, oral presentation, written reports, integration with other studies, post comprehensive test, and home/community presentations. This diversity of activities allows the instructor to deal with topics that require different approaches, differences in learning styles, and make the learning experience more interesting. Concept mapping has been used effectively in most of these activities, but in most cases is only applied to one of these activities at a time. We propose the use of the concept map as an artifact over which most of the activities can be centered. Based on the features provided by the CmapTools software (Canas et al., 2004), the student can use the concept map prepared as a pre-test as an initial step towards learning, as a way to organize the various sources from which the student will construct this understanding, as the artifact with which to collaborate with peers, and as the means to present his/her findings at the end of the unit. Furthermore, the concept maps constructed by the student can become the foundation for a portfolio evaluation of his/her performance. In this presentation we present how these features provide a learning environment that supports the variety of activities that are encountered in a classroom.

On the use of visual models of knowledge and information in a technical course
John W. Coffey, Department of Computer Science and IHMC, United States

The presentation contains a description of a knowledge model based upon Concept Maps aiming at a visual representation of both information and knowledge. The model is suggested to be used as an advance organizer for a course of study, and as a navigation device for getting access to course contents as potential knowledge resources which are associated with the concepts in the maps. A method of knowledge modeling and visualization based on Cmap Tools (http://cmap.ihmc.us/) that was originated at IHMC is briefly discussed. These tools allow for the development and perusal of hierarchically structured, Concept Map-based, knowledge models, and the attachment of accompanying resources to concepts within the maps. The method has been used to generate LEO. LEO is a Learning Environment organizer that is intended to help students and instructors to visualize and organize knowledge as well as large quantities of course contents (Coffey, 2003). This presentation focuses on how LEO supports information and knowledge visualization for students and instructors, in the context of courseware development and course delivery.
A pilot study in the use of the Knowledge Model was conducted. Research questions focus at the acceptability, usability and effectiveness of the modeling approach for gaining a better global understanding of the content of the course as a prerequisite

for a knowledge based access to course contents. Students completed a survey that addressed their attitudes toward visual representations of knowledge, the utility of such representations in gaining a global understanding of the course materials, and the utility of creating their own Concept Maps. The results of the pilot study will be reported.

A framework and four new visual representation methods for concept mapping
Remo Burkhard, University of St.Gallen, Switzerland
Michael   Meier, vasp datatecture GmbH, Switzerland

This presentation presents a framework for alternative visual representation methods for concept maps and introduces four new approaches for concept mapping. Concept maps allow the mapping of abstract concepts and the comprehensive representation of knowledge, such as annotations, personal documents, visual images, mental models, or lessons learned, as well as related information resources. The research area Knowledge Visualization concentrates on visualization methods that improve the creation and transfer of knowledge among individuals. This presentation applies the theoretical frameworks and taxonomies of knowledge visualization to the field of concept mapping. It introduces a new framework that allows researchers to apply and invent new visualization methods for the domain of concept mapping. The framework discusses three relevant perspectives that are important when searching for new visualization methods. Based on this framework four new interactive approaches for concept mapping have been implemented and are discussed in this presentation. The first contribution uses the power of storytelling to illustrate the various interlinked concepts in the project ETH Science City. The second contribution exploits the power of visual metaphors and applies the tube map metaphor for interfunctional communication of project related concepts and tasks. A third application uses the power of information visualization to illustrate invisible relationships and conceptual insights from abstract data. The last application uses the power of the third dimension to create both a virtual and physical three dimensional object where the key concepts of a complex project are combined to an appealing knowledge artifact. Both the framework and the four applications aim to motivate researchers and teachers to apply existing and develop new visual representations for concept maps. The presentation therefore has implications for researchers in the domains of Concept Mapping, Learning Technologies, e-Learning, Knowledge Visualization, Information Visualization, and Visual Communication Sciences.

Symposium
Collaborative Learning

THE CHALLENGES AND REWARDS OF WEB-SCAFFOLDED WRITING-TO-LEARN

Chair: Matthias Nueckles, University of Freiburg, Germany
Organiser: Matthias Nueckles, University of Freiburg, Germany
                   Christian Schunn, University of Pittsburgh, United States
Discussant: Prof. Dr Gert Rijlaarsdam, Graduate School of Teaching &
                   Learning Muenster, Netherlands

Web-scaffolded learning opens up a new array of possibilites to complement and enrich traditional classroom settings. A great potential of the Internet to support learning is derived from the very fact that it is primarily a medium for writing and collaboration through written communication. In this symposium, the challenges and rewards of the Internet as an instructional tool to implement new forms of writing-to-learn will be explored. The contributions share the theoretical claim that web-scaffolded writing can serve to reach the following goals: (1) a thorough understanding of contents through writing and evaluation of peer learners' texts, (2) the appreciation and negotiation of different perspectives on a particular issue, (3) the experience of learning from the corrective feedback provided by peers. However, these goals can only be achieved, if adequate instructional support is provided that capitalizes on the affordances and acknowledges the constraints inherent to web-based writing and communication. In the symposium, different forms of Internet-based writing activities will be investigated with different methodologies and on different levels of analysis. Laurinen and Marttunen present an analysis of speech acts in web-based argumentative discourse. They show that within chat debates different types of argumentation patterns emerge that can be placed in a continuum between written-like and oral-like language. Schunn and Cho present a web-based reciprocal writing evaluation system. Through the production and reviewing of each others' essays students acquire not only an understanding of contents but also meta-knowledge about writing. The contributions of Schwonke as well as of Nuckles, Renkl and Fries examine different methods of applying learning protocols in web-based collaborative settings. Schwonke compares the collaborative production of learning protocols in a web-based and face-to-face environment. Nuckles et al.

study the learning processes resulting from the exchange and reciprocal evaluation of peers' learning protocols within long-term learning teams.

Written arguments and collaborative speech acts as means for learning through chat debates

Leena Laurinen, University of Jyvaeskylae, Department of Education, Finland
Miika Marttunen, University of Jyvaeskylae, Department of Education, Finland

Learning can be enhanced by a collaborative and argumentative process in which students are sharing a common goal: to get to the essentials of the topic to be learned by putting forward arguments for and against each others' positions. In addition, students can also learn by writing. This study concerns the effectiveness of a learning situation in which collaborative argumentation was practised by writing chat messages in pairs. Students (n=24) participated in 12 dyadic debates concerning two topics: nuclear power (NP) and genetically modified organisms (GMO). The chat debates were first analysed by classifying the successive speech turns according to the level of argumentativeness. After that the emergence of collaboration in the argumentative task-related parts of the students' speech turns was analysed in more detail. Most of the debates were argumentative and all of them were collaborative. During NP-debates 67.2 % and during GMO-debates 47.8 % of the speech turns were argumentative. Among the task-related argumentative speech turns the two most frequent collaborative speech act categories were responding to issues presented by the interlocutor (49.2 %) and presenting questions or sharp provocative statements or asking for clarifications (23.6 %). When the collaborative and argumentative properties of the chat debates were studied qualitatively it was found that there were four types of debates which could be placed in a continuum: sophisticated argumentative debates, in which the written code of language was used ? oral-like debates in which the quality of argumentation was quite low. In spite of the different level of argumentativeness, the distribution of collaborative speech acts was rather similar in all debates. This means that students have adopted the collaborative use of language that could be utilized more in learning task assignments. The study is a part of the SCALE project funded by the European Commission (IST program).

Examining student reflections on the many opportunities to learn in reciprocal-evaluation writing settings
Christian Schunn, LRDC, University of Pittsburgh, United States
Kwangsu Cho, LRDC, University of Pittsburgh, United States

Reciprocal evaluation brings with it many new opportunities for learning from writing exercises, because students not only write a paper, but they also read other student papers, evaluate other student papers, write constructive criticism, and perhaps also evaluate the peers' feedback and evaluate their paper revisions. In terms of learning outcomes, the students may learn basic content, applications of content, others' understanding of basic content, others' values on basic content, writing genres, useful writing moves, the usefulness of different kinds of feedback, and the perceived usefulness of different kinds of feedback. In the context of a web-based reciprocal writing evaluation system called SWoRD (Cho & Schunn, 2003), we examine students' perceptions of learning, using an anonymous survey and a structured interview applied to graduate and undergraduate courses. Overall the majority of students reported learning outcomes from each of the main activities suggesting that the learning landscape is potentially rich. For example, from reviewing other student papers, the majority of students saw examples of what not to do. Overall, graduate students were more suspicious of reciprocal evaluation and its benefits than were undergraduate students, but yet were able to articulate just as many concrete benefits. Interestingly, undergraduates thought grading accountability was key for producing strong learning, whereas graduate students had the opposite beliefs.

Collaborative learning protocols: Writing-to-learn in networked and face-to-face environments
Rolf Schwonke, University of Freiburg, Germany

Writing has a high potential to shape what we know and how we think. Usually it is performed as an individual task. However, individual thinking and learning is often prone to errors as well as to motivational and volitional threats. Synchronous collaboration during writing may not only help to overcome these difficulties but may be of substantial value for individual learning as it allows the collaborators to profit from observation, modeling, scaffolding, and (self-)explaining. In addition, net-based environments that support the synchronous sharing and editing of documents may add new and promising modes of collaboration that are not conceivable without these technological aids. The aim of this study is to explore potential benefits and drawbacks of enriching a tried-and-tested individual learning-by-writing

approach by collaboration in a face-to-face scenario and in a net-based scenario. Twenty-four undergraduate psychology students wrote a learning protocol in each of these scenarios. Results showed that the amounts of planning and text production showed a reversed pattern in two learning environments. Learning outcomes in terms of attainment of learning goals and comprehension were better in the face-to-face setting. However, the perceived helpfulness of the two learning environments was highly correlated with different patterns of organizational, metacognitive, and elaborative support given to and received from the collaborator. From these results it can be speculated that net-mediated writing environments could be made more effective if they explicitly encourage the collaborators to give organizational support as well as to ask for organizational and elaborative support. As a next step the learning protocols will be coded for cognitive and metacognitive learning activities to relate them to the settings and to the writing process. Furthermore, the results of in-depth analyses of the writing processes in the different settings will be reported.

Publishing and annotating learning protocols in a blended-learning environment
Matthias Nueckles, University of Freiburg, Germany
Alexander Renkl, University of Freiburg, Germany
Stefan Fries, University of Mannheim, Germany

Learning protocols are a method to engage students in learning activities that result in a deep comprehension and sustained retention of the learning contents. In university courses, we had students write learning protocols in which they reflected on their learning experiences and outcomes from traditional classroom sessions. The students wrote a learning protocol about each weekly session and uploaded it in a cooperation platform. To initiate an exchange on a regular basis, students of parallel courses at two different universities were grouped into virtual teams that lasted over the whole term. The students of each team exchanged their weekly protocols and commented on their partner's protocol. In the present study, we analysed whether the exchange of learning protocols and the provision of feedback by peers may be appropriate to enhance the elicitation of productive activities in students' protocols. An evaluation of a psychology course is presented where a regular exchange and annotation of learning protocols was implemented. An in-depth analysis of 13 learning teams was conducted. The students' comments (a total of 510) were rated on several dimensions. In particular, it was analysed how extensively they evaluated the quality of their partner's protocols. Additionally, it was determined to what extent the students elaborated on semantic aspects in their partner's protocols. The learning protocols (750 pages) were analysed with regard to the degree of elabo-

ration, organisation, and metacognitve reflection. The results show that students within a team influenced each other strongly with regard to the way they gave feedback to their partner and the quality of their learning protocols. The feedback provided by one partner influenced the degree of elaboration and organisation of the other partner's protocols. At the same, time, there were large differences between teams. The results are suggestive of how to improve dialogue protocols in blended learning.

I 9   25 August 2005   14:30 - 16:30   Room E111

Symposium
Comprehension of Text and Graphics

REASONING WITH GRAPHS: PRECONDITIONS, CHALLENGES, AND INSTRUCTIONAL IMPLICATIONS

Chair: Ilonca Hardy, Max Planck Institute for Human Development,
                Germany
Organiser: Ilonca Hardy, Max Planck Institute for Human Development,
                Germany
                Elsbeth Stern, Max Planck Institute for Human Development,
                Germany
Discussant: Peter Reimann, University of Sydney, Australia
                Zemira Mevarech, Bar-Ilan University, Israel

Graphs are used routinely by experts for the representation, interpretation, and communication of data in mathematics and science. Children are usually introduced to graphs as part of the secondary school curriculum within the context of linearity and covariation. However, research results reveal that the interpretation of graphs remains difficult even for secondary students with instruction on graphs, especially regarding the concept of slope. Conceptually, this difficulty is grounded in the integration of two variables into a new entity; mathematically, a slope may be interpreted with a focus on the algebraic system or the geometric system, each with different, often implicit assumptions underlying interpretations. Given these challenges regarding students' conceptual understanding of graphs, which instructional approaches may be taken to further students' mathematical sense-making at an early age? In this symposium, we will learn about Children's preconditions for graphical interpretations, the challenges faced by instructors especially with regard

to students' interpretation of the slope, and instructional approaches appropriate for preventing some of students' conceptual difficulties. Koerber will report on young Children's ability to make sense of graphs for data of covariation. This finding poses the question of an early familiarization of children with graphs in order to foster their conceptual understanding of covariation and to prevent some of the misconceptions, such as pictorial interpretations, found with secondary school students. The study by Felbrich focuses on fostering six-grade students' understanding of the concept of slope, using an instructional approach of contrasting cases. Her results may be put in a broader context of different mathematical approaches to the interpretation of slopes found by Zaslavsky, differentiating between algebraic and geometric interpretation in diverse samples, ranging from secondary school students to mathematics experts. Finally, Kramarski will introduce an instructional approach for fostering graphical competencies of secondary school students emphasizing metacognitive and self-explanatory reasoning skills.

Interpreting graphs in order to make inferences on covariation data
Susanne Koerber, Ludwig Maximilian University of Munich, Germany

The goal of the present study was to investigate the effect of different visualization formats (realistic pictures vs. graphs) on young Children's scientific reasoning, specifically on their understanding and interpretation of covariation data. Commonly, covariation data are integrated in graphic representations which allow quick access and efficient processing of large amounts of data. Traditional research – using realistic pictures - suggests that in elementary school children begin to interpret covariation evidence. In two studies we investigated young Children's beginning reasoning processes with graphical representations. In Study 1 we investigated 4 – to 6-year-old Children's interpretations of covariation data which were presented either as bar graphs or as realistic pictures. For testing Children's prediction of beliefs from patterns of covariation evidence they were for instance presented with a character's firm belief about something and then asked to judge the character's belief after having been presented with covariation data displaying the counterevidence. Our data suggests that even four-year-old children are able to interpret information provided in graphs and to understand how they bear on causal hypotheses. They are as good in interpreting data from graphs as from realistic pictures. Study 2 examined more demanding interpretation of data by presenting 5-year-olds with different patterns of covariation (perfect, imperfect and non-covariation data) and by varying the experience with the content (prior belief about cause-effect relations or neutral condition). Our data show that in the more demanding conditions their performance was

slightly better in interpreting realistic pictures than graphs. However, in unambiguous conditions they performed equally well and their answers were predominantly evidence-based referring as often to data represented in graphs as in realistic pictures. Taken together this suggests that already kindergarten children can work with graphs thus allowing trainings which promote an integrated development of graph understanding and scientific reasoning right from the beginning.

Contrasting cases for understanding the slope of line graphs
Anja Felbrich, Humboldt University of Berlin, Germany

The introduction of graphs in mathematics instruction as an illustration of the concept of functions was shown to be inefficient for fostering a conceptual understanding of graphs, as evident in the persisting misconceptions held by students as well as in their lack of understanding of graphs as representational systems for communication and problem solving. One successful method of learning about such abstract concepts is using contrasting cases, for they have been shown to facilitate insight and abstraction. However, the contrasts used have to be finely tuned to the learning goals, since the specific nature of contrasts will highlight different information and properties. In an experimental training study with fifth grade students three kinds of contrast, potentially appropriate for learning the concept of slope, have been explored. Students in the content-contrast-group learned to map two concepts from different domains to the slope, whereas students in the structure-contrast-group mapped one concept to the slope twice - once with axis description in line with graphing conventions and a second time with reversed axis descriptions. It was hypothesized that students in this group had the opportunity to directly observe, how a reversal of axis assignments changes the meaning of the slope, thus gaining a deeper insight into the structural properties of the slope. Students in the combined-contrast-group learned with both variations combined. Results from transfer to new domains indicate that students learning with the structure-contrast develop a more flexible understanding of slope than students learning with the content- and the combined-contrast. However, as a detailed analysis of test items showed, this only applies to items which afforded the correct and flexible use of a strategy for finding the slope value, whereas items which afforded the interpretation of slopes using a multiple-choice-format revealed no differences between treatment groups. Implications of research results will be discussed.

Refining the notion of slope through change of scale of a coordinate system
Orit Zaslavsky, Technion, Israel Institute of Technology, Israel

Slope is a mathematical concept that is grounded in people's physical world and everyday experiences. The notion of slope has both a geometric/visual meaning as well as an analytic meaning. The study which will be presented examined the understanding of slope of a (linear) function among a diverse population: secondary students, prospective secondary mathematics teachers, in-service mathematics teachers, mathematics educators, and mathematicians. In particular, their understanding of the connection between the analytic and geometric aspects of slope was investigated. The participants were given a simple but non-standard task, concerning the behavior of slope under a non-homogeneous change of scale. It was presented to some on an individual basis in the form of an interview, and to others as small-group work followed by whole group discussions. Apparently, a seemingly simple question regarding the meaning of the slope of a (linear) function led to some subtle issues that are not usually addressed in the school curriculum. The task arose much conflict and confusion, leading to the need to rethink some common but undeclared default assumptions concerning the connections between the algebraic and geometric systems. Analysis of the responses revealed two main approaches, which are termed algebraic and geometric, as well as some 'mixes' of the two.

Effects of Three Metacognitive Instructional Approaches on Conceptual Errors of Linear Function
Bracha Kramarski, Bar –Ilan University, Israel
Sarit Zoldan, Ofra Institiute, Israel

The study investigated the effects of three metacognitive instructional approaches: DIAGNOSTIC errors (DA), IMPROVE, metacognitive questioning (IMP), DIAGNOSTIC approach embedded within IMPROVE method (DA+IMP) and no metacognitive instruction (CONT) on mathematical reasoning, conceptual errors of linear functions and the use of self-regulated learning strategies (SRL).
 The DIAGNOSTIC teaching approach (DA) was based on emphasizing cognitive conflict by discussing conceptual errors (Bell et al., 1987a; 1987b), the IMPROVE approach was based on using self-metacognitive questioning: Understanding questions, connection questions, strategy use questions and reflection questions (Mevarech & Kramarski, 1997; Kramarski & Mevarech, 2003). Participants were 115 ninth grade students who studied linear function in Israeli junior high schools. Results showed that the students who were exposed to the DIAGNOSTIC ap-

proach (DA+IMP; DA), significantly outperformed the IMP students, who in turn significantly outperformed the CONT students on mathematical reasoning, using logic-formal arguments and eliminating conceptual errors on linear functions and graphic representations. Students that were exposed to the IMPROVE approach (DA + IMP; IMP) used more often than their counterparts self-regulated learning strategies. The practical and theoretical implications of the study will be discussed at the conference.

I 10   25 August 2005   14:30 - 16:30   Room E004

Symposium
Learning styles

LEARNER AND INFORMATION CHARACTERISTICS AS EMERGING TOPICS IN COGNITIVE LOAD RESEARCH

Chair: Jeroen Van Merrienboer, Open University of the Netherlands,
             Netherlands
Organiser: Fred Paas, Open University of the Netherlands, Netherlands
             Liesbeth Kester, Open University of the Netherlands, Netherlands
Discussant: Remy Rikers, Erasmus University Rotterdam, Netherlands

Instructional control of the high cognitive load that is associated with the learning of complex cognitive tasks has become the main concern of Cognitive Load theory (CLT). CLT suggests that learning happens best under instructional conditions that are aligned with the cognitive architecture. It has become clear that the knowledge structures underlying this architecture substantially change as a function of learner expertise and age. Consequently, knowledge about the learners' age and level of expertise is imperative for enabling instructional designers to categorize information and learning activities as intrinsic, extraneous, or germane, and to predict learning outcomes. This symposium presents some of the emerging research areas focusing on these learner and information characteristics in the context of CLT. Kalyuga presents a rapid assessment method of learners' knowledge structures based on CLT, which could be embedded into computer-based instructional packages as diagnostic tools for tailoring instructional procedures and materials to changing levels of student expertise in cognitively optimal ways and building adaptive e-learning systems. Paas and Van Gerven try study instructional procedures that can compensate for age-related cognitive declines in the efficiency of working memory

operations by investigating the differential effects of interactivity on learning from animations among young and old learners. Darabi and Nelson investigate the effectiveness of product-based and process-based worked examples, and conventional problem-solving in troubleshooting training among novices and more advanced students. Kester, Kirschner, and Van Merrienboer present an experiment to test the hypothesis that conceptual and procedural support in e-learning environments will help learners determine and act upon their information requirements during problem solving, which will lead to higher learning outcomes provided that the support is faded as learner expertise increases. Zumbach, Bannert, and Mohraz use CLT to investigate the interaction of text type (with and without narrative structures) with text presentation format (linearity/non-linearity) in hypermedia learning.

Assessment of learners' organized knowledge structures in adaptive learning environments
Slava Kalyuga, University of New South Wales, Australia

To develop learner-adapted instructional environments with optimized cognitive load, it is necessary to have a rapid measure of learners' knowledge structures suitable for real-time assessment of expertise. Traditional methods of evaluating learners' knowledge structures are usually time consuming and limited in their ability to diagnose different levels of knowledge acquisition. They are hardly suitable for real-time evaluation of learner progress during instruction, to be used for on-line adaptation of instructional procedures to changing levels of expertise. This presentation reports results of developing and applying a schema-based rapid method of evaluating learners' knowledge structures based on cognitive load theory. The method is based on tracing the immediate content of learners' working memory, as they approach a task, and evaluating the extent to which working memory load has been altered by solution schemas held in long-term memory. Further increases in the amount of information obtained in a limited amount of time could be achieved by using multidimensional test tasks, which require application of several types of schematic knowledge structures, and corresponding data summaries relevant to the cognitive inferences. Applications of the method in several specific task domains (arithmetic word problems, kinematic tasks in physics, and reading comprehension tasks) are considered. These task domains differ in the degree of specification of their associated schematic knowledge structures. They are generally less structured than algebra and coordinate geometry tasks areas in which the method was originally developed. Preliminary trials of the method in these domains indicated an enhanced diagnostic power and significant reductions of test time in comparison with

traditional knowledge tests. The paper discusses evidence of the suitability of the rapid assessment method for on-line monitoring of learners' knowledge structures in adaptive learning environments (computer-based tutors in algebra and kinematics) by combining rapid measures of learners' performance with measures of associated cognitive load.

Instructional compensation for age-related cognitive declines in learning from dynamic visualizations
Fred Paas, Open University of the Netherlands, Netherlands
Pascal Van Gerven, Maastricht University, Netherlands

This study aims at the identification of instructional procedures that can compensate for age-related cognitive declines in the efficiency of working memory operations. It is believed that conventional instructional materials using dynamic visualizations such as animations are not compatible with the human cognitive architecture and, consequently, interfere with the learning process, especially with complex cognitive tasks in the elderly. According to a cognitive load theory of dynamic visualization, the major detriment to learning from animations is the transient nature of the information presented. Important information, which was briefly present, disappears before it can be retained in long term memory (LTM). Attempts to keep such information active in working memory (WM) while simultaneously receiving new information leads to cognitive overload and retroactive interference. The trace strategy keeps key information available in a small sequence of frames, rather than having it replaced by the ongoing animation. By retaining information in a trace the demands on WM are reduced, the learner has more time to process the information and commit it to LTM, while reducing the likelihood of cognitive overload. Using a tracing strategy lowers extraneous load, but to ensure that an active engagement contributes to the construction of schemata, it may be necessary to require learners to interact with the animations. The interaction strategies in this study require learners either to complete a trace sequence or reconstruct a trace sequence. It is hypothesized that a completion strategy used in conjunction with traced animations will be an effective learning strategy for younger learners but not for older learners whom will benefit most from a reconstruction strategy. This hypothesis is tested in a 2(Interactivity: completion vs. reconstruction) x 2(Age: young vs. old) design among 40 young (M=20 year) and old (M=60 year) adults learning from traced animations of the human circulatory system.

Instructional Efficiency of Process-Oriented and Product-Oriented Worked Examples in Simulation-based Training of Troubleshooting Skills: Novices versus Intermediates

Abbas Darabi, Florida State University, United States
David Nelson, Florida State University, United States

Cognitive load research has repeatedly found that presenting novice learners with a set of worked examples to study imposes less extraneous load and is more effective in the training of complex cognitive tasks than the conventional strategy of solving the equivalent problems. In contrast, more advanced learners who have developed cognitive schemata for solving problems in a particular domain may not benefit from worked examples, and may even demonstrate lower performance on transfer tasks due to an 'expertise-reversal effect'. Product-oriented, and recently, process-oriented worked examples have been distinguished to mediate the learner's cognitive load, ability to transfer learning to novel tasks, and contribute to the efficiency of instructional interventions. Two experiments were conducted to compare the effects of 3 instructional strategies for training troubleshooting skills in a computer-simulated chemical plant on performance, mental effort, instructional efficiency and motivation. In Experiment 1, 36 intermediate students were randomly assigned to three instructional strategies which involved conventional problem solving, process-oriented worked examples, and product-oriented worked examples. The Problem group had to solve conventional problems in the treatment phase, the Process and Product groups had to study worked examples in process- and product-oriented format in this phase. There were no significant differences among these groups on performance or mental effort. However, both worked example groups, indicated a significantly higher instructional efficiency than the Problem group. Furthermore, the Product group indicated significantly higher motivation than the Problem group. In Experiment 2, 30 novice learners were randomly assigned to the same three instructional conditions. It is hypothesized that process-oriented worked examples will be more efficient than conventional problem solving. With regard to motivational attributes of the instructional conditions it is expected that the process oriented strategy will be more motivational than the product-oriented strategy. The data of this experiment are currently being collected.

Effects of Fading Conceptual and Procedural Support on Information Interaction during Problem Solving in Powerful e-Learning Environments

Liesbeth Kester, Open University of the Netherlands, Netherlands
Paul Kirschner, Open University of the Netherlands, Netherlands
Jeroen Van Merrienboer, Open University of the Netherlands, Netherlands

Powerful e-learning environments (pELEs) contain realistic practice problems and varied information resources. During problem solving in these environments learners need to interact with the available information to construct their own knowledge. However, novices are not able to determine their information requirements with regard to a problem and they have difficulty in perceiving the problem demands, which hinders them to act upon their information requirements. Moreover, the pELEs are cognitively very demanding for learners because of their realism. A pilot study was carried out that confirmed the assumptions that novices in a domain have difficulty determining their information requirements and acting upon them. Twenty-five nursing students of ROC Eindhoven (i.e., senior vocational education) carried out realistic practice tasks in the domain of dietetics in a web-based pELE. The pilot shows that most participants did not use the theoretical information resources offered to them. Moreover, 64% of the participants got stuck in complexity level two of five (i.e., body weight and energy expenditure) and never reached a higher complexity level. An experiment is proposed in which two types of support are added to the pELE: conceptual support to help learners determine their information requirements and procedural support to help learners act upon them. Whereas this support is expected to represent a germane cognitive load for novices, with increasing learner expertise it will become redundant, imposing an extraneous and impeding learning. Consequently, it is hypothesized that conceptual and procedural support will help learners determine and act upon their information requirements during problem solving which will lead to higher learning outcomes provided that the support is faded during practice as learner expertise increases. A 2x2 factorial design with the factors type of support (conceptual vs. procedural) and fading (faded vs. not faded) is used to answer this hypothesis.

Cognitive load in reading comprehension: influence of text type and linearity

Joerg Zumbach, University of Heidelberg, Germany
Maria Bannert, University of Chemnitz, Germany
Maryam Mohraz, University of Heidelberg, Germany

In this contribution we propose a model that picks up the global assumption of

cognitive overhead in hypermedia learning. It specifies this concept using Cognitive Load Theory. We suggest an approach based on the dimension of linearity/non-linearity, different types of cognitive load as well as text characteristics. The model proposes that extraneous cognitive load in hypermedia learning is basically determined by the interaction of text type (especially text with and without narrative structures) with text presentation format (linearity/non-linearity). This assumption was tested by means of a 2x2 between subject experimental design. Sixty participants completed a computer based learning program that contained a narrative text versus an encyclopaedia text in either linear or non-linear presentation format. Participants' prior knowledge as well as their knowledge acquisition after the treatment were compared by means of a propositional analysis based on essay tasks. Furthermore, we applied measures of cognitive load by using the NASA-TLX questionnaire as well as the Mental Effort Rating Scale. Results confirmed a suggested interaction hypothesis postulating that non-linear information presentation of narrative text structure increases cognitive load. This was operationalized by a decreased amount of acquired propositions compared to linear text presentation. We did not find this effect for encyclopaedia text. Here participants' knowledge acquisition was not affected by a linearity/non-linearity presentation format. Furthermore, results suggest an external validation of cognitive load measures by basic propositional analysis.

I 11   25 August 2005   14:30 - 16:30   Room A110

Symposium
Lifelong Learning and Professional Development

LEARNING FROM WORK – PRECONDITIONS, PROCESSES AND OUTCOMES

Chair: Erkki Olkinuora, University of Turku, Finland
Organiser: Erkki Olkinuora, University of Turku, Finland
                Hans Gruber, University of Regensburg, Germany
Discussant: Sanne Akkerman, Utrecht University, Netherlands

Much research has been conducted on individual learning. One of the central findings is that those individuals who engage in individual learning or efforts to develop his or her organisation are doing so intentionally. What is far less known is how to foster (or even sustain) these individual processes in a situated workplace

context and to align them with organisational goals. Work commitment could be a mediating construct that binds together the situated organisational context and the individual learner (i.e. employee). A second point is that sense of agency in terms of one's own learning trajectory and organisational development will promote engagement in learning and organisational development. Sense of agency, in turn, can be promoted by handing over responsibility over learning, work and organisational development to individual employees by, for example, allowing an employee to participate in the negotiation of work roles and common practices. The obvious danger with providing responsibility is that different types of errors increase, but organisations do not seize upon opportunities to capitalise on the learning potential stemming from errors. However, for an employee to learn from errors and to participate in negotiations at the workplace, he or she has to have well developed self-regulated learning competence, collaborative competence as well as a high level of domain-specific competence. The challenge is to find and to validate ways of promoting these competencies before the individual enters the work force (i.e. in education).

Work commitment – A precondition for learning and development at work
Erkki Olkinuora, University of Turku, Finland
Jarkko Makinen, University of Turku, Finland

In this presentation, we explore the concept of work commitment and its role as a central precondition for learning at work. A certain amount of commitment is necessary for all kinds of work, but its role is emphasized in professions based on human interaction. A typical example of this kind of profession is nursing. For the abovementioned reason, the empirical data of the study was gathered at a hospital environment. Altogether 377 hospital nurses participated in a survey and 12 of them also took part in an interview. This presentation aims, firstly, to describe the factors influencing the level of work commitment. Secondly, we explore how feelings of commitment are in turn reflected in one's willingness to develop one's own work and common work practices. On the other hand, we also investigate whether commitment is related to nurses' intensions to transfer to another workplace. In sum, we aim to accomplish a holistic understanding of the role of commitment in workplace learning.

Learning from errors – results from an interview study with employees

Johannes Bauer, University of Regensburg, Germany
Dagmar Festner, University of Regensburg, Germany
Helmut Heid, University of Regensburg, Germany
Christian Harteis, University of Regensburg, Germany

Business practice in context of modern organised enterprises is a highly complex field. The less regulation the more degrees of freedom open space for errors. Things and processes can fail on varying levels of a business organisation, so that it has to be checked, what kinds of incidents are called to be an error, and to which organisational level employees do refer when talking about errors. Prerequisite for that is the development of a theoretical pattern. That leads to question 1: What different levels can be distinguished when talking about errors? The second question concerns the consequences drawn from errors. Question 2: How do employees handle errors? Do they utilise errors as chances for learning? This contribution reports a qualitative study of half standardised interviews. A distinction between two hierarchical levels of profession (managers vs. staff members) has been made. The group of managers consists of $n1 = 14$ persons, the group of staff members covers $n2 = 14$ persons. All test persons are employees in industrial or in service enterprises (e.g. BMW, Infineon, Siemens, Telekom). A first analysis of the interviews shows that in reflecting errors, managers tend significantly more to focus results and figures, whereas staff members think about processes, which went wrong (question 1). Neither managers nor staff members see themselves influencing the definition of criteria for ascertaining errors and errors (question 2). The organisational consequences drawn from errors comply with basic requirements of learning processes by arranging feedback-loops (question 2).

Where's the learning in work-based project learning? A case study in information systems design.

Laura Helle, University of Turku, Finland
Paivi Tynjala, University of Jyvaskyla, Finland

The purpose of the study is to examine the learning outcomes related to a particular model of work-based project learning. Small teams of Finnish third-year university students were commissioned to complete an information systems assignment during a six-month period (400 h) under the guidance of a university teacher and a representative of the client called 'mentor'. The goal is to find out a) what students are learning and b) what learning related challenges remain. Preliminary results

based on semi-structured interviews of students, teachers and mentors (n=51) suggest that students are acquiring some knowledge and skills related to subject matter and team competence. In addition, their professional identity begins to emerge. However, they differ to a great extent in readiness for boundary crossing, which is necessary for in order to develop one's polycontextual skills. Another challenge is that – just as in the workplace(!) (Hakkarainen et al., 2004) – knowledge seems to be unequally distributed, which easily leads to distorted patterns of collaborative learning.

Responsibility in daily working life: As employees perceive conditions for responsible acting
Dagmar Festner, University of Regensburg, Germany
Christian Harteis, University of Regensburg, Germany
Hans Gruber, University of Regensburg, Germany
Helmut Heid, University of Regensburg, Germany
Johannes Bauer, University of Regensburg, Germany

Traditional concepts of working organisation show a strict regulation of inner-firm processes. This regulation determines all working steps employees have to fulfil in the entire organisation. A central characteristic was the distinction between planning and performing levels of operation. The working staff's tasks consisted of only one or few working steps without any degree of freedom. The co-ordination and planning of the working steps was conducted by the managers. Consequently the responsibility for decisions used to be a matter of managers only. Nowadays modern concepts of working organisation proclaim the abolition of the distinction between planning and executing staff levels. Concepts of the 1980ies (e.g. lean organisation) copied far eastern structural models of delegating decision-authority to lower hierarchical levels. All models published and recognised since that time demand degrees of freedom for all employees, who are recognised as individuals with specific competencies. Simultaneously they are taken into charge for their decisions. This contribution analyses the subject of responsibility from an educational perspective, which specifically focuses on several aspects of participation, and sketches results from an empirical study in several German industrial and service enterprises, which are structured according to modern concepts of working organisation. The findings show that employees perceive opportunities for participation only in small areas of their professional acting.

I 12   25 August 2005   14:30 - 16:30   Room E102

Symposium
Parental Involvement in Learning

PARENTAL IMPACT ON EDUCATIONAL MOTIVATION AND ACHIEVE-MENT

Chair: Jean-Luc Gurtner, Department of Education, University of
              Fribourg, Switzerland
Organiser: Timo Ehmke, Leibniz Institute for Science Education (IPN) Kiel,
              Germany
              Thilo Siegle, Leibniz Institute for Science Education (IPN) Kiel,
              Germany
Discussant: Tina Seidel, Leibniz Institute for Science Education (IPN) Kiel,
              Germany

The development of Children's educational motivation and achievement clearly is not only restricted to the classroom environment. Family, social and cultural influence are important context factors. So parents with different knowledge, attitudes, and competencies have specific expectations to their Children's performance and differ in their educational engagement. Research attempts to analyse how these parental context factors are linked to Children's beliefs, motivation, and achievement. Several studies undertaken in this field provide empirical data that parental background is related to Children's motivation and achievement. As a goal of this symposium, current research in the subject area is compared and integrated. Parental impact expresses its power in multiple manners. One type of impact is parental pressure, which Peixoto relates to adolescent motivational orientations, self-esteem, self-concept, and school achievement. Another effect originates in parental goal orientation, i.e. performance or learning goals. Gurtner and Calame relate parental goal orientation to learning intentions, estimation of subjective competence as well as utility of school work, and current school marks. Regarding Children's beliefs, Bouffard et al. examine Children's perceived competence in relation to a broad set of parental characteristics and the contribution of both on intrinsic motivation and achievement. Finally, Ehmke and Siegle connect parental performance in terms of mathematical literacy to parental educational behaviour as well as their Children's motivation and performance in mathematics. Each contribution reflects the focus on a specific aspect of parental engagement and its relation to different aspects

of their Children's educational achievement . These four specific views provide a multi-perspective on the impact of parental background on educational motivation and achievement.

How parental pressure to academic success affects school achievement in adolescence? The role of motivational orientations and self-concept
Francisco Peixoto, Higher Institute of Applied Psychology, Lisbon, Portugal

Research shows that family dynamics and the way they are perceived by adolescents are related with several indicators of adolescent adjustment and school achievement. One feature of family dynamics is parental pressure to succeed at school, which negatively relates with some adolescents outcomes. The aims of this study are twofold: first to analyse the differences introduced by parental pressure on motivational orientations, self-esteem, specific self-concepts and school achievement; on second hand, we will test a model of relationships between variables. Participants were 238 students attending 9th grade, from three schools in the south of Portugal. Of these students, 130 are boys and 108 are girls, with ages ranging from 14 to 18 years. In what concerns to academic achievement, 142 have never repeated a grade and 96 failed at least once in previous years. To collect data we used a self-concept scale, a scale of motivational orientations and a scale to assess parental pressure to academic success. The self-concept and self-esteem scale was build up from Harter's Self-Perception Profile for Adolescents, with a different item format and with two new sub-scales (Portuguese Self-Concept and Mathematical Self-Concept). Motivational orientations were assessed by a Portuguese version of Skaalvik's motivational orientations scale (Skaalvik, 1997). The parental pressure to academic success scale (Baiao & Peixoto, 2001) is a 14-items measure that intends to assess adolescent's perception about the pressure that parents put towards academic performance. Results show that the perception of parental pressure differentiates students on several indicators of school adjustment, namely self-esteem, academic self-concept, motivational orientations and school marks. Results of SEM show that parental pressure affects school achievement mainly through academic self-concept.

Parental goal orientations and their impact on children motivation and achievement

Jean-Luc Gurtner, Department of Education, University of Fribourg, Switzerland
Matthieu Calame, Department of Education, University of Fribourg, Switzerland

In this study we tried to investigate whether the way students understand their parents priorities – performance or learning – influence their achievement at school and their motivation towards schoolwork. Subjects, 33 girls and 35 boys in their last year of compulsory school, were asked to complete a test on their parents' goal orientations and to appraise their subjective competence in mathematics and in French, their own learning intentions and the utility of school for their future personal and professional life. In parallel, their current marks overall, as well as in French and in mathematics separately were also collected. Interestingly, parental goal orientations have a different relation to achievement and to the Children's motivation. If children perceive their parents as more learning than performance oriented, the difference is considerably reduced among those with lower marks. Negative correlations stand between performance orientations of the parents and achievement overall and in French but not in Mathematics. Positive correlations appear on the contrary between learning orientations of the parents and achievement overall and in French; in mathematics, the correlations are slightly negative between learning orientations of the parents and achievement, a tendency even more evident for girls than for boys. With respect to motivation, parental learning orientations tend to yield no or even negative correlations with motivational beliefs while performance orientations of the parents and motivation variables sometimes come up with positive correlations. These results confirm the importance of both types of orientations. They also underlie the double role of parents in sustaining their children efforts at school. Parental learning orientations seem to be necessary to give value to and acknowledge a child's efforts, while their performance orientations are needed to keep him or her striving in the face of difficult situations.

Parents' involvement in Children's perceived competence, intrinsic motivation and achievement

Therese Bouffard, Universite du Quebec a Montreal, Canada
Marie-Helene Fleury-Roy, Universite du Quebec a Montreal, Canada
Valerie Dubois, Universite du Quebec a Montreal, Canada

This study was aimed at examining 1) the relationships between Children's perceived competence and parental characteristics whose selection is based on their

relevance in previous studies, 2) the relative contribution of Children's perceived competence and parental characteristics in explaining Children's intrinsic motivation and achievement in language arts and mathematics. Participants are 307 (168 girls and 139 boys) regular French-speaking pupils either in Grade 5 (mean age = 11,2 years old) or 6 (mean age = 12,1 years old) whose parents also agreed to participate. Children's IQ, school perceived competence, perceived competence and intrinsic motivation in language arts and mathematics, appraisal of achievement goals valued by their parents, and the unconditional support they provide were assessed. Teachers provided Children's achievement. With regard to parents, assessment includes family socio-economic status, self-efficacy beliefs, valuation of control and autonomy in Children's school functioning, provision of positive and informative feedback on their behaviours and accomplishments and avoidance of negative practices or criticisms that may undermine their self-confidence. Children's IQ, gender, and parents' valuation of learning goals were related to Children's positive perceptions of competence in each domain, while parent's self-efficacy was related in language arts, and negative practices were negatively related in mathematics. Children's perceived competence was the most powerful predictor of intrinsic motivation in each domain, although IQ and parents' valuation of learning goals were also related. Finally, 48% of the variance of Children's achievement was explained: Children's school perceived competence and IQ as well as parents' self-efficacy were the only significant predictors. Findings of this study strongly suggest parents' sense of self-efficacy and valuation of learning goal for their child are important in the development of Children's positive perceptions of competence that are the major determinant of their intrinsic motivation and achievement

Parental mathematical literacy and Children's motivation and performance in mathematics
Timo Ehmke, Leibniz Institute for Science Education (IPN) Kiel, Germany
Thilo Siegle, Leibniz Institute for Science Education (IPN) Kiel, Germany

Research results have shown that students' mathematical literacy varies to a considerable extent. Moreover, parental background is an important extracurricular resource for the development of mathematical literacy. Based on the self-determination theory (Deci & Ryan, 1985), one can distinguish between four dimensions of parental strategies that is emotional support, stimulation, autonomy granting, control and structure. The aspects of stimulation and autonomy granting are especially relevant for the development of mathematical literacy. In this study we analyse to what extent mathematics related educational behaviour is influenced by the math-

ematical literacy of the parents and to what extent the mathematical literacy of the parents is connected to their Children's estimation of mathematics and their motivation and performance in mathematics. This study, therefore, has three research aims: 1.The survey of mathematical literacy of a random sample of adults.2.The analysis of connections between mathematical literacy of parents and their parental behaviour in relation to mathematics.3.The analysis of connections between mathematical literacy of parents and the mathematics related variables of their children. The study is coupled with the German supplementary study to PISA 2003. The sample ($N = 323$; age: $MW = 46.5$ years) is comprised of parents of students who took part in PISA. The parents were tested in group sessions in the respective PISA schools. A selection of the items used to survey mathematical literacy in PISA 2003 was used as the testing instrument. With regard to the connection between parental mathematical literacy and parental educational behaviour, a positive link with the estimation of mathematics and with mathematics-related learning and autonomy granting can be seen. With parents who have higher mathematical literacy, children demonstrate higher mathematical literacy, a higher estimation of mathematics and a higher motivation in mathematics than the children of parents who have lower mathematical literacy.

I 13   25 August 2005   14:30 - 16:30   Room A010

Symposium
Social Aspects of Learning

COGNITIVE AND SOCIO-MOTIVATIONAL ASPECTS IN LEARNING FROM DYNAMIC VISUALIZATIONS (PART I)

Chair: Katharina Scheiter, University of Tuebingen, Germany
Organiser: Katharina Scheiter, University of Tuebingen, Germany
              Peter Gerjets, Knowledge Media Research Center, Germany
Discussant: Richard Catrambone, Georgia Insitute of Technology, United
              States

Contrary to the widespread use of dynamic visualizations in educational software, only very little is known with regard to their design and their instructional functions. This lack of insight may also explain why current literature reviews often fail to report consistent positive results in favor of learning from animations.
In Part 1 of the symposium we address this issue by presenting empirical evidence

for the importance of specific design features of animations which influence the cognitive processing of visualizations. Scheiter et al. will first discuss whether animations should entail concrete objects or should be designed in a more abstract way. Schuh et al. demonstrate how animations can foster problem-solving transfer by supporting abstraction across contextually and structurally variable instances. Huk et al. focus on the impact of three-dimensional animations and visual cues on multimedia learning, whereas Tabbers and de Koeijer investigates how learner control affects the trade-off between effectiveness and efficiency of learning from animations. The second part of the symposium extends this cognitive perspective by incorporating socio-motivational aspects that may additionally influence the effectiveness of learning from animations Linek et al. discuss the design of audio materials for animations from a socio-cognitive perspective by considering the gender of the learner as well as of the presenting voice. Merrill and Atkinson show that incorporating pedagogical agents as well as animating solution procedures both increase problem-solving transfer. Moreno investigates cognitive and motivational consequences of dynamic visualizations in case-based teacher education. Her results support the claim that more knowledge on moderating factors is needed before animations can be put into practice effectively. Finally, Betrancourt et al. extend the research on animations to collaborative learning scenarios and show that the effectiveness of animations is moderated by the instructional setting in that animations produced positive outcomes only when students learn in a collaborative setting.

Concrete animations cannot facilitate the understanding of mathematical solution procedures, but what about abstract animations?
Katharina Scheiter, University of Tuebingen, Germany
Peter Gerjets, Knowledge Media Research Center, Germany
Richard Catrambone, Georgia Insitute of Technology, United States

Students often face severe difficulties in understanding mathematical solution procedures even when they have received elaborated instructional explanations of the individual solution steps. In a prior experiment we investigated the effects of different kinds of computer-based visualizations to foster the acquisition of problem-solving skills in the domain of probability theory. Learners received either purely text-based worked examples, text plus an instruction to mentally imagine the examples' contents, or they could retrieve either static pictures or concrete animations that depicted the problem statement and the problem states achieved by applying a specific solution step. It could be shown that frequently using static pictures or imagining the examples' contents both improved performance. However, the fre-

quent use of animations led to substantial increases in learning time, while it was at the same time associated with a decrease in performance. In the present experiment we thus pursued the idea of reducing the cognitive demands imposed by animations by using abstract rather than concrete dynamic visualizations of the worked-out examples. These abstract animations were characterized by the fact that the visualizations of all examples shared a common representation of objects and of the relevant relations among them. This common representation across examples was expected to help learners to focus on the structural similarities and differences between the examples while being able to ignore their surface features. We compared abstract and concrete animations to a purely text-based version of the worked-out examples with regard to learning time as well as to problem-solving performance. We expected that abstract animations should be less cognitively demanding than the concrete animations and should thus yield superior results. Moreover, with abstract animations learners might finally benefit from dynamically visualizing worked-out examples and thus might outperform learners studying only text. The results will be presented at the conference.

Fostering the acquisition of transferable problem-solving knowledge with an interactive comparison tool and dynamic visualizations of solution procedures
Julia Schuh, University of Tuebingen, Germany
Peter Gerjets, Knowledge Media Research Center, Germany
Katharina Scheiter, University of Tuebingen, Germany

Learners experience difficulties transferring knowledge from one domain into another (context transfer), especially if the domains are not isomorphic with regard to the problem structures involved (structural transfer). In this study we investigated whether embellishing hypermedia learning environments with dynamic visualizations of worked-out examples is helpful to overcome these problems and whether these visualizations would be superior to other types of instructional support that are based on hypermedia linking capabilities. Therefore we compared an example-based hypermedia environment (baseline) to three other experimental conditions (comparison tool, dynamic visualization, both). The comparison tool was based on hyperlinks and helped to compare different examples with regard to their structural features. We assumed that this would support recognizing relevant example features and thus the acquisition of context-independent problem-schemas as a prerequisite for context transfer. The dynamic visualizations provided for every worked-out example comprised one visualization of the problem statement and one dynamic visualization for each of the individual steps of the solution procedure. The visualiza-

tions of a problem statement illustrated the transition between a concrete problem representation and a more abstracted representation of its structural features. The same type of abstract visualization was used for all examples so that all visualizations shared a common representation of objects and the relevant relations among them. We assumed that this would help learners to focus on the structural example features. Moreover, the dynamic visualizations illustrated changes in problem states over time that resulted from applying solution steps. This might enable learners to better understand individual solution steps as a prerequisite for structural transfer. In line with our expectations the interactive comparison tool led to an increase in problem-solving performance but only for problems requiring context transfer. However, learning with dynamic visualizations resulted in superior performance with regard to both, context transfer as well as structural transfer.

The educational impact of visual cues and 3D-representational formats in a computer animation on students with different prior domain knowledge
Thomas Huk, Research Center L3S, Germany
Mattias Steinke, Research Center L3S, Germany
Christian Floto, Technial University Braunschweig, Germany

The present study investigated the educational value of two important visual instructional design properties in dynamic visualizations, i.e. computer animations. Commercial e-learning tools show an enhanced tendency to incorporate animations with 3D-representation formats although their production is rather costly and empirical studies focussing on the educational relevance of 3D-representation formats are scarce. Hence, the dimensionality of the representation format (2D vs. 3D) was chosen as a first independent variable. The implementation of visual cues served as the second independent variable since the educational value of cues has been taken recently into the focus of empirical research. Both independent variables were implemented in a 2 x 2 design leading to four different versions of a computer animation explaining structure and functioning of the biomolecule ATP-synthase. While previous studies compared these versions in rather restricted scenarios, the present study examined the impact of these instructional variants in a setting with increased ecological validity since the computer animations were implemented within a complex hypermedia-learning environment on cell biology for students of biology. According to the results of a pre-test, the participating 234 students were identified as having high or low prior domain specific knowledge. After working with the hypermedia learning environment for 20 minutes, a subsequent post-test assessed performance with regard to remembering and understanding. Additionally,

we assessed cognitive load as well as attitude towards the variants of the animation while log file protocols offered the opportunity to reveal differences in duration of usage. A 3-way-ANOVA revealed two significant main effects. The implementation of cues as well as high prior knowledge increased post-test performance. However, differences between 2D- and 3D-representational formats were lower than in previous, more restricted experiments indicating that students in self-controlled user scenarios can partly compensate poor instructional design conditions. Results are discussed in the light of cognitive load theory.

Learner control in animated instructions
Huib Tabbers, Erasmus University Rotterdam, Netherlands
Bastiaan de Koeijer, Tilburg University, Netherlands

Although animations are popular instructional tools, learning from animations can seriously be hindered by their dynamic nature. Especially when an animation is accompanied by an explanatory text, the learner hardly has enough time to integrate both information sources. A solution to this problem might be to add interactivity to the animation. For example, Mayer and colleagues found out that presenting an animation in smaller segments and giving the learner control over the pace decreased the cognitive load imposed on the learner and increased transfer performance (Mayer & Chandler, 2001; Mayer, Dow, Mayer, 2003). In one experiment, we tested this so-called 'segmentation effect' by comparing a learner-paced instruction with a system-paced instruction, using an adapted version of one of Mayer's materials, which was a short multimedia explanation on the formation of lightning. Moreover, we looked at some variables that might be related to the interaction process, like time-on-task, cognitive involvement with both the subject matter and the learning materials, and subjective and objective estimates of prior knowledge (Williams, 1996). In our experiment, the segmentation effect was successfully replicated with higher transfer scores in the learner-control condition. However, this coincided with a large increase in time-on-task. Also, we did not find any relation between cognitive involvement and interaction behaviour. Furthermore, almost all participants underestimated their prior knowledge, but this did not seem to influence interaction behaviour as well. In sum, it seems that the learning benefits of learner control are at the expense of learning efficiency, at least for the kind of procedural multimedia explanations we used in our experiment. This implies that designers of animations will have to make a trade-off between effectiveness and efficiency when deciding whether to incorporate learner control. Moreover, research is needed to find out what might make learners interact more effectively with an animation.

I 14   25 August 2005   14:30 - 16:30   Room A109

Symposium
Motivational, Social and Affective Processes

FUTURE AS AN INCENTIVE

Chair: Thea Peetsma, University of Amsterdam, Netherlands
Organiser: Thea Peetsma, University of Amsterdam, Netherlands
Discussant: Jari-Erik Nurmi, University of Jyvaskyla, Finland

Future time perspective has been defined as the mental perception of future events, or the anticipation in the present of future events (Nuttin & Lens, 1985). It includes two aspects: a dynamic one, regarding the incentive value of an objective, or an individual's disposition to value goals in a distant future; and a cognitive one, that is the perception of the utility of a behaviour in the future. The cognitive aspect has been operationalised as perceived instrumentality, that is an individual's comprehension of the future value of a present behaviour. The concept future time perspective is characterized thus mainly of cognitive nature, but in other definitions it comprises affective aspects as well. For instance Peetsma (1985) regarded time perspective as an attitude, with three components (affection, cognition and behavioural intention), towards a certain life domain viewed in time. Students' time perspectives proved indeed to be good predictors of their learning behaviour (e.g. Lens, 1986; Peetsma, 2000).
In the first presentation by Boscolo et al. interest and perceived instrumentality of school subjects is related to students' goal orientations during the transition to high schools. The relation between instrumentality and goal orientation will come back in the second presentation by Husman et al., but here instrumentality is divided in two types (endogenous and exogenous). This second presentation is, like the third and fourth, based on a longitudinal research. The third presentation by Tsuzuki concerns relations between future time perspective and learning motivation for students with different ability. The research focussed on the transition from elementary to junior high school. In the fourth presentation Peetsma et al. use students' future time perspectives as predictors for the decline in learning behaviour from the start of secondary education – in this case schools for pre-vocational education, which are more and less focussed on one profession.

Interest in school subjects and motivational orientation: A future time perspective

Pietro Boscolo, University of Padua, Italy
Giovanna Chiatti, University of Padua, Italy

The objective of the study was to investigate 8th graders' perceived instrumentality of the school subjects in which they are most and least interested. At the end of middle school students are asked to make the choice of the type of branch of high school. This choice may also influence subsequent ones, regarding higher education vs. finding a job. We hypothesised a relation between the instrumentality of liked and disliked school subjects perceived by students, and their goal orientations. On the basis of the results of several studies, high instrumentality with internal regulation (HI-IR) should be related to mastery orientation, whereas high instrumentality and external regulation (HI-ER) should be related to performance orientation. Moreoever, we expected the most liked subject matter to be perceived useful in a more distant future (from 18 onwards) than the disliked discipline. Lastly, we wanted to investigate gender-related differences, often neglected in FTP research. Four hundred 8th graders (M = 214, F = 202) were administered a questionnaire, divided into three sections. They were asked to indicate the discipline they liked most and least, and answer items regarding the instrumentality of both disciplines. They were also asked to choose the situation and time in which they thought the liked and disliked subject might be useful. From canonical correlation analysis two significant correlations emerged: 1. a relation between mastery orientation and low and high instrumentality with internal regulation; 2. a relation emerged between avoidance orientation and school achievement (negative), on the one hand, and high and low instrumentality with external regulation, on the other. Students with the intention of attending university had higher perceived instrumentality with internal regulation. No gender-related difference emerged in perceived instrumentality.

Endogenous and Exogenous Instrumentality: How can we make sense of these constructs?

Jenefer Husman, Arizona State University, United States
Mary Anne Duggan, Arizona State University, United States
Nan Pennington, Arizona State University, United States
Leigh Wadsworth, Arizona State University, United States

Within research on Future Time Perspective it is likely that no one concept has been as researched as that of Perceptions of Instrumentality. Instrumentality has been shown to support intrinsic motivation (Husman, Derryberry, Crowson, & Lo-

max, 2004), mastery motivation (Simons, Dewitte, & Lens, 2000), and academic motivation and achievement (Miller, DeBacker, & Greene, 1999).   Recently researchers have demonstrated that different types of instrumentality. Specifically instrumentality has been separated into two constructs, Endogenous and Exogenous instrumentality. Although the differences between utility value, instrumentality, and endogenous have been shown (see Husman, et al, 2004) very little research has examined the convergent and divergent validity of both exogenous and endogenous instrumentality. This paper will investigate the divergent and convergent validity of these constructs. The relationships endogenous and exogenous instrumentality and student goal orientations were investigated among undergraduate students from the southeastern United States. The sample comprised 953 undergraduates who were participating in a lower-division intermediate algebra course. Results confirm that endogenous instrumentality and exogenous instrumentality are independent constructs, which -- although related to each other -- are empirically and theoretically distinguishable. Specifically the results demonstrate that endogenous instrumentality support both achievement motivation and mastery orientation whereas exogenous instrumentality does not.

Learning motivation and future time perspective in school children
Manabu Tsuzuki, Chuo University, Japan

The author has been examined developmental changes of future time perspective during the transition from elementary and junior high school children by a longitudinal survey since 2000. This study aimed to examine developmental relationship between learning motivation and future time perspective during this transition. At the third semester of 6th grade in elementary school (Time 1) and the first semester of 7th grade in junior high school (Time 2), 749 children completed a sheet of questionnaire including future time perspective scale (10 items, four subscales) and self rating four-point scales related to academic ability (2 times). All children were categorized into four groups according to self rating scores of academic ability at Time 1 and Time 2: (a) low academic ability at both times (Low group), (b) academic ability improved at Time 2 comparing Time 1 (Improvement group), (c) academic ability fell at Time 2 comparing Time 1 (Fall group), and (d) high academic ability high at both times (High Group). Three way ANOVAs and multiple comparisons showed that Low group had significantly lowest score of Hope for the future, and High group had significantly lowest score of Emptiness and highest score of Time management and planning For Improvement group, Hope for the future, Desire for having future goals and Time management and planning increased from Time 1

to Time 2. For Fall group, Hope for the future, Emptiness and Time management and planning decreased from Time 1 to Time 2. These obtained results suggested that (a) Children's level of academic ability effects on development of future time perspective, and (b) support for improvement of understanding school subjects is important factor to develop future time perspective in school children.

The developments in future time perspectives and motivation in more and less focussed vocational education
Thea Peetsma , University of Amsterdam, Netherlands
Ineke Van der Veen, University of Amsterdam, Netherlands

A decline in motivation from the start of secondary education is a well-known phenomenon in education. For this different explanations have been given. Peetsma (1997) found that time perspectives might be of influence. She reported shifts in the relevance of domains concerning the future time perspective of students in secondary school. Students' time perspective on school and professional career became less important while perspectives on other domains of life did grow in importance or stayed stable. It seems that student' perspectives on other domains of life interfere with their learning motivation. In the lowest type of secondary education, where the percentage of early school leavers is highest, the decline in students' motivation can be expected to be considerable. Schools in this type of education, pre-vocational education, differ in the extent in which learning is focussed on one vocation. Part of the students made already a choice for a profession. What they learn is more inherent to this profession. This might have consequences for their future time perspectives regarding a school and professional career and consequently for their motivation. We try to explain a decline in motivation (learning behaviour) by the development of students' time perspectives in more and less focussed pre-vocational schools. The participants were about 1500 students in the first and second school year. The first data collection has taken place shortly after the students started the school year (September 2004), the next will take place February and May 2005. Students report on their time perspectives on a school and professional career, social relations and leisure time, their learning behaviour (investment and self-regulation), self-efficacy and well-being in school. Results from the first data collection show indeed that first year students score higher on learning behaviour than second year students, as well as on the short-term time perspective on school.

Symposium
Metacognition

DIAGNOSIS AND SCAFFOLDING OF LEARNING DIFFICULTIES AND THEORIES OF MIND

Chair: Allal Linda, University of Geneva, Switzerland
Organiser: Sodian Beate, University of Munchen, Germany
                Marcel Crahay, University of Geneva, Switzerland
                Perreard Vite Anne, University of Geneva, Switzerland
                Minna M. Hannula, University of Turku, Finland
                Grange Teresa, University of Aosta, Italy
Discussant: Lafontaine Dominique, University of Liege, Belgium

In the contexts of scaffolding, tutor or teacher reacts to learning difficulties of the tutee or the pupil in function of mental categories and/or cognitive schemes, which determine his/her analysis, understanding, and diagnosis of these difficulties. This general hypothesis, formulated on the basis of Bruner's theory of scaffolding, can be considered in combination with studies conducted in the field of cognitive psychology concerning Mind's Theory. Precisely, the topic of the symposium would be the understanding by pupils and by teachers of school and learning difficulties and will be aimed to consider studies related to the following issues:
• How do children, respectively teachers, understand learning and more general school difficulties (especially school failure)?
• How do children explain this psychosocial phenomenon with which a lot of them are confronted?
• How do teachers explain that some pupils can't learn certain pieces of subject matter or can't solve certain problems and, finally, that some of them fail?
At the age when they are enrolled in primary school, it may be supposed that children have developed basic understandings of mental process and cope with the social reality by the mobilization of various psychological concepts. So, it is supposed that they call upon some of these concepts to come to terms with the fact that some of their comrades or themselves are designated as failing and/or having difficulties in learning. Obviously, teachers also have theories of mind. It can be hypothesized that they mobilize these theories when they are faced with problematic pupils and especially when they attribute causes to their difficulties and when they make de-

cisions about pupils. Interacting with very young children, they can be faced with very different ways of thinking and, consequently, with difficulties in the scaffolding process.

Theory of Mind Development in Elementary School Age. Possible Implications for Learning and Teaching
Sodian Beate, Ludwig-Maximilians-Universitat, Germany

Advanced theory of mind development has been characterized in terms of a growing insight into the interpretive and constructive nature of mental activity. Children understand second order belief (Mary thinks that John thinks that …) by the age of 6 to 7 years, and consequently they begin to understand complex speech acts like irony, promises and commitments. While preschoolers conceive of thinking in terms of isolated acts, grade school children begin to understand mental activity in terms of a continuous stream of consciousness that is only partly under conscious control. By the age of 6 or 7 years, children begin to conceive of people in terms of psychological traits and they understand the role of social stereotypes in interpreting people's actions. Similarly, developmental trends in Children's understanding of mental verbs point to a growing insight into the constructive nature of knowledge. This is also reflected in Children's increasing ability to distinguish between epistemic states. To date, there is little research into the importance of theory of mind development for Children's success in school. We propose that the development of an advanced theory of mind helps young elementary school children to adapt to achievements required in school by supporting higher order intention reading and improved self-regulation. Furthermore, trait understanding, as well as an understanding of intelligence and thinking appears to have major implications for the development of the self-concept, and for causal attributions of success and failure. Specific predictions about relations between theory of mind development and the acquisition of domain-specific knowledge   can be made for mathematics and science learning. We review the literature on the acquisition of metaconceptual notions like theory, evidence, and proof, and present empirical evidence indicating that such concepts can successfully be taught in elementary school when curricula explicitly emphasize metacognitive reflection.

How do successful pupils explain the failure of some of their peers
Marcel Crahay, University of Geneva, Switzerland

What are the high-achieving pupils' representations with regard to grade retention

practice and to pupils repeating a grade? An interview-based survey was led with more than 800 pupils of the primary education in Geneva. Interviewers had at their disposal an interview framework, articulated around nine themes (reasons, fairness, effects, parents' reactions, ...) and were required to write down word by word the children's answers. A content analysis was made, proceeding theme by theme. To explain their massive support for the logic of grade repetition, children use a line of argument that draws on principles of learning as well as psychological concepts that are already quite developed. The principle of sequential learning is a well-rooted idea among pupils (schooling education is organized in stages). Hence, they are aware of the importance of prerequisites, of foundations. In this logic, grade repetition appears as a solution within a perspective of retroactive regulation of learning. In the comments of numerous children, grade repetition overcomes shortcomings at the level of prerequisites through the repetition of lessons. Bur some children subordinate the effect of grade repetition to a key condition: the child to whom it is imposed must come to terms with it or accept it. The shock theory comes to the fore again, and by this very fact the affective-motivational dimension of the experience. The frequency of the term understanding in the Children's explanations and, above all, its association with the term learning reveals another strong point of their psychological conceptions: learning means understanding, or, otherwise said, one has to understand in order to learn. Other responses reveal the great sensitivity of children with regard to the affective and social dimensions of grade repetition.

Relations between teachers' beliefs and grade retention
Perreard Vite Anne, University of Geneva, Switzerland

Through different sources of qualitative data, this presentation first explores what general beliefs teachers possess about development when they enter the teaching profession. It then proceeds to deepen this understanding thanks to more thorough interviews with teachers on development and retention. Finally, it brings an illustration of the consequences that can arise when a decision (repeating a grade) is made without sufficient consideration or knowledge of the different dimensions of development. Globally, results indicate that although prospective teachers are ready to accept a developmental perspective, they also maintain certain innate conceptions which could be counterproductive to their students' learning. It also seems that, abiding by the age of their pupils, teachers beliefs vary. For instance, as their pupils grow older, they believe that the necessity of considering cognitive and metacognitive development increases. On the other hand, the importance of conative development decreases with the age of children. Considering the beliefs of teachers

about retention, it seems that teachers who believe in the importance of conative development and work with younger children do not approve of retention as much as teachers who, working with older pupils, consider cognitive and metacognitive development as more important. However, these results are mostly indicative of tendencies and cannot be generalised without a certain amount of contextualisation. Finally, the third research illustrates the fact that an innate point of view often remains when making a decision about retention. Moreover, this nativist point of view does not always produce the expected effect, even given time. Indeed, whereas the reasons for repeating a year seem legitimate to teachers in the first place, in most cases, pupils retain their difficulties and a prognosis for their future is in no way totally positive.

Reasons for failure in Teachers' explanations: A case study
Grange Teresa, University of Aosta, Italy

Based on the results of two studies carried out in Primary Schools in Aosta, we aimed at highlighting significant connections existing among teachers' theories of mind, causal attributions of failure and planning of corrective regulations. The first study is focused on teachers' attributional processes concerning the performances in math of a few of pupils. Dates have been collected both through a structured interview and a Q-sort about valuation, administered to the teachers three times during a school year. It appears that the attribution of causes for success or failure vary according to the status of pupils (brilliant, medium or in difficulty). Retention decisions have principally been taken according to inner stable or instable standards: pupils' maturity, pupils' attitudes towards his schoolwork, psychological state, character. Marks and test scores come in second place as regards the above mentioned factors in the decision making process concerning grade retention. This pattern of responses concerning grade retention reflects a representation of a teacher's role that is more similar to that of a judge than to a professional position about teaching-learning processes and situations. In the second cases study, we have proceeded at the content analysis of about fifty semi-structured interviews of primary teachers. They have been questioned about reasons explaining school failure. More than the frequency of the occurrences, we tried to identify the explicative models and the inner coherence underlying the discourse of the teachers, in order to evaluate the overriding nodes, the stability and the pregnancy of the representations, the criticality of the beliefs systems. The discussion will particularly focused on this issue about the core of the teachers' theories concerning the reasons of their teaching choices for prevention and treatment of school failure, with particular reference to

the option between grade repetition and alternative modalities regarding remedial capacity of students' difficulties.

Difficulties in scaffolding young Children's mathematical thinking
Minna M. Hannula, University of Turku, Finland
Maattinen Aino, University of Turku, Finland
Lehtinen Erno, University of Turku, Finland

In the context of a quasi-experimental study aiming to investigate, whether it is possible to influence 3-year-old Children's tendency to spontaneously focus on numerosity, and thus promote Children's deliberate practice in recognizing and producing small numbers of objects or incidents, qualitative data on adult's and Children's joint processes of numerical focusing in different day-care settings were gathered. The aims of the qualitative study were first to describe how adults can notice, create and promote Children's focusing on numerosity during normal day-care hours, second to localize the difficulties of adults to meet non-numerically focusing Children's intentions and ways of perceiving the tasks and create intersubjectivity, third to reflect these findings on our knowledge on differences in adult's and young Children's number representations and attentional processes. In the presentation, the quantitative results of the study are briefly presented, but the main focus is on describing and demonstrating the specific difficulties of adults in scaffolding some Children's mathematical thinking, especially focusing on numerosity. The results of the quantitative study show an experimental effect on SFON (Children's Spontaneous FOcusing on Numerosity) tendency and subsequent development in cardinality-related skills in the children with some initial SFON tendency unlike the children whose initial SFON tendency was very low. The qualitative study based on interviews and observations provided confirming knowledge on how easily adults can create moments of joint attention on the aspect of number especially with those children, who already have some SFON tendency and counting skills, as well as it showed first evidence on the specific difficulties of adults to scaffold non-numerically focusing Children's mathematical thinking. It appeared that it was especially difficult for the adults to take the perspective of non-numerically focusing children, and create a zone of proximal development for these Children's numerical activities.

Symposium
Mathematics Education

WHICH KIND OF INTERVENTIONS DO YOUNG LOW PERFORMING CHILDREN IN MATHEMATICS NEED?

Chair: Johannes Van Luit, Utrecht University, Netherlands
Organiser: Johannes Van Luit, Utrecht University, Netherlands
Discussant: Jose Navarro, Universidad de Cadiz, Spain

The main theme of this symposium 'Which kind of interventions do young low performing children in mathematics need?' (chair: Van Luit, Utrecht University, The Netherlands; discussant: Navarro, Universidad de Cadiz, Spain) concerns the difficulties in mathematics learning of young children in regular and special education. The paper 'Number sense of young children with special educational needs' (Aunio, Sajaniemi, Hautam?ki & Van Luit, University of Helsinki, Finland) shows that se-needs children have significantly lower number sense than their normal developing peers, and children with language deficit encounter most of the problems. The paper 'Individual differences in young Children's mathematics' (Kroesbergen & Van Luit, Utrecht University, The Netherlands) shows the relationship between early mathematics learning difficulties and working memory functions. The study is meant to provide better starting points for interventions with children at risk for math learning disabilities. The paper 'Low-achieving children in mathematics in the context of the English National Numeracy Project' (Aubrey, Godfrey & Dahl, University of Warwick, United Kingdom) shows that without active intervention, it is likely that children with little mathematical knowledge at the beginning of formal schooling will remain low achievers throughout their primary years up to grade 4. The paper 'Strategy competencies across different levels of math achievement: Instruction favouring strategy flexibility' (Torbeyns, Verschaffel, & Ghesqui?re, Catholic University of Leuven/FWO Flanders, Belgium) shows that children's strategy characteristics in domain specific choice and no-choice conditions indicate that high-, average-, and low-achieving children applied both the decomposition-to-10 and the tie strategy on sums over 10, but do not apply them with the same frequency and efficiency. In the symposium discussion a reflection will be given on the question which aspects in specific math domains and cognitive function are relevant for specific instruction to young low performing children in mathematics.

Number sense of young children with special educational needs
Pirjo Aunio, University of Helsinki, Finland
Nina Sajaniemi, University of Helsinki, Finland
Jarkko Hautamaki, University of Helsinki, Finland
Johannes Van Luit, Utrecht University, Netherlands

This study examined the number sense of 257 children with different special educational needs (i.e. attention deficit disorder, language deficit, delayed school start, multi-language background). The matched comparison group of children with no diagnosed special educational needs (N=254) was taken from the norm sample of the Finnish Early Numeracy Test. The children were aged between three and ten years. Two highly correlated aspects of number sense were measured with Early Numeracy Test, one reflecting the Children's ability to organize and compare quantities (i.e. relational skills), the other pertaining to their ability to operate with number-word sequences (i.e., counting skills). In the small scale follow-up study the development of mathematics skills in children with multi-language background (N=14) were studied in the last year of preschool and in the first grade of primary school. The results showed that the special educational needs children had a significantly lower number sense than their normally developing peers, and that the children with language deficit encountered most of the problems. The subjects with a multi-language background had a different number-sense profile than the other special educational needs children. No gender differences were found among the special educational needs children. The follow-up study revealed that the children with multi-language background continued to have problems in their mathematics learning in the first grade of primary school. Young children with special educational needs clearly require support in their number sense development already before the beginning of the Finnish compulsory education in the age of seven years. The children with multi-language background seem to need a different educational approach than other special educational needs children in this study.

Individual differences in young children's mathematics
Evelyn Kroesbergen, Utrecht University, Netherlands
Johannes Van Luit, Utrecht University, Netherlands

In this paper, the results of a study on the relationship between early mathematics and working memory functions are presented. The hypothesis is tested that each of the three components of the working memory, the central executive controlling system, the phonological component, and the visuo-spatial component, influences

specific math processes. The phonological component is considered to be needed for the representation and articulation of number words during the counting process. The visuo-spatial component is involved when problems are presented with visuospatial materials, or when children need some concrete (visual) items to support their counting. It is also used to temporarily store visuospatial information, e.g. about mathematical tasks, or to store verbally or numerically presented information using a visual code. Executive functions are necessary for keeping track of the counting process and sequencing the multiple steps involved in problem-solving. To test these hypotheses, different cognitive and math tests will be administered to a group of 200 Dutch children (data will be available at the time of the conference). It is studied how cognitive functions can explain individual differences in Children's math performance. The role of the distinct working memory functions in the different aspects of math development will be explored in detail in in-depth studies. Based on pilot studies, we expect planning, inhibition, and working memory capacity to be important predictors. Implications for instruction will be discussed also.

Low-achieving children in mathematics in the context of the English National Numeracy Project
Carol Aubrey, University of Warwick, United Kingdom
Ray Godfrey, Canterbury Christ Church University, United Kingdom
Sarah Dahl, University of Warwick, United Kingdom

This study took place at a time marked by swift, top-down implementation of English education policy change. The introduction of a National Numeracy Strategy (DfEE, 1999) alongside a raft of other initiatives, although stimulated by a genuine desire to improve numeracy standards, might not have had the desired effect (Aubrey and Dahl, 2004). This paper focuses on a cohort of 300 English pupils who have been tracked through primary school during the first five years of the new National Numeracy Strategy. This began as a limited longitudinal study (Van de Rijt et al., 2003) of young Children's early mathematical development, initially within three testing cycles: at the mid-point and towards the end of their reception year (at five years-of-age) and again at the midpoint of Year 1 (at six years-of-age). Results showed that children who brought into school early mathematical knowledge did appear to be advantaged in terms of their mathematical progress through primary school. Numerical attainment increased in importance across the primary years and practical problem solving remained an important element of this. In general, there appeared to be some consistency in Children's performance in mathematics. Children were making some real progress through time in terms of mathemati-

cal development but slower progress during the early years seemed unlikely to be compensated for by faster progress later on. Moreover, children making almost no progress up to seven years and classified at age eleven as 'N' were distinguished less by low initial scores, than by their swift decline during the earliest years of schooling. Without active intervention, it is likely that children with little mathematical knowledge at the beginning of formal schooling will remain low achievers throughout their primary years an, probably, beyond. The implications of this in the current context are considered

Strategy competencies across different levels of math achievement: Instruction favouring strategy flexibility
Joke Torbeyns, Catholic University of Leuven, Belgium
Lieven Verschaffel, Catholic University of Leuven, Belgium
Pol Ghesquire, Catholic University of Leuven, Belgium

The study of Torbeyns, Verschaffel and Ghesquiere investigated the fluency with which first-graders of different mathematical achievement levels applied multiple school-taught strategies for finding sums over 10. Children's strategies were characterised with the four parameters of Lemaire and Siegler's (1995) model of strategy change, namely strategy repertoire, distribution, efficiency, and selection. To gather unbiased data about strategy efficiency and selection, we used the choice/no-choice method (Siegler & Lemaire, 1997). Eighty-three first-graders who had been taught both the decomposition-to-10 and tie strategy on near-ties over 10 (e.g., 8 + 7 = .), solved a series of sums over 10 in one choice and three no-choice conditions. In the choice condition, children could choose between the decomposition-to-10 and tie strategy on each sum. In the three no-choice conditions, they had to solve all sums with, respectively, the decomposition-to-10, tie, and retrieval strategy. Our results revealed that children of all achievement levels applied both the decomposition-to-10 and the tie strategy on near-ties over 10. But high achievers used the flexible tie strategy more frequently than their lower-achieving peers. Furthermore, they executed both the decomposition-to-10 and the tie strategy more efficiently than their lower-achieving peers. High achievers had also memorised the correct answer to a larger number of sums up to 10 and sums over 10 than low achievers. Surprisingly, we found no group differences in strategy adaptiveness: children of all achievement levels took into account strategy efficiency characteristics during the strategy choice process. From a theoretical viewpoint, this study enriched our understanding of children's calculation strategies on simple additions. From a methodological viewpoint, it documents the usefulness of the choice/no-choice method to study

children's strategy characteristics in the domain of simple arithmetic.

I 17   25 August 2005   14:30 - 16:30   Room E103

Interactive Poster
Higher Education

THE IMPACT AND SUCCESS FACTORS OF STAFF DEVELOPMENT AC-TIVITIES FOR UNIVERSITY TEACHERS

Chair: Peter Van Petegem, University of Antwerp, Belgium
Organiser: David Gijbels, University of Antwerp, Belgium
                Serge Hubers, University of Antwerp, Belgium
                Gert Vanthournout, University of Antwerp, Belgium
Discussant: Angela Ho, Hong Kong Polytechnic University, Hong Kong
                Lynn McAlpine, McGill University, Canada

The lack of systematic program evaluation and research going beyond the use of 'happiness-sheets' is an ongoing concern in staff development (Rust, 1998; Wilson & Berne, 1999). This symposium is aimed at contributing to an understanding of the impact and success factors of staff development activities for university teachers, taking these concerns seriously. The symposium brings together an international group of researchers and practitioners who are investigating the topic from different perspectives. The first perspective taken in the symposium is the participants' perception of the way in which programs have influenced their individual teaching practice. The symposium aims a better understanding of the impact during the training program, shortly after the program and on the long term . The second perspective is the institutional impact of university teacher training programs, in terms of engagement for teaching at the institutional level. Third, the symposium will explore the perceived success factors of teacher training programs for university teachers from both the points of view of the participants and the staff developers. Each paper in the symposium explores the perspectives in a specific way. The paper by Lotriet and Volschenk investigates which aspects of a teacher training program appear to have filtered through to participants' thinking and practice as well as which factors are perceived to be the success factors that facilitated this outcome. Stes and Clement study both the long term individual and institutional impact of a faculty training program for novice university teachers. Vizcarro and colleagues address the potential success factors of a staff-development program by reporting on

the development and implementation of an evaluation scheme for a teacher training program involving. Finally, De Rijdt and colleagues discuss the use and effects of teacher portfolios as an integral part of staff development from the (potential) participants' point of view.

The power of process

Marena Lotriet, University of Pretoria, South Africa
Volschenk Gail, University of Pretoria, South Africa

This paper explores the critical factors that contribute to the success of an Education Induction Program at the University of Pretoria (South Africa). In an attempt to address the enormous task of staff development in higher education to change lecturers' teaching and learning conceptions and ultimately their practice, the Education Induction Program for new lecturers at the University of Pretoria was designed, planned and implemented in a way that consciously avoid it focusing on the linear transfer of isolated teaching skills. One of the most prominent features of the initial four and a half day introductory course is the two dimensional design focusing on both content and process. In addition to this introductory course a variety of follow-up opportunities form part of the program. The program has been presented 8 times and continuous action research is conducted. The following questions guide the research: What aspects of the program appear to have filtered through to participants' thinking and practice? What do participants perceive to be the success factors that facilitated this outcome? A set of systematically gathered, organised, thoroughly scrutinised and triangulated qualitative data (including questionnaires, observations and interviews) was used to answer the questions. It is evident from the data that concepts central to the program (such as deep and active student learning) have influenced lecturers' thinking about teaching and learning and have filtered through to their practice. It can be derived from the various sets of feedback that the processes underlying the program are key to the perceived success. These processes form the core of the findings and are discussed in detail. The findings do not only contribute significantly to the continuous development of the Induction Program at the University of Pretoria but also to the body of staff development theory in general.

The effectiveness of a faculty training program: Long term and institutional impact

Ann Stes, University of Antwerp, Belgium
Mieke Clement, University of Leuven, Belgium

Long term influences of educational development initiatives for novice faculty members are not often studied in a systematic way. In this study the long term individual (in terms of teaching behaviour and instructional beliefs) and institutional (in terms of engagement for teaching at the organisational level) impact of a novice faculty training program at the University of Antwerp (Belgium) was evaluated, using a written survey with open questions. All participants of the two training programs run in the academic year 1999-2000 and 2000-2001 (n=30) received a survey. 14 respondents (47%) provided their answers. The data were analysed first 'vertically' in order to fully 'understand' the comments of each respondent. In a second step a horizontal analysis was made, comparing the results among the participants, to check whether common scenarios could be discerned. The results revealed that one year after finishing the program the respondents still referred to the program to explain for changes in their daily teaching practice. Although the strengths of behavioural changes coincides with the extensiveness of change in instructional beliefs, no firm relationship could be established between the institutional impact and the strength of the individual impact. The data suggest that the long term impact of the program depends mainly on contextual elements, such as collaboration with colleagues and the number and attitudes of the students. The paper discusses the (methodological) shortcomings of this exploratory study as well as the implications of the results for the design of future novice faculty training programs.

A pilot program to train university teachers for the European harmonization process.

Carmen Vizcarro, Autonomous University of Madrid, Spain, Spain
M. Benito, University of the Basque Pays, Spain
F. Blanco, University of Zaragoza, Spain
M. Esteban, University of Murcia, Spain
A. Fernandez, Politechnic University of Valencia, Spain
V. Guijo, University of Burgos, Spain
C. Naval, Autonomous University of Madrid, Spain, Spain
C. Yaniz, University of Deusto, Spain

An educational development program addressed to university teachers to help them

face the demands of the European harmonization process is described. This process introduces different innovative concepts which taken together may be overwhelming for participants if a special effort is not made to highlight their consistent nature. In order to help them cope with the different concepts the design centers on a specific active learning method, namely Problem Based Learning (PBL) through which other innovative concepts such as cooperative learning, alternative assessment or teachers' team work are introduced as needed. This is a blended (face to face and distance) program which includes different universities. The project aimed to explore which training components are considered as basic by all participants and are recognised by different universities. For this purpose an evaluation scheme was developed and implemented. In this paper the development and implementation of the evaluation scheme is discussed. It is hoped that the project will finally generate the needed knowledge on the ways to reach the best quality of blended training programs, as current trends advice. Participants in this projects were professionals responsible of teacher training in several universities. Results of the participants' discussions, describing their experience, highlighting potentialities of the project and drawbacks to date are presented. These features offer some advantages to reach significant conclusions on the best conditions these programs need to show to reach the best outcomes. Special attention will also be given to the assessment of the training needs of the participants as well as to the scheme developed to evaluate the outcomes of this development effort.

Teaching portfolios in higher education and their effects: An explorative study
Catherine De Rijdt, University ofMaastricht, Netherlands
Eva Tiquet, Christelijk Onderwijzersverbond Brussel, Belgium
Filip Dochy, University of Leuven, Belgium
Maurice Devolder, Open University, The Netherlands, Belgium

Research on teaching portfolios in higher education shows that such portfolios are beneficial for teachers, students and educational institutions. Developing a teaching portfolio can serve several goals such as stimulating reflection, assessment and consciousness-raising. In each case, educational improvement is seen as the overall goal.
In this empirical study we investigate, by means of a survey (N=117) whether teaching portfolios are used in higher education, and if so, which effects they bring about. Furthermore, the attitude of teachers towards the use of teaching portfolios is examined, in the same way.
For the analysis of the quantitative data we used descriptive statistics, T-tests,

ANOVA and the Bonferroni method.

The answers to the open questions were analysed in a qualitative way. We analyzed the content of the answers and deduced some categories. Answers were classified according to these categories.

The study shows that currently not very many teachers are using teaching portfolios. When used, a teaching portfolio is an instrument that can bring about some important positive effects. Respondents report that, due to the use of portfolios, they were stimulated to: reflect on their own teaching, actualise the learning content, improve their course materials, search for alternative educational methods, etc. When teachers are using teaching portfolios it is important that, besides any negative effects, they also experience positive effects. If this is not the case, teachers will see the teaching portfolio only as an extra administrative inconvenience.

I 18   25 August 2005   14:30 - 16:30   Room A108

Interactive Poster
Social Aspects of Learning

EFFECTIVE LEARNING ENVIRONMENTS: SOLVING OF REAL LIFE PROBLEMS AND MOTIVATION

Chair: Valentina Lea Lavrik, Jerusalem College, Israel
Organiser: Jozef Feigenberg, Jerusalem Interdisciplinary Seminar, Israel
Discussant: Peter Roedler, Koblenz-Landau University, Germany
                   Mark Perel'man, The Hebrew University of Jerusalem, Israel

The main purpose of teaching is to prepare the student not only for exams, but also for real life, in which every person has to resolve problem situations. Under problem solving we understand the ability of making decisions on actions which will help to reach the goal in problem situations. Therefore it is not enough to give to the student the necessary knowledge, but an active training in diverse problem solving is unavoidable. Only in such a way the student becomes capable of solving a wide range of different problems. That's why problem solving shouldn't be a means of knowledge memorizing but the acquired knowledge has to serve the purpose of active diverse problem solving.

What kind of problems can satisfy such purpose at different stages of teaching? The traditionally used problems don't serve this purpose. Their variety and character should be significantly extended and even changed. Our symposium will discuss

these questions.

Problem solving in learning as a model of real life
Jozef Feigenberg, Jerusalem Interdisciplinary Seminar, Israel
Valentina Lea Lavrik, Jerusalem College and Lifshitz Academic College, Israel
Tatiana Olevsky, The Hebrew University of Jerusalem, Israel
Henrietta Granik, Institute of Psychology of Russian Education' Acad, Russia (Moscow)

Every person has to solve professional and routine problems on a daily basis. Problem solving is a purpose-oriented decision making, made in a given situation. This is what learning process has to prepare the students to. Problem solving should occupy a very important place in the teaching process. This presentation focuses on those particularities of life problems that make them different from traditional school tasks. The learning process should include tasks of following types:
1. Tasks with lack of data, which is crucial for answering the question. The student should search actively for the needed information.
2. Vaguely formulated tasks. The student has to reformulate the task, clarify what exactly is his/her purpose, and what is the cost of solving it.
3. Tasks with surplus data. The student has to choose only those data that are necessary to solve the problem.
4. Tasks with contradicting data. Solving them, the student has to decide which data source is more credible, and prove that the choice was right.
5. Tasks that have only a probabilistic solution. The student has to understand that there are tasks that don't have the only one right solution in principle.
6. Tasks with a strict time limit solving.
7. Tasks that demand the usage of some operations or objects in an unusual function.
8. Tasks on finding a mistake in an already given answer.
9. Chains of pseudo-similar tasks. A mistake can be a result of the psychological trap of the previous tasks that only seem to be of the same nature. Examples of tasks for primary, elementary, and high school will be given in this presentation.

Historical experiment as a case of physics problem solving
Nahum Kipnis, The Bakken: A Library and Museum of Electricity, United States

A standard physics problem provides students with an artificial situation, which is fully described in terms of physical concepts and laws. For instance, 'find the dis-

tance a car travels in 3 sec with acceleration 2 m/sec2 Or, ''find the angle of refraction for a ray falling at the angle of 40? at a glass plate with an index of refraction 1.5. In a real-life situation we don't know whether the car moves with a constant acceleration. Moreover, we don't have an idea what a ray is and how to measure its angle of incidence. The standard problems teach students merely how to use equations, if they want to learn to solve real-life problems, they have to do experiments. While experimenting, students use a sequence of actions reverse to that in solving pen-and-paper problems. For instance, a practically important assignment would be to measure an index of refraction of a glass plate. We start by looking through a plate at a pin and marking the position of its image by another pin. We assume that incident rays are straight line coming from a point object, while refracted rays are those entering its image. After tracing on paper these lines one can measure the angles and calculate the index of refraction of glass. Replicating historical experiments provides additional benefits, such as knowledge of their results (for teachers): and an excitement of a participation in a scientific discovery (for students). This paper provides examples of historical experiments from optics and acoustics, which not only teach basics of investigative experimentation but also give an insight into such areas as precision of quantitative results and persuasive power of qualitative ones.

Teaching of mathematical problem solving in elementary school using gameplaying methods and techniques
Lilia Bogracheva, Jerusalem Municipal School, Israel

When teaching mathematics in elementary school, we as teachers are often faced with pupils who have no desire to learn the subject. The reason is not that they do not understand the subject, but that they are bored and not interested in learning about abstract mathematical principles, which they find too difficult to grasp and often cannot relate to. Children are motivated by game-playing, in which they compete with their friends with the aim of winning. Game-playing enhances a child's motivation and emotionally grabs him. My lessons are built around a series of games, initially games that I designed and ultimately games developed by the pupils themselves based on what they have learned. I have constructed these games in such way that the pupil does not realize that he /she is learning and absorbing new abstract mathematical principles. All that the child realizes is that he is playing a game with a chance to win. The games are built on previously learnt material in which the pupils have already mastered certain mathematical concepts and executed the necessary mathematical operations. These games aid the child, where

the pupil easily overcomes the difficulties of mathematical material. After pupils leave my classes, I follow their progress throughout their schooling. My pupils tell me that they enjoy learning mathematics and that they continue to use the skills and methods that I taught them in their early school years and that they have achieved a higher level of mathematical achievement as a result. In my presentation at the conference, I will provide detailed examples of how I teach, illustrating the seven points that I outlined earlier. These examples will include work cards, the course materials that I use and examples of my pupils' work.

Problems as a manual for development of keenness' of searching
Mark Perel'man, Racah Institute of Physics,The Hebrew University o, Israel

The major feature of development of creative personality represents a preservation at the period of teenager's growing the ability to permanently asking: «Why it so?», peculiar to babies. Such keenness of searching of sense can lead, as against simple inquisitiveness, to revealing internal connection between, apparently, far enough phenomena, to opening unexpected connections and to occurrence of non-evident associations. With this purpose the series of problems and the questions are designed, mainly, for teenagers of years with 12-13, i.e. for that age in which bases of style of thinking and scale of relative intellectual preferences must be formed. These questions should induce the teenager to conceive about things and phenomena, which seem familiar, but frequently were non-understood, and to search for connections between them. The questions are, whenever is possible, independent, they do not demand knowledge or use of mathematics, but, for some systematization, are united in series or in such sections: physics on kitchen, in a life, in street, in stadium, on beach, at concert, in military science, in construction, in flights, etc. The searches of answers to the questions can promote development of psychological installation on searches of true sense and new sides in the well known and familiar objects. On the other hand, they should stimulate interests of teenager to science that more and more diminishes at schools, and to show the interrelation of different sciences and of knowledge received in them. Such knowledge would seem sketchy, but at the further regular studying o f separate sciences they can be manifested in consciousness and automatically joined to the general system.

Synergetics in Cognition and Learning
Galyna   Nosovytska, Donetsk Scientific Technology Company of the Ukrai, Ukraine
Yakiv Beygelzimer, Donetsk Physical &Technical Institute named after, Ukraine

1.Synergetics is a general theory of self-organization in open complex systems. Its main thesis says that an open complex system consisting of a large number of interacting elements can undergo a spontaneous self-organization caused by a collective behavior of its elements. Self-organization is typically marked with emergent behavior.

2. The process of cognition and learning occur via self-organization in the system of concepts and ideas (referred to as C1). Here models (or hypotheses) serve as order parameters of the system. Self-organization of C1 leads to emergent structures – new ideas, images, concepts. A number of hypotheses may be considered, but only those that correspond to current self-structures of C1 will sustain causing self-organization. Others will lead to temporary, frail structures.

New emergent phenomena occur due to the pattern of interactions between the elements of a system over time. The addition of emergent concepts leads to new stages of self-organization and new emergent structures. This captures the process of self-development of C1, enriched by external information. This process represents learning.

3. Self-organization can involve different subsystems of system C1. Depending on the complexity of the subsystem, emergent concepts are of different significance. Fundamental concepts – paradigms, represent self-structures of large subsystems and organize large amounts of knowledge.

4. Principles of synergetics (see 1) imply that learning process (self-organization) is possible only if the information flow is appropriately structured and sufficiently intense. This seemingly trivial fact allows us to make useful conclusions. For example, by increasing the intensity of information flow one can cause a qualitatively new level of learning. This is evidenced by the effectiveness of techniques for learning foreign languages based solely on the intensity of information flow (submergence into the language).

I 19   25 August 2005   14:30 - 16:30   Room E104

SIG Invited Symposium
Learning and Cognitive Science: Phenomenography and Variation Theory

CONTRASTING DIFFERENT PERSPECTIVES ON THE OBJECT OF LEARNERS' ATTENTION

Chair: Jonas Emanuelsson, Gothenburg University, Sweden
                Ming-Fai PANG, University of Hong Kong, Hong Kong
Organiser: Jonas Emanuelsson, Gothenburg University, Sweden
                Ming-Fai PANG, University of Hong Kong, Hong Kong
Discussant: Yrjo Engestrom, University of Helsinki, Finland

In this symposium we will present and contrast different perspectives on learners' attentional processes. All authors will focus on learners' experience, noticing, attention, discernment or understanding of phenomena and objects, but they will each examine the issue from different points of departure. Ference Marton and Ming-Fai Pang will illustrate a theory of learning, i.e. the variation theory, in their study, in which what is necessary and what is a contingent in learning are separated. They argue that in order for the learners to master a specific object of learning, it is necessary to enable them to experience a particular pattern of variation and invariance so that they can attend to and discern the critical aspects of the object of learning. Joanne Lobato contends that traditional transfer approaches need to advance from interpretative frameworks to theory development and suggests attention-focusing as an alternative model of transfer. In her study, differences in the nature of students' generalizations are found to be related to differences in focusing phenomena across two different instructional environments. Also, Taylor Martin argues for a focus on learners' attention. In so doing she used the concept of noticing as a means to explain the outcome of experimental studies in which students notice more of the mathematically relevant features of the situation in their notations. She concludes that noticing is learned and that noticing develops as an interactive process. Finally, in the context of studying mathematics textbooks, John Mason and Anne Watson use the framework of variation in examining how and whether learners' attention can be directed by carefully chosen examples and exercises. By scrutinizing dimensions of variation and invariance as expressing the structures of mathematics and considering where the attention of the learners might be focused, they explain the learning difficulties as experienced by the learners.

Mathematical exercises: what is exercised, what is attended to, and how does the structure of the exercises influence these?

John Mason, The Open University, United Kingdom
Anne Watson, University of Oxford, United Kingdom

Mathematics is most frequently taught through example and exercises. Learners are supposed to perceive generality in the examples and to achieve understanding, fluency and accuracy through the exercises. However, what generalities are perceived depend on where the learners' attention is, which may not be on the same features as the teacher's or the author's. Similarly, if any understanding results from doing exercises, the nature of that understanding may not be what the textbook author intends. By looking closely at dimensions of variation, ranges of permissible change, and invariance as expressing the structures of mathematics, and considering where the attention of the learner might be focused, we can explain many of the difficulties experienced by learners. We can also consider how and whether such attention can be directed by carefully chosen examples and exercises. In our view, the relationship between variation and invariance is often delicate and finely-balanced: too much variation obscures that variation, while too little produces tedium; sometimes attention is drawn to what is varying, and sometimes to what is invariant. We illustrate this with analysis of some lesson plans and excerpts from a number of textbooks.

On some necessary conditions of learning

Ference Marton, Gothenburg University, Sweden
Ming-Fai PANG, University of Hong Kong, Hong Kong

Previous discussion on design experiments underlined the importance of theory for enabling the researcher to distinguish between what is necessary and what is contingent. The effects of two groups of teachers' teaching on student learning are compared in this study. One group made use of the variation theory of learning which enabled not only the researchers but also the teachers to make the above distinction. The other group had no knowledge of the theory at all. The differences in what happened in the classroom, both between the groups and within them, were interpreted by means of the same variation theory that was used by one of the groups for planning and carrying out the teaching. The differences in what the students learned from three consecutive lessons in Economics were striking, and these differences were closely related to the differences in what happened in the classroom.

Noticing in symbolic and physical contexts
Taylor Martin, University of Texas, United States

A challenge for using realistic problem contexts is helping students notice important contextual features. Gibson and Gibson (1955) suggest that people learn to notice. Experts discern more than novices in the same situations. This insight suggests examining structured classroom experiences that could promote the development of noticing. This paper examines the effects of experiences designed to develop noticing in symbolic and physical contexts.

Fifty-four college undergraduates noticing were examined when they solved a series of complex problems in challenge-based instruction. Students began each challenge by generating ideas about problem solutions and further knowledge needed. This activity provides an index of a student's perception of the important elements in the problem. Students noticed more of the important elements of the problems over time. For each challenge, students followed a cycle of generating products, receiving feedback and resources, and revising. This iterative cycle have developed their ability to notice in new contexts.

Noticing is also difficult in physical contexts. One approach that has potential to improve students' mathematically relevant noticing in physical contexts is to use contrasting cases. I examined this method in a study in which twenty-nine fourth graders invented numerical characterizations that captured the difference between physical representations of fractional amounts. Students engaged in cycles of inventing and receiving feedback. Their invented notations were a measure of noticing. Over time, students included more of features of the situation in their notations. The iterative cycles may have caused students' improvements.These results suggest two conclusions. One is that noticing is learned – these students improved at it. The other is that noticing develops in an interactive process. Repeated opportunities to generate ideas, receive feedback, and revise can lead students to notice more important elements in novel problem situations in both physical and symbolic contexts.

Attention-focusing and the transfer of learning
Joanne Lobato, San Diego State University, United States

Several alternative models of transfer have emerged in response to critiques of the classical transfer approach. As these emergent perspectives mature, they need to move from interpretative frameworks to the development of theory including transfer mechanisms. In the classical approach, transfer mechanisms are typically conceived as identical elements, either common physical features of the environment

or overlapping abstract symbolic mental representations. One possible mechanism in alternative models of transfer is that of attention-focusing. One way to link features of instructional environments with transfer is through the construct of focusing phenomena (Lobato & Ellis, 2002; Lobato, Ellis, & Mu?oz, 2003). Focusing phenomena are observable features of the instructional environment (including aspects of teachers' actions, artifacts, curriculum, and students' actions) that regularly direct students' attention toward certain (mathematical) properties when multiple properties are competing for students' attention. Focusing phenomena influence what students attend to mathematically which, in turn affects how students generalize their learning experiences. This paper compares the focusing phenomena and related student generalizations across two instructional environments: a high school classroom and a teaching experiment involving a subset of students from the classroom. In both cases, the instruction addressed the same mathematical topic of rates of change. The main point of the paper is to show how differences in the nature of students' generalizations are related to differences in focusing phenomena. The study is grounded in the actor-oriented transfer perspective (Lobato, 2003). In this approach, transfer is defined as the personal creation of relations of similarity. Taking an actor-oriented approach often reveals idiosyncratic ways in which individual learners generalize their learning experiences. At first these idiosyncratic forms of transfer may seem random. However, the work on focusing phenomena is demonstrating a basis by which the nature of actor-oriented transfer is constrained.

I 20   25 August 2005   14:30 - 16:30   Room E010

SIG Invited Symposium
Teaching and Teacher Education

DEMONSTRATING ACCOUNTABILITY THROUGH OUR SELF-STUDY PRACTICES AS TEACHER EDUCATORS

Chair: Jean McNiff, University of Limerick, Ireland
Organiser: Jean McNiff, University of Limerick, Ireland
                Michal Zellermayer, Levinsky College of Education, Israel
Discussant: Christopher Clark, University of Delaware, United States
                Chrystalla Mouza, University of Delaware, United States

This symposium aims to explain how our self-studies enable us as teacher educators to demonstrate our accountability in supporting teachers' professional learning

as we seek to improve students' learning. We, teacher educators in Ireland, the UK and in Israel, address these issues by making explicit the processes we engage in as we test our claims to know our practices, including the explication of our standards of practice and judgement, and we invite critical responses to our work. We address the conference themes by integrating the perspectives of ourselves and others in the creation of learning environments that encourage the originality and critical engagement of participants, in relation to our work contexts and in relation to this presentation, which we use as an opportunity to validate our theories of practice, in order to continue to develop them with confidence. Extending the work of Loughran et al. (2004), the symposium represents a range of approaches to self-study, which show the lived reality of teacher educators exercising their critical judgement as they study their practice, thus reconceptualising professional learning as the capacity to make critically engaged judgements (Coulter and Wiens 2002) within a community of praxis (Groome 1998) through the development of accounts that constitute personal living theories of practice (Whitehead 1989). The educational significance of the symposium is in its integrated attempt to demonstrate the transformation of teacher educators' ontological commitments into their living standards of judgement (Whitehead 2004), as they offer their accounts within a new scholarship approach to teaching and learning. By showing how the presentation itself can act as a context for the testing of educational knowledge, the presenters aim to explain how they live their values of professional accountability in their practice. This accountability will include an analysis of educational influence in students' learning.

Supporting teacher learning through use of a collaborative online learning environment
Margaret Farren, Dublin City University, Ireland

This paper explores the growth of my educational knowledge, as a higher education educator, as I develop my pedagogy of the unique and co-create a curriculum in collaboration with practitioners on an award-bearing programme in Computer Applications for Education and Information and Communications Technology (ICT) in Education and Training Management at Dublin City University, Ireland. The paper examines how the growth of one's own educational knowledge occurs in relationship to the development of the knowledge base of other people, and how this process can be shared through use of ICT. I have clarified the meaning of my values in the course of their emergence in my practice of enquiry. The ontological values, which I have clarified, have become stabilised and have become epistemological standards of judgement. One of my stable standards of judgement, the

'web of betweenness' (O' Donoghue, 2004) respects the unique constellation of values that I, and practitioners, can contribute to a knowledge base of practice. It has been generated and sustained through a spirit of community, which values each human being. The 'web of betweenness' is a metaphor that conveys that we learn in relation to one another and it also relates to how we make use of ICT to bring this about. This reflects my belief that education is dialogic in nature. Whitehead (2004) claims that a new epistemology for a new scholarship may come from the process of creating living standards of judgement from the embodied values of humanity we express in our educational practices. In this stepping forward new living standards of judgement emerge for a particular group of practitioner-researchers, who have undertaken to research collaboratively into their individual enquiries.

Pedagogy, theory of mind, and educative influence: how do I contribute to the education of sustainable social formations?
Jean McNiff, University of Limerick, Ireland

The question 'How do I account for my pedagogical practices as I try to exercise my educative influence?' is addressed in this paper, as I explain how my pedagogies in supporting doctoral studies are grounded in a commitment to individuals' capacity to exercise creativity and critical engagement as we seek to influence the quality of our students' learning. I explain how this commitment, which is commensurate with the institutional criteria for judging doctoral theses, is informed by a theory of mind, a concept that denotes a person's capacity to understand the other's perspective. A theory of mind incorporates theoretical perspectives to do with the transformational nature of learning and the generative potential of individuals to inform the education of sustainable social formations. Using a self-study action research methodology, I explain how I generate evidence from my own and others' accounts of practice that shows how my developing pedagogies are the realisation of my educational values, and how these values come to act as the living standards I use to judge my practice. I show how my educative influence enables others to develop new forms of professional development through their local communities of practice, with the generative potential to influence wider groupings, and how these efforts represent a transformation of the underpinning ontological commitments with educational intent. I explain how I am integrating multiple perspectives into my work and encouraging others to do the same. I am using this presentation to test my claim that an emergent culture of enquiry is transforming into a collective commitment to transforming professional education through the realisation of its underpinning epistemological base, which carries implications for the development

of a scholarship of educational enquiry as the basis for new institutional pedagogies that may contribute to wider educational understanding.

Accounting for ourselves as we develop a new scholarship of educational enquiry in our college
Rosie Penny, St Mary's University College, London, United Kingdom

In this paper we explain how we are holding ourselves accountable for our educational practices as a group of ten faculty members in a London teacher training college who are working to raise our research capacity for the benefit of ourselves and the teachers we support, and to meet the legislative criteria involved for our College to achieve taught degree-awarding powers. Because we locate our work within the new scholarship of teaching, we regard the study of our practice as our research. By undertaking our self-study action enquiries we show how we are both influencing professional learning for improving practices, and also developing a research culture in our College. We aim to test the validity of our claims to knowledge by submitting them to public critique in this conference forum. We explain that these innovations involve developing new perspectives about the nature of our work and an acceptance of responsibility for our influence. We hold ourselves accountable for the production of authenticated evidence in support of our claims to knowledge as we ask, 'How do I/we improve my/our work?' We also explain how we are re-conceptualising ourselves as a community of enquiry, and the considerable implications this may have for redefining what counts as institutional forms of teaching and learning practice. We believe that the educational significance of our work lies in our capacity to clarify the processes we engage in as we explicate the meanings of our lives in educational relation with others. We believe that we are building new professional relationships through our emergent community of enquiry, which have considerable implications for reconceptualising educational enquiry both as a living educational form of theory and also as a process by which a community of enquiry is formed and sustained.

Supporting teachers' communities of inquiry through second order research
Michal Zellermayer, Levinsky College of Education, Israel

In this paper I explore my work in co-constructing communities of inquiry for pre- and inservice teachers and their clinical supervisors, participants of a partnership between the elementary school program in our college and cooperating schools. In each of these groups, the participants engage in some kind of an innovative

practice, document that practice, and on the basis of the documentation, negotiate their practice with their colleagues, student teachers or supervisors. They talk about what seems to be happening at different points in that text, select excerpts of the text, and incorporate them in written research reports and public presentations. In parallel, I demonstrate my accountability to this process by conducting second-order action research. In my study I document the teachers' inquiry process in order to render it more visible to me, to them and to others in the educational community and situate my analysis in a theoretical framework that helps theorize our practices, relationships and professional identities. My main source of data normally consists of transcribed audiotapes of the teachers' describing, interpreting and theorizing the evidence they produced for their innovative practices. I also conduct one to one open-ended interviews with the participants and dialogue journal writing with them. On the basis of these I attempt to construct thick descriptions of teachers' discursive learning. In these descriptions I pay particular attention to the tensions that arose from the dissonance they felt between the traditional ways of learning and teaching in which they have been socialized and the experience of collaborative inquiry. The purposes of this presentation are a) to explore my understanding of accountability as manifested in second-order research, b) to present two examples of such studies, and c) to explain the usefulness of sociocultural activity theory for the of teachers' collaborative inquiry.

I 21   25 August 2005   14:30 - 16:30   Room A018

EARLI Invited Symposium
Learning Environments

AFFECTIVE ASPECTS OF EFFECTIVE LEARNING ENVIRONMENTS
Chair: Reinhard Pekrun, University of Munich, Germany
Organiser: Reinhard Pekrun, University of Munich, Germany
Discussant: Simone Volet, Murdoch University, Australia

Learning environments shape students' development by a number of mechanisms, including both cognitive and affective pathways. Among these different processes, students' emotions received less attention than others. Notable exceptions were studies on test anxiety, and on attributional antecedents of achievement emotions (Pekrun & Frese, 1992; Weiner, 1985; Zeidner, 1998). As a consequence, we still lack knowledge on the interrelations of students' emotions with their academic learning and achievement, and with aspects of their learning environments. During

the past ten years, however, research on multiple dimensions of students' emotions has started to explore these interlinkages. This research has produced emerging evidence corroborating both the functional importance of emotions for students' learning, and of learning environments for the development of students' emotions. This symposium brings together five research groups from around the world that contribute to this emerging field of educational research. The symposium includes researchers from three European countries, North America, and Australia, as well as a discussant that is a world-renowned scholar in the field of students' affect and motivation. The five presentations all share a common focus on students' emotions. Based on the results of empirical studies, all five presentations will discuss emotions and their relationship to aspects of students' learning environments, goal strivings, and academic achievement. The structure of presentations implies that the symposium (1) discusses multiple facets of students' emotional life, including anxiety, but also negative and positive academic emotions other than anxiety; (2) addresses emotions both from a trait perspective and from a process-oriented, situated perspective; (3) examines different aspects of learning environments like classroom composition, tasks, as well as interactions within the family; (5) presents findings gained by non-experimental as well as experimental studies. The format of the symposium will be a traditional one with five presentations followed by remarks from the discussant, Simone Volet.

Classroom environment, academic achievement, and students' emotions: Multi-level implications of control-value theory
Reinhard Pekrun, University of Munich, Germany
Thomas Goetz, University of Munich, Germany

Recent research on students' academic emotions focused on their interrelations with learning processes, but neglected the impact of educational environments. In the present study, we analyzed the influence of classroom environment variables on the development of students' emotions in mathematics. The focus was on the impact of the ability composition of classrooms. Using Pekrun's (2000) control-value theory of academic emotions, we assumed that students' emotions depend on their control-related and value-related appraisals (e.g., self-concepts of ability, values of achievement). Furthermore, we hypothesized (a) that individual achievement exerts positive effects on control and, thereby, on academic emotions, whereas (b) the average achievement of the classroom has negative effects on subjective control and resulting emotions due to social comparison processes implying lower chances for success in high-achieving classrooms. The latter hypothesis would imply a Big-

Fish-Little-Pond-Effect (Marsh, 1987) on students' emotions. Assumptions were tested using data from the longitudinal Project for the Analysis of Learning and Achievement in Mathematics (PALMA). HLM was used to analyze effects of grade 5 individual and classroom level achievement on students' emotions in grade 6, and effects of grade 6 achievement on emotions in grade 7. Samples consisted of N = 1,762 / 1,741 students from 78 / 73 classrooms for the grade 5 to 6 and grade 6 to 7 intervals. Achievement was assessment by a mathematics test, and students' emotions in mathematics by our Academic Emotions Questionnaire (AEQ; Pekrun, G?tz, Titz, & Perry, 2002). First results imply that grade 5 individual achievement had a positive effect on subsequent enjoyment and a negative effect on anxiety, whereas average classroom achievement had a negative effect on enjoyment and a positive effect on anxiety. Findings thus corroborate that the BFLP-effect may be important for the development of academic emotions. Implications for future research and educational practice will be discussed.

Shame as the emotional core of fear of failure
Andres Elliot, University of Rochester, United States
Andres Elliot, University of Rochester, United States

In classic theorizing on achievement motivation, emotion has been posited to be the core of achievement motives. With regard to the fear of failure motive, shame has been posited as its emotional core. In my talk, I will overview research that was designed to examine hypotheses derived from the proposition that shame is the emotional core of fear of failure. Study 1 was conducted in a naturalistic setting, and demonstrated that individuals high in fear of failure reported greater shame upon a perceived failure experience than those low in fear of failure. These findings were obtained controlling for other negative emotions. Study 2 was conducted in a laboratory setting, and demonstrated that high fear of failure individuals reported greater shame, overgeneralization, and closeness to their mother (controlling for baseline levels of these variables) than those low in fear of failure. Those high in fear of failure also reported that they would be less likely to tell their mother and father about their failure experience, and would be more likely to tell their mother and father about their success experience. The implications of these findings for acquiring a deeper understanding fear of failure will be discussed.

Emotions are powerful cues that signal that all is or is not going well
Monique Boekaerts, Leiden University, Netherlands

Committed and competent students bring different domain-specific motivational beliefs to the table (e.g., self-efficacy beliefs, values, effort beliefs, and outcome expectations) than their less committed or competent peers, they also differ in their appraisal of the learning situation, the emotions they experience during goal pursuit (e.g., joy, anxiety, boredom), and in the way they respond to obstacles en route to the learning goal. In her dual processing self-regulation model, Boekaerts views students' appraisal and emotions elicited in the here-and-now-situation as the connecting links between stored domain-specific motivational beliefs on the one hand and task engagement on the other. In the present study we tested some of the assumptions of Boekaerts' dual processing model. Our hypotheses were that students' value and competence judgments about homework at a particular moment in time (1) feed forward into their judgment about homework on a later occasion, and (2) trigger positive or negative emotions, which in turn influence effort investment and self-assessment. Also, experienced positive and negative emotions are attributed a mediating role in these feed forward processes. 648 students in secondary education took part in this longitudinal study. Students completed the on-line motivation questionnaire(OMQ) before and after they did their homework as part of a keep-a-diary requirement. Structural equation modeling was used to test the model in its general form (i.e., domain-independently) and a good fit was found. Multiple sample path analysis showed that the relationship between the variables was the same in two random samples. It was predicted and found that the model had a better fit if the parameters were set free for the different school subjects. I will report on the domain-specificity of the emotion mediation effect.

The impact of mood on learning - the impact of task on mood
Ainley Mary, University of Melbourne, Australia

The increased attention being given to investigation of achievement emotions and their role in academic achievements has increased awareness of a range of affective variables that might impact on achievement. In this presentation we specifically focus on the variable of mood and consider how students' mood state when they come to a learning activity influences the course of interaction with that activity. In a sample of 155 Grade 7 and 8 students we identified a subgroup of students whose mood profile at the end of the learning activity was more positive than was their mood profile immediately prior to commencing the activity. For these students,

changes in mood were found to be significantly related to their reflective judgments concerning the answer they had submitted to the problem task. They reported significantly higher levels of satisfaction with the quality of their answers and higher goal attainment than did students whose mood had not changed. Data collected both prior to and during the learning activity allowed us to track some of the variables that were associated with students' moods and changes in mood: achievement goal orientation, specific task goals, interest and on-task affect. Profiles of goals, interest and affect associated with mood and mood changes will be presented.

These findings point to the central role of the task in effective learning environments. They suggest that participation in a task that produces feelings of satisfaction with what has been written, and feelings of having achieved specific task goals can turn around the negative affect some disengaged students bring to their classrooms. Further investigations will examine more closely the character of specific tasks that might reorient the affect of disengaged students.

Emotions, metacognitive experiences, and regulation of effort in learning
Anastasia Kourkoulou, Aristotle University of Thessaloniki, Greece
Anastasia Efkides, University of Thessaloniki, Greece

Cognitive and motivational theories of effort postulate that effort is a function of task difficulty, available capacity, and allocation policy, that is, policy regarding how much effort will be exerted to which task and for how long. Learning requires both intensive, momentary effort during task processing, and sustained effort over long periods of time. Students differ not only in the intensity of the effort they exert but, also, in the regulation of effort in the short and the long run. This presentation is based on two studies that aimed at delimiting the affective and metacognitive correlates of different effort regulation styles. In Study 1 we tested 234 students of 7th, 9th, and 11th grade with 3 questionnaires regarding motivation, controllability of effort, and regulation of effort. Factor analysis revealed three styles of effort regulation: two styles regarding self-regulated short- and long-term effort, respectively, and a third regarding other-regulated effort. The three styles comprised strategies related to the initiation, continuation, and termination of effort. Study 2 regarded the effects of effort regulation style, mood, and interest on task-specific metacognitive experiences and self-reported effort. We tested 120 students of 7th and 9th grade with the Effort-Regulation Questionnaire and one mathematical problem. There were 3 groups based on the mood treatment received – i.e., positive, negative, or no mood. Participants reported their metacognitive experiences before and after solving the problems. The analysis of results is in progress.

EARLI Invited Symposium
Conceptual Change

EFFECTIVE LEARNING ENVIRONMENTS FOR CONCEPTUAL EVO-LUTION

Chair: Silvia Caravita,
               Institute of Cognitive Sciences and Technologies, Italy
Organiser: Silvia Caravita,
               Institute of Cognitive Sciences and Technologies, Italy
Discussant: Kaarina Merenluoto, University of Turku, Finland

Can the conceptual change approach capture micro-stories of ideas that are situated in proceses of enculturation and of meaning making fostered by school environment? How do we monitor the stories, the changes in the conceptual profiles? Can we qualify and trace the long-term effectiveness of conditions that have been introduced in the instructional design and in the educational mediation? When we design experimental settings we constantly experience the gap that exists between the explanatory theories and pedagogical conjectures (di Sessa, 2004). The conceptual change approach has provided domain specific instructional theories; it might be fruitful to question whether it has produced a more general theoretical advancement, constructs that can empower us to see patterns in the complex teaching/learning settings. The Symposium aims at stimulating this line of reflection through the presentation of a range of studies that are concerned with different areas of competence (in scientific and in non-scientific domains), ages of students, educational contexts. These studies share the view that conceptual understanding involves deep, long-term elaboration, thoughtful processing, which affects many dimension of the whole person and, ultimately, implies a re-tuning of one's own relationship with the external world. The value of making a conceptual shift concerns grand ideas and lies in its potential to generate new ways of viewing the content of a domain of knowledge, and also of interacting with a domain of reality. The weight of the many factors that come into play varies greatly in relation to the nature of the conceptual object, to the competence of students in the domain that should be affected by the conceptual evolution. The educational implications that have been drawn from the evolving models of learning have progressively reflected a systemic view of the class environment. A re-thinking of how to specifically address concep-

tual evolution is therefore necessary.

Interpretation of the development of living beings at pre-school level
Andres Acher, University of Barcelona, Spain

The aim of this research is to characterize a set of cognitive strategies supporting general dynamics of interpretations during the explanation of a chicken formation in a pre-primary science classroom and to explore their Biological meaning. These strategies are considered as pragmatic ways of organizing intellectually a phenomenon based on cognitive dimensions involved in intuitive interpretations (e.g. space-time-change) and the close connection with the nature of the phenomenon (i.e. referential anchorage). They are intended as potential sources of conceptual change due to their capacity to interpretatively adapt to the different aspects of the phenomenon. Conversations in a preschool classroom were audio-taped in situations in which the 5 years-old children were observing and explaining the chick formation in the eggs. For the qualitative analysis an analytical tool was created to identify functions, elements and conditions that were considered to be representative of the cognitive dimensions implied in the interpretation of the phenomenon. In order to define cognitive strategies I related combinations between functions-elements-conditions with the aspects of the phenomenon being addressed. Then I explored the Biological meaning of these strategies by discussing them comparatively with those used by Developmental Biologist. The findings show that a strategy of qualitative change is used to explain the form acquisition by the chicken as an explanation of the whole. This strategy is combined with other strategies dealing with change which address more specific phenomenological aspects, mainly to manage the relationships between inside and outside of the egg-system or with the increase of mass. This set of cognitive strategies showed creativity in 'splitting up' a 'whole causality' into different partial causalities, essentially in the same basic ways that Developmental Biologist use when they organize intellectually processes of development.

Using metacognitive strategies to learn classical music
Rita Aiello, Department of Psychology, New York University, United States

This contribution addresses how usually classical music is learned in a conservatory. Specifically, it looks at data based how classically trained pianists at various levels of expertise learn to play and to perform from memory. These data indicate that some beginners and intermediate pianists seem to lack a master plan

for combining aspects of their musical knowledge. Even students with very good performance skills may not be able to discuss in detail the theoretical background of the pieces they perform. This contribution discusses why the musical knowledge of some beginner and intermediate performance students appears to be somewhat compartmentalized. It addresses why students seem not to know how to fully transfer what is taught in the theory classes to the pieces that they practice and perform. Students learn the performance of the repertoire and the technical mastery of their instrument in the studio classes, and learn the theoretical aspects of music in the theory classes. Given the structure of the curriculum, it is possible that the theory classes may not provide a forum for discussing the theoretical underpinnings of the pieces that students are preparing for performance. Due to tradition, some performance teachers often stress mostly a behavioral model in their teaching. But unless the studio teachers explain in detail the theoretical aspects of the works being studied, it is left entirely up to the students to integrate what they have learned in the theory classes with their performance. Some students do not integrate aspects of their musical knowledge as skillfully as possible because they seem to lack an overall master plan for learning music. Both studio and theory teachers should explicitly show their students how knowledge can be transferred and how metacognitive strategies can be developed. Seminars on metacognition ought to become part of the conversatory curriculum.

Differences between hearing and deaf students reasoning on energy.
B.-O. Molander, Department of Education, University of Stockholm, Sweden
Ola Hallden, Department of Education, University of Stockholm, Sweden
Camilla Lindahl, Department of Education, Stockholm University, Sweden
Andreas Eriksson, Department of Education, Stockholm University, Sweden

A central topic in biological education is ecology. The area is often introduced early in formal education. The complexity of the area call for the ability to handle a number of scientific concepts: matter, energy, circulation, food-chains, etc. A comparison is made on how hearing and deaf children, aged 13 – 14 years, reason on concepts related to ecological processes. The aim of this study was to describe the Children's reasoning on the concept of energy and a) compare if the lines of reasoning differ between the two different groups with different first languages, Swedish and Swedish Sign Language (SSL), b) compare if possible differences in line of reasoning affect their reasoning to related concepts, and understanding of the subject as taught in the classroom. Semi-structured interviews were conducted with eighteen hearing and twenty-four deaf children. The interviews were group-interviews with three

students in each group. The interviews were video-tape recorded. Interviews with the hearing students were conducted in Swedish. Deaf students were interviewed in SSL. The data has been analyzed regarding what kinds of meaning students give the word energy. The dialogue among deaf students showed a large variation of different meanings of the word energy, but generally they were less focussed on different meanings than the hearing students. Possible explanations to the differences between deaf and hearing students are related to how they meet concepts and how differences in language might signify differences in connotation. In SSL, the sign for energy and activity is the same, except for a difference in expression of the mouth. The students who have not had the chance to elaborate between meanings in the words, start a discussion with connotations to activity rather than to energy.

Effective learning environments for conceptual development in physics
Enrica Giordano, University of Milano, Italy

Some ideas about the knowledge we attribute to students and about the dynamic of change of this knowledge (mainly in the case of physics) will be discussed. In particular the resonant cognitive model and the characteristics of effective learning environments according to this model will be presented and exemplifyed. The main features of the suggested environments are the result of the work of the Italian research group about basic science education (in particular Marta Gagliardi of Bologna University and Milano-Bicocca research group). The work, a collaboration between university researchers and teachers, was carried out in classrooms and in our laboratories along one or more years. It involved reflection and innovation in science teaching. Learning environments about selected phenomenological areas were designed, tested in these laboratory classroooms, revised. Many data were collected (individual written work, transcript of peer discussions, reports of experimental workgroups made in lab or outside the school, few video registrations that record gestures and body language), analysed and discussed inside the community of research, by investigators and teachers. Our results corroborate the importance of a long term work with children to promote conceptual change or better conceptual development, i.e. to drive students from their first experiences (in everyday life and in school) and their initial interpretation toward scientific knowledge.

The research work indicates that to produce effective learning this long term teaching action needs to satisfy some requirements:

• Careful selection of what to teach about

• Time, coherence, continuity, longitudinal (across school levels) and transversal coordination

• Careful use of methodologies promoting understanding
• Attention to the formalization and modeling process.
Examples of learning paths and environments for students of different ages that joint these features will presented. The attention will be on effective learning environment for conceptual development, in the meaning discussed at the beginning.

I 23   25 August 2005   14:30 - 16:30   Room E113

SIG Invited Symposium
Moral Development

MORAL DEVELOPMENT AND CITIZENSHIP

Chair: Nava Maslovaty, Bar Ilan University, Israel
Organiser: Nava Maslovaty, Bar Ilan University, Israel
Discussant: Helen Haste, University of Bath, United Kingdom

Modern society asks of its citizen increasingly autonomy and an active involvement in the community at all levels. Citizens have to adapt to the changes in society, in cultures, in organization and governance, in technology, in ways of communicating, etc. With the growing integration of Europe and the globalisation the local level seems to become more authentic. Growing up in nowadays Europe implies developing your own identity in a pluralistic, democratic but risk society. Citizenship development therefore needs a strong moral base.
Citizenship refers to different levels of social functioning: the personal, the control over one's own life; the interpersonal, the interaction with the immediate environment; and the socio-political, the functioning in all wider social and political structures. Moral values like justice, respect and care can contribute to a citizenship that modern society needs. The development of sensibility, commitment, responsibility and competence in the moral domain is part of this critical-democratic citizenship. Moral development can give citizenship the foundation it needs for a dynamic citizenship of society, a society that is knowledge-based but embedded in values. In this symposium we will bring together four research projects that tries to combine moral development and citizenship education.

On the difference between moral and political judgment: A developmental frame
Fritz Oser, University of Fribourg, Switzerland

Within the frame of a quantitative longitudinal investigation on political attitudes of adolescents (connected with the IEA study on civic education) we conceived a qualitative study on how subjects respond to political issues with respect to age related differences. The hypothesis was, that it is possible to formulate a kind of stage oriented progressive framework. Thus we collected answers given to political vignettes. Six stories, each of which refers to important political dimensions like freedom versus dependency, power versus consensus, property rights versus public welfare etc. were developed. One story deals with the question whether a government has the right to take away the land of a farmer for building a freeway. In each interview we asked questions with respect to the mentioned dimensions, here of course concerning the right of a single person towards the powerful interests of the state. – For each of the six stories we made interviews with subjects of an age range from 9 to 21 years as mainstream, and some examples from 21 to 60 years. For each story we balanced gender and intelligence. The total number of interviews was 6 x 40 = 240 interviews, which were typed, tensely described and codified. The result is a provisional stage description of political reasoning.
In this presentation we would like to show that the results of this study contradict the hypothesis that moral and political thinking cannot be disentangled. We would like to show, that the moral judgment is always embedded into cultural content, and that a political concept behind a political judgment is even more communitarian in the sense of political communitarism. Thus we would like to show that political judgment precedes the moral thinking in general.

Use of military force: Justified or unjustified?
Vera Husfeldt, University of Goettingen, Germany

Several reasons are proposed for which the use of military force by one country against another could be justified. On the basis of their moral values, students had to decide how justified the use of military force could be in different circumstances. It can be shown that there are two major concepts of justification among the students from the 12 analyzed countries. On the one hand side military force is justified with the reason to defend human lives. On the other hand it can be justified through the reason of defending the own territories. The structure of these concepts is validated by a confirmatory factor analysis, which shows the high impact of the two latent factors defend human lives and defend territories on the manifest variables and at

the same time a relatively low intercorrelation between the two factors. The corresponding items are scaled by using partial credit models and the scales are further analyzed with respect to the country differences and the impact of background variables to explain them. It is shown that the justification of use of military force is quite different in different countries. For example western European countries are less supportive towards the use of military force to defend territories, than the other countries. A multilevel regression approach to analyze the relationship between the justification of military force and other students background variables shows that the explaining variables are quite different for the two factors defend human lives and defend territories. Interestingly it is shown that the percentage of variance on the school level is higher on the scale defend territories meanwhile the justification of the use of military force to defend human lives seems to be more a matter of individual reflection.

Accepting the Other: Improving inter- group relations and education toward peace and its application to the relation & dialog between Israeli and Palestinian educators.
Avigail, Bracha Yinon, Bar Ilan University, Israel

A sense of integral and valuable collective Identity is found to be a very vital and potent force in navigating the relationship between collectives toward peace-full relations or toward intractable conflicts. The collective identity of the other can pose a threat to the integrity, value, appreciation, status and power of one's own collective identity. The need to enhance and crystallize one's own collective identity is reached many times through derogating and reducing the value of the other collective.   On the other hand, improving inter-group relations is found to be reached through a change in the perception, understanding and empathy to the other collective, its history, culture, narratives, and suffering. The proposed model describes a new method to change the collective perception of the other without threatening one's own collective identity. The model was tested on three successive groups of religious Jewish educators (overall 60 participants) in Israel and 40 Palestinian educators from east Jerusalem. The Israeli Group participated in a yearly seminar that part of it was held through a dialogue with the Palestinian educators. The second year of the program included the development of learning materials according to the program and implementing them in the classrooms.
The results of the qualitative research that was conducted showed an impact of the program on its participants on several variables; some of them are the following:
1.Increased empathy to the suffering of the other (Palestinian / Israeli),

2.Increased acceptance of the legitimacy of different narratives to the history of the Israeli-Arab conflict.

3.Re-conceptualization the Israeli –Arab conflict from a Win-Lose situation to a Win-Win situation.

4.Implementation of peace education programs in the schools.

I 24   25 August 2005   14:30 - 16:30   Room A111

SIG Invited Symposium
Social Interaction in Learning and Instruction: Multiculturalism in Education

SOCIAL INTERACTIONS IN MULTICULTURAL SETTINGS

Chair: Margarida Cesar, University of Lisbon, Portugal
Organiser: Margarida Cesar, University of Lisbon, Portugal
                Kristiina Kumpulainen, University of Oulu, Finland
Discussant: Peter Renshaw, Griffith University, Australia

The phenomenon of immigration is relatively recent for some countries, namely in Europe, while it is much older for other ones. However, Europe is becoming more multicultural than ever and the presence of immigrants or pupils from minority cultures in elementary and secondary schools is increasing consistently. Faced with this ever-increasing number of immigrant or minority culture pupils in their classes, many teachers have to confront completely new pedagogical challenges. These challenges also concern the whole school system. Social interactions play an essential role in educational settings, in general, and in multicultural settings, in particular. This symposium aims at opening and furthering the dialogue concerning the meaning of social interactions in multicultural settings, their role in learning and instruction as well as their contribution to reach educational practices that respect and include diversity. Furthermore, the symposium aims at illuminating different approaches to multiculturality and to the role played by social interactions. The analysis of four different studies, from four different countries and three continents highlights different types of multicultural settings in which learning and instruction takes place as well as the responses that were implemented for each case. Ed Elbers and Mari?tte de Haan's research was conducted in a multicultural primary Dutch school and analyses collaboration between Dutch and migrant students in the classroom, and ideas and practices of instruction in migrant families. Judith Green, Elizabeth Yeager and Maria Lucia Castanheira examine the ways in which a bilin-

gual teacher (Spanish/ English) constructed a community for learning. Margarida Cesar illuminates the role of collaborative work in the promotion of inclusive settings and an intercultural education, showing different types of solving strategies and collaboration among students related to culture. David Clarke and Louisa Remedios present an empirical example of teaching and learning in a multicultural setting. They examine culturally-derived patterns of participation.

Learning and instruction in multicultural classrooms.

Experiences from primary schools in the Netherlands
Ed Elbers, Utrecht University, Netherlands
Mariette de Haan, Utrecht University, Netherlands

The Netherlands has an increasing migrant population with Moroccans, Turks, Surinamese and people from the Dutch Antilles as the largest migrant groups. Dutch primary schools, in 2003, have a population of, on average, 15% minority students. In the big cities, schools have an average of between 38% and 57% minority students. We have been involved in research of learning and instruction inside multicultural classrooms. Dutch sociologists have made available ample information about the school results and language skills of minority students and the relationship of cognitive and language competencies with cultural background variables. However, what goes on in multicultural schools and classrooms has been a neglected research area. We know very little about how teachers deal with cultural differences and language problems and about the way students cope with these problems. Our research focuses on interaction processes in the school and classroom. We have also observed practices of instruction and learning at minority students' homes. We will present our research on two related topics:

1.Collaboration between Dutch and migrant students in the classroom. Our observations show that Dutch and migrant students construct their contributions to the classroom differently. Dutch students tend to dominate the interaction and act as cultural and language experts, whereas migrant students prefer more symmetrical relationships.

2.Ideas and practices of instruction in migrant families. Misunderstandings and conflicts between children and teachers and between parents and teachers often have an origin in different ideas about learning and experiences with instruction. In Moroccon education, e.g., the peer group is much more important than for Dutch youngsters. Therefore, Moroccan students, much more than their Dutch age-mates, rely on support from siblings and friends.We will discuss our research both in the

context of migrant groups in the Netherlands and of the Dutch school system.

Listening to different voices: Collaborative work in multicultural Maths classes
Margarida Cesar, University of Lisbon, Portugal

Alike many other European countries, Portugal has a growing number of foreigner and minority culture communities that enter the educational system. But this system did not change much and teachers' practices remain mostly the same they had when the school population was much less multicultural. This led to a selective process of exclusion. The role of social interactions in knowledge appropriation and in competencies mobilisation was studied by several authors, who stress their facilitating role in promoting socio-cognitive development and academic achievement. The didactic contract and the nature of the task also shape the social interactions established in classes. Learning is situated and must be understood as influenced by culture. Becoming a legitimate participant of a learning community is an essential step in order to achieve an intercultural education. During the last eleven years we implemented a project called Interaction and Knowledge whose main goal is to study and promote peer interactions in mathematics classes. It is divided in two levels: (1) quasi experimental studies that aim at analysing in-depth the characteristics of peer interactions; (2) an action-research level in which peer interactions are implemented in several mathematics classes (5th to 12th grades), whose selected cases are analysed in this presentation. The ultimate goal of this project is to contribute to more inclusive learning settings and to an intercultural mathematics education. Data show that collaborative work is a powerful way of achieving the ideals of inclusive schooling, including an intercultural education. There are empirical evidences showing that solving strategies, collaboration between students and social representations are influenced by culture. In order to promote students' performances teachers need to respect this diversity. Otherwise they risk to promote exclusion instead of inclusion, as only the students from the mainstream culture fit in the social interactions accepted in Maths classes.

Two languages, one community: On the discursive construction of community in bilingual classrooms
Judith Green, University of California, Santa Barbara, United States
Elizabeth Yeager, University of California, Santa Barbara, United States
Maria Lucia Castanheira, Universidade Federal de Minas Gerais, Brazil

This presentation examines the ways in which a bilingual teacher constructed a

community in which both English and Spanish became resources for learning and for community construction in a 5th grade class. Through analysis of the patterns of initiation of academic disciplines, we show how the use of two languages supported students in constructing knowledge about what it means to be a reader, a writer, a mathematician, a social and natural scientist, an artist, a community member, an historian and an anthropologist. Analysis will be presented to demonstrate ways in which the teacher created a meta-discourse about disciplines that enabled students to create a relationship between language-in-use, discourse processes and the work of people engaged in academic work within and across disciplines. To illustrate how these opportunities for learning and community construction led to the construction on a community, where a local language for learning was constructed, we present an analysis of student essays on their community written at the end of the school year. Analysis of these essays focuses on the ways that students inscribed the social and academic work required of community members and how students viewed the role of the two languages (English and Spanish) in creating the community, and the language of the community.

The cultural-specificity of patterns of participation in multi-cultural classrooms
David Clarke, University of Melbourne, Australia
Louisa Remedios, University of Melbourne, Australia

Classrooms are complex social and cultural settings, and research in such settings must reflect and accommodate that complexity. If we approach social settings (and the situations they frame) as multiply-constructed and open to multiple construal, then the methodology employed in their study must offer a voice to the several participants in these settings. This is particularly true when our interest is the cultural-specificity of practice. Research in such settings is inevitably shaped by the cultural orientation of the researcher(s). Every effort must be made to allow differences in cultural perspective to emerge in both the data collected and in the analysis undertaken. In all the research reported in this paper, post-lesson video-stimulated interviews offered classroom participants the opportunity to reconstruct for the researcher their actions in class, the motivations behind those actions, and the meanings they attributed to their actions and the actions of the teacher and their classmates. This paper uses the detailed analysis of first year university physiotherapy classes (utilising a problem-based learning tutorial format) as an empirical example of teaching and learning in a multi-cultural setting. In particular, the analysis examines culturally-derived patterns of participation such as the Silent Participant, a pattern of participation particularly characteristic of students from Asian classroom

settings. In order to understand the inheritance of culturally-specific patterns of participation that students bring to multi-cultural classrooms, we examine classroom practices in Asian classrooms (Tokyo, Hong Kong and Shanghai) and contrast these with practices in San Diego, Berlin, and Melbourne. Our analysis suggests that there are distinct differences in patterns of participation even within 'Asian classrooms' and that teachers in multi-cultural classroom settings must avoid simplistic cultural typifications, while remaining sensitive to the differences in expectation and participation that students from different cultures inevitably bring to the multi-cultural classroom.

J 1   25 August 2005   17:00 - 18:20   Room A007

Paper Presentation
Assessment and Evaluation

SCHOOL SYSTEMS

Chair: Jim Ridgway, Durham University, United Kingdom

The Toronto District School Board Grade 9 Cohort of Fall 2000: A four year geospatial cohort analysis, 2000-2004
Robert Brown, Toronto District School Board, Canada
Erhan Sinay, Toronto District School Board, Canada

GIS is a tool of increased use in evaluation. This spatial analysis examines the Grade 9 cohort of Fall 2000, followed for four years (2000-2004). The postal code of each student home residence (Year 1 and Year 4) is geocoded using a GIS point file of the centrepoint of the postal code. Thus, every student in the study will be represented by two geographical points—one representing the approximate location of the student residence in Year 1, the other representing the student residence in Year 4. In addition, student information will be aggregated to the Census Tract (CT) geographic level. Census tracts are neighborhood sections of large Canadian urban centres. Data will be examined in an investigatory geospatial analysis using ESRI's ArcView 3.3 spatial extension and the ArcGIS 9 spatial extension. Among the areas to be investigated are four key directions: 1. Overall spatial patterns. Toronto has a geographic pattern of socially challenged neighborhoods. This analysis will examine the Grade 9 cohort to see if this pattern is replicated through academic achievement. 2. Patterns of change over time. Among the spatial analyses of mobil-

ity over time will be the following: school to school (Year 1 and Year 4), changing residence (Year 1 and Year 4), transferring and dropping out (Years 1 and 4). 3. Spatial representation of a Principal Component Analysis (PCA) in Grades 9 and 10. 4. Student variables through aggregation to the Census Tract Level. This analysis will examine the relationship of outcome variables such as credit accumulation to Year 4 and completion of the Literacy Test by Grade 10 to key 2001 Census variables.

An examination of practices of portfolio assessment in three experimental primary schools in china
Chun Li Zhang, Faculty of Education, University of Macau, China, Peoples Republic of China
Kwok Cheung Cheung, Faculty of Education, University of Macau, China, Peoples Republic of China

This study addresses a very pragmatic issue, namely how to implement portfolio assessment as stipulated in the new curriculum standards in primary schools in China. Traditionally, paper and pencil tests, coupled with practical examinations, are the major modes of assessment for monitoring the achievement standards and growth of student learning. However, revised rationale of student learning urges teachers to think about how to practice individually configured education so as to respect the intellectual strengths and weaknesses of the students. Portfolio assessment is proposed because there is an emphasis on processes than products of learning. All over China, there are experimental schools testing the feasibility of such new initiatives. This study seeks to examine whether portfolio assessment is welcomed by teachers, students and parents, possible modes of implementation of portfolio assessment as well as the logistics regarding its use in three experimental schools in China. The findings point to more systematic synthesis and research if the new curriculum reform is to succeed in the decade to come.

The School Evaluation Spectrum: Seeking a working compromise between autonomy and accountability
Gerry McNamara, Dublin City University, Ireland
Joe O'Hara, Dublin City University, Ireland

In recent years there has been an intense debate in many countries concerning the best approach to improving schools. The various methods being tried might be reasonably seen as constituting a spectrum ranging from strict external control and inspection at one end, to self-evaluation and internal regulation at the other. In

practice, most education systems appear to be moving towards a combination of these methods, involving a degree of external monitoring of internal self-evaluation mechanisms. This paper analyses the gradual emergence in the Irish education system of such an accommodation. It charts the increased emphasis being placed upon school self-evaluation and argues that this does indeed constitute the best way forward. This shift in emphasis is placed in the context of wider debates in Europe and particularly in the UK which are influencing policy (Nevo, 2002). The changing policy is illustrated by a close analysis of the official school evaluation framework documents and through interviews with a number of school leaders. In addition, the paper also highlights a major lacuna at the heart of the emerging system, namely the lack of firm data on which schools can really base effective improvement strategies. This paper responds to the conference theme by addressing ways in which the learning context, in this case the school, can be influenced by the type of evaluation system adopted by the broader educational community. It addresses in particular the domain of Assessment and Edumetrics and should be of relevance to the Assessment and Evaluation SIG.

Learning Situations in the Context of an Educational Change
Audrone Valiuskeviciute, Vytautas Magnus University, Lithuania
Giedra-Marija Linkaityte, Vytautas Magnus University, Lithuania
Lineta Zilinskaite, Vytautas Magnus University, Lithuania

In the context of educational change, learning situation can be defined from the perspective of the collision of different teaching-learning paradigms. The identification and coordination of teaching-learning paradigms becomes an important issue. The authors of this paper identified a need of a helping tool, thus, to develop it the model of four teaching-learning paradigms (Coomey and Stephenson, 2001) has been selected as the methodological background. The primary purpose of this tool is to identify tendencies of a change within pedagogical practices and to support the coordination of different teaching-learning paradigms represented by the different target groups, that is, a course developer, a teacher/tutor and a student. The tool is designed as a multiple-choice questionnaire, which consists of five sets of questions, encompassing five aspects of teaching-learning practice: 1) learning objectives; 2) learning outcomes; 3) tasks and exercises; 4) roles of a teacher and a student; and 5) assessment and evaluation. Different versions of the same tool were suggested for the different target groups. The research of the tool usage was performed aiming to explore the possibilities to use the tool in different situations and its impact on the different target groups. To achieve that the case study methodology

was employed. Three cases were selected for a deeper analysis: 1) the identification of a teaching-learning paradigm in the course of 'University Didactics'; 2) the collaborative definition of quality and evaluation of the course Quality Management in Education'; 3) the analysis of the educational bases of the ODL courses. The cases were analyzed in three aspects: A) the rationale of the tool usage in a concrete educational context; B) the way the tool was used, and C) the results and the impact of the tool. Results are discussed in this paper.

J 2   25 August 2005   17:00 - 18:20   Room E111

Paper Presentation
Conceptual Change

SCIENCE LEARNING

Chair: Marjatta Kangassalo, University of Tampere, Finland

High school students' ideas related to speciation and common descent
Luli Stern, Technion, Israel
Galit Hagay, Technion, Israel

Evolution of living organisms is a central scientific theory that explains and synthesizes observations in many different areas of biology. While numerous studies in the past three decades have focused on the learning and teaching of natural selection, very few studies attempted to explore students' ideas related to common descent. This study was intended to address this neglect. A diagnostic questionnaire, validated through an iterative process of three cycles of research and development, was developed as a first step of the study. High school students (n=231) from eight schools throughout Israel responded to the questionnaire. Our findings indicate that high school students have difficulties appreciating the idea that new species are formed as a result of the continuing operation of natural selection on new characteristics and in different environments. In addition, students are reluctant to believe that all living things are related by descent from common ancestors even when this idea is explicitly presented to them. Instead, students hold alternative conceptions, such as that people deliberately produce new species (but speciation is not part of nature) or that evolution is a ladder in which the lower forms are all replaced by superior forms, with humans emerging at the top as the most advanced species. Interestingly, there were no significant differences observed between ideas held by students who

major in biology and the ideas held by students who major in other fields. Given the emphasis that is placed on the idea of common descent in the modern theory of evolution and in the high school biology curriculum, we believe that insights gained from this study will provide some helpful suggestions for curriculum development, science teaching, and research.

Children's attempts to contextualize the concept earth in the presence of a satellite photo
Karin Ehrlun, Stockholm University, Department of Education, Sweden

The aim of this study was to find out how different contexts interplay when a child is trying to differentiate the concept earth in an interview situation with a satellite photo of the earth. Fourteen children aged six to eight were interviewed in the presence of a poster of a satellite photo of the earth. The interviews were semi structured and focused on the concept earth but also open to the Children's own interests. The material was analyzed with an intentional method and two interesting tendencies were detected. One was that some of the children seemed to be stuck in the context of the satellite photo. This became apparent when the interviewer asked if they had seen the earth. The other was that the context of the satellite photo meant very different things for different children. The results show that in a situation like this several contexts were possible to identify, which were interfering with the child's concept of the earth, not only the earth as a naive concept and a scientific concept. Beside different contexts that the children associated with the earth, you also have to consider contexts of the social rules for an interview situation and cultural rules for how to understand a picture. It is argued that conceptual development is best described as a problem of finding the relevant context for a concept in the web of contexts which are at hand in a specific situation. This is seen as an alternative to the view of conceptual development as a change from one na?ve concept to a scientifically more correct concept. The implication by this in school situations is that teachers should not try to help pupils to find the right concept but instead try to help them to find the right context for the concepts.

On acquiring a naive theory of biology: Knowledge about inheritance in children with lower intelligence
Claudia Maehler, Georg-August-University of Goettingen, Germany
Marcus Hasselhorn, Georg-August-University of Goettingen, Germany

The development of a naive theory of biology in children has been an important

focus of research on conceptual development during the last 20 years. There is some agreement that by the end of the preschool years basic concepts are within the competencies of children, although important development will take place at school age, especially the understanding of causal processes. Fairly little is known though about the development of naive biology from a differential perspective. Do children with an abnormal intellectual development acquire the same theories at the same time?Three aspects of biological knowledge about the process of inheritance were examined in the study: Children had to differentiate between inherited vs. acquired properties, they had to solve the problem at what time future attributes are being determined and which mechanisms are relevant for inheritance (external, internal or intentional mechanisms). Twenty children with mild mental retardation (mean age 10;3 years, mean IQ 75) participated in the study (MR-group) and two groups of children with normal IQ were recruited as controls, one equal in chronological age (CA-group) and one matched for mental age (MA-group). Results revealed an overall developmental lag for the children with lower intelligence. Most interestingly, the MR-children preferred the intentional mechanism as a relevant causal explanation for inheritance, which rarely occurred in the control groups. We interpret this result as a possible conceptual deficit in children with lower IQ. The pattern of results across the different tasks shows that the MR children do not yet fulfill the criteria of an established theory of biology. This may lead to the postulate of special education for conceptual development.

Investigating the occurrence and effects of cognitive conflict on primary school students' learning
Stella Hadjiachilleos, University of Cyprus, Cyprus
Nicos Valanides, University of Cyprus, Cyprus

Each individual experiences Cognitive Conflict (CC) differently, but research results concerning its effectiveness in science learning are not very consistent. Thus, the potential of CC to trigger conceptual change is still under scrutiny and there exists an urgent need to refine methods of identifying its occurrence and its implications on science learning. The purpose of the study was to investigate how primary school students experience CC and the kind of their reasoning in case they are engaged in a process of cognitive restructuring. Seventy-two fourth-, fifth-, and sixth-grade students were presented with problems concerning floating/sinking and were administered a pre-test targeting their preconceptions concerning the factors affecting floating/sinking. Next, an intervention was designed to induce CC. Students were subsequently presented with a different set of problems concerning

floating/sinking and administered a post-test to identify their reappraised conceptions. Students were also administered an instrument measuring four aspects of CC (recognition of anomalous situation, interest, anxiety, and cognitive reappraisal) based on a model developed by Lee and Kwon (2001). Factor analysis supported the four-construct model of CC, but more research is needed for the refinement of the test items measuring the four constructs. Regression analysis indicated that the four constructs of CC were significant predictors of students' performance on the post-test and could account for 59% of the total variance, with recognition of anomalous situation being the best predictor. Additionally, semi-structured interviews were conducted with two students from each grade level using the same sequence of events. Persistence to alternative frameworks was often evident even after the induction of cognitive conflict, and cognitive reappraisal was often perceived but not actually performed by all. Research results indicate that methods of inducing and diagnosing CC are promising, but need to be further refined in order to find better approaches fostering conceptual change.

J 3　　　　　25 August 2005　　　17:00 - 18:20　　　　Room A108

Paper Presentation
Multiculturalism in Education

CULTURAL INFLUENCES ON LEARNING

Chair: Lanwan Chang, National Taichung Teachers College, Taiwan

The Performance of 15-year-old students with Turkish or former Yugoslavian origin in Austria, Germany and Switzerland
Gesa Ramm, Leibniz-Institute for Science Education, Germany
Heike Heidemeier, Leibniz-Institute for Science Education, Germany
Christian Bruehwiler, Paedagogische Hochschule St. Gallen, Switzerland

The OECD (Organisation for Economic Co-Operation and Development) created the Programme for International Student Assessment (PISA) in order to respond the need for comparable results on the performance of a representative sample of 15 year old students in different countries. In PISA 2003 the performance in mathematics, reading, science and problem solving were generally assessed. For the education systems the integration of students with migration background is a demanding task. Therefore PISA compares the performance of Students with migration back-

ground in particular. The historical, political and cultural aspects involved in migration make the interpretation of the results in PISA difficult. More useful for the evaluation of the education systems are comparisons between groups of the same origin and duration of residence in countries that are comparable in many aspects. Considering this, we compare the results of students with migration background in three European countries, Austria, Germany and Switzerland. For all these countries up to date research proves a lower level of performance for students with migration background in comparison to native students (OECD, 2001). Using PISA 2003 data we investigate the learning outcomes of 15-year old students: Do the education systems in Austria, Germany and Switzerland lead students with Turkish and former Yugoslavian origin to different performance levels? In the analyses the social-economic status (HISEI) is also taken into account. The results related to the major domain mathematics show that students with Turkish origin and students who migrated from former Yugoslavia reach lower performance in Germany than in Switzerland and Austria. Students who were born in the country but with parents born in former Yugoslavia perform on an equal high level in Germany and Switzerland but lower in Austria. The results are discussed considering the different education systems and programmes for support of migrant students in Austria, Germany and Switzerland.

Interaction between family languages and language of schooling
Isabelle Negro, University, Martinique
Sophie Genelot, University, Martinique

This study was designed to examine in Martinique kindergarteners the interaction between two languages learned in the family context (French & Creole) and the language of schooling (French). Studies about bilingualism suggest that bilinguals elaborate a single mental lexicon composed of subsets of language-specific information (Wei, 2000). Conceptual information or general syntactic rules (Hartsuiker, Pickering & Veltkamp, 2004) could be shared between languages while lemmas and lexemes (Levelt, 1989) are separately represented. Within this frame, performances across two languages are highly related: they depend on the speaker's general level of intelligence and on the automation of some processes (Geva & Ryan, 1993). Furthermore, difficulties concern phonological and syntactic abilities more than semantic ones (Sparks & Ganschow, 1993). In this view, we hypothesised that performances in Creole tests should be correlated with performances in French tests. This correlation should be explained by social factors, by general cognitive competencies and especially by working memory spans. Two hundred kindergarteners (5/6

y.o) from Martinique took part in this experiment. They were given verbal tests in French and Creole implying various language dimensions as well as tests of logical reasoning which did not involve verbal answers. A questionnaire, comprising of information about the child and his/her parents was completed by each child's family. It was designed to control for social factors that might account for each child's performance. The results are currently in the course of being compiled. The data from the social questionnaire and from the different verbal and non-verbal tests are being analysed with MANOVA and with multiple regression analyses. This study is intended to improve our knowledge about the interaction between languages and about the factors responsible for academic failure in all the countries in which the language of schooling is in competition with a language of lower social status.

The role of culture in learning: Parents' perspectives
Jill Bevan-Brown, Massey University College of Education, New Zealand

The contention that culture plays an important, influential role in students' learning is supported from a variety of theoretical perspectivesboth cognitive and affective. However, is this belief held at a grass-roots level? This presentation examines the results of a study that investigated this question. More specifically the research sought to discover what cultural input, if any, the parents and family of Maori children with special educational needs wanted in their child's special education? Did they believe that cultural input would benefit their child's learning? Using a three-pronged approach of: focus group interviews of parents and families of children attending six different Maori early childhood centres; a 6 year longitudinal study of one child; and interviews with the parents and families of 30 Maori children with special educational needs, it was found that 86% of participants considered that cultural input in both special and general education was important for the learning, self-esteem and cultural development of Maori students. This cultural input included the incorporation of Maori content and language into the curriculum; the use of culturally appropriate identification and assessment measures, procedures, teaching strategies and resources; and the recognition and incorporation of Maori values, perspectives and perceptions of special educational needs. However, parents and family members also noted that this cultural input was generally missing from their child's special education due to, firstly, a widespread shortage of culturally appropriate services, programmes, resources and people with Maori cultural and language expertise and, secondly, societal and individual beliefs and attitudes that are detrimental to Maori. Consequently it can be concluded that while academic theorists, parents and families may concur about the important role culture plays in

learning, this belief is not always being put into practice.

Attitudes of bedouin teachers and students towards the factors influencing academic achievement and their perspective on israeli society
Sliman Khawalde, Achva Academic College of Education, Israel

This paper presents an empirical study that compares the radically divergent attitudes and perspectives of two groups towards the low level of academic achievement of the students in the Arab Bedouin sector in the Negev (the south of Israel). The achievements of the Arab Bedouins on the matriculation exams are the lowest in the country. We wanted to investigate whether the participants attribute their low achievements to external factors related to their traditional lifestyle or, they project their frustration onto the Israeli establishment and object to cooperate with this establishment. The research tool was a questionnaire. The sample included 311 teachers and 585 high school students studying in 10 schools in grades nine and eleven. The data show that there exists a wide gap between the attitudes and perspectives of teachers and students regarding the influences effecting academic achievement. The teachers attribute the low achievements to structural and traditional factors of the Bedouin community, such as the socio-economic situation, the low educational level of the parents. The students are less radical than the teachers and object less to cooperation with the Israeli establishment that neglects and discriminates against them. The attitudes of the teachers and students concerning the support for the creation of a Palestinian State are similar and closely in agreement. It is necessary to invest efforts to narrow the gap between the different perspectives of teachers and students, thereby enabling the teachers to enter into the world of their students and attain positions as role models with which the students can identify.

Paper Presentation
Mathematics Education

TEACHING MATHEMATICS

Chair: Costas Christou, University of Cyprus, Cyprus

A comparative analysis of the educational objectives and didactic strategies of mathematics teachers from five European countries
Paul Andrews, University of Cambridge, United Kingdom

This paper reports on part of the work of the mathematics education traditions of Europe (METE) project, which is a small-scale, European Union-funded, video-based study of the teaching of mathematics in Flemish Belgium, England, Finland, Hungary and Spain. The project has focused on the age range 10-14 and the teaching of sequences of four or five successive lessons taught on the same topics across the project countries. Project lessons were videotaped and then coded against a schedule which had been developed, in a grounded manner and acknowledging the social construction of meaning, contemporaneously with a series of live observations in each project country involving, in each case, at least one observer from each country. Each episode of a lesson was coded according to the presence or otherwise of each coding category. For the purpose of the project an episode was that part of the lesson in which the teacher's didactic intention remained constant. The coding schedule was structured in four parts of which two are discussed in this paper. The mathematical focus of an episode comprised seven codes relating to the observable objectives of a teacher's actions and, essentially, presented mathematics as conceptual, structural, derivational, procedural, efficiency, problem-solving and reasoning. The mathematical didactics of an episode comprised ten codes related to the observable strategies employed by teachers to realise their objectives. These were activating prior knowledge, exercising prior knowledge, explaining, sharing, exploring, coaching, assessing, motivating, questioning and differentiating. A comparative analysis of these two sets of lesson characteristics and their interactions indicated substantial variation which, in some sense, was determined by nationality. Such findings accord with earlier research which conjectured the existence of a particular characteristic pedagogical flow in each country (Schmidt et al, 1996). Some implications in respect of comparative education in general are considered.

Mathematical paradoxes as a tool for developing students' metacognitive skills
Vadim Livshitz, Science Teaching Center, Hebrew University, Israel
Alex Kozulin, ICELP, Israel
Igal Galili, Science Teaching Center, Hebrew University, Israel

The present research is dedicated to piloting the instructional method developed for the enhancement of metacognitive skills in middle-school students. The method is based on the classroom analysis and discussion of mathematical and logical paradoxes. The main assumption of the research was that active classroom analysis of mathematical paradoxes contributes positively to the development of students' high cognitive functions, including task analysis, planning, reflection, and metacognition in general. The study was conducted in a realistic classroom environment in two 8th grade classes. Eighteen students participated in all tests and activities in the experimental group and 23 students in the control group. Pre- and post tests for both groups included mathematical as well as general cognitive problems. Mathematical problems were based on the material familiar to students and corresponding to the 8th grade math curriculum. The problems were selected so that their correct solution depended on the students' attention to the problem instructions and a return to these instructions during the problem solving. The instructional phase in the experimental group included nine weekly lessons devoted to the analysis of mathematical and logical paradoxes. The lessons were conducted using Feuerstein's interactive technique of mediated learning and were aimed at developing students' rigorous mathematical thinking as stipulated by the Vygotskian theory of theoretical learning. The analysis of pre- and post-test as well as the experimental group's performance during intervention sessions led to the following conclusions: 1. Students' problem solving difficulties are directly related to their lack of attention to and reflection upon problem instructions. 2. Active classroom analysis of mathematical paradoxes contributed positively to the development of students' high cognitive functions as reflected in significant improvement in experimental group math performance from pre-to post-test.

Primary mathematics teachers' pedagogical content knowledge of the teaching of quadrilaterals
Ida Ah Chee Mok, The University of Hong Kong, Hong Kong
Yee Han Park, The University of Hong Kong, Hong Kong

Teacher's pedagogical content knowledge is essential in bringing about effective learning. Different models have been developed in recent studies (e.g., Shulman,

1987; Peterson, 1988; Leinhardt et al., 1995; Marks, 1990; Cochran et al., 1993). Deriving from these models, an analytical framework of four components, namely, subject matter knowledge, knowledge of students' understanding, curriculum knowledge, and knowledge of instructional strategies is developed in this study. The aim of this study is to explore primary school mathematics teachers' pedagogical content knowledge in the teaching of quadrilaterals. The subjects included 8 primary mathematics teachers with different experience in teaching from a Hong Kong school. The teachers were interviewed. In the interviews, they were presented scenarios constructed out of common tasks of teaching mathematics. The scenarios were designed in order to explore three things: (1) What the mathematics teachers seemed to know about quadrilaterals and the teaching and learning of quadrilaterals in classroom; (2) What actions the mathematics teachers would take in responding to each scenario; and (3) How the mathematics teachers weave together different kinds of knowledge in making interpretations and choice. Other interview questions focused on teacher's knowledge of students' understanding, curriculum knowledge, knowledge of instructional strategies and subject matter. The results show that the four components of pedagogical content knowledge are interrelated. The lack of one of the components may have a negative impact on the holistic development of pedagogical content knowledge. However, the teachers in this study were confident with what they had learnt during their schooling and did not realize that their subject matter knowledge was not sufficient for their teaching. They even did not consider whether their concepts about quadrilaterals were right or not. Such lack of awareness of their weaknesses will probably imply difficulties in providing an enhanced environment for their students' learning.

Intensive Quantities: Why They Matter to Mathematics Education
Christine Howe, University of Strathclyde, United Kingdom
Terezinha Nunes, Oxford Brookes University, United Kingdom
Peter Bryant, Oxford Brookes University, United Kingdom

Although a distinction can be drawn between extensive and intensive quantities, mathematics teaching throughout Europe focuses upon extensive quantities only. If intensive quantities are addressed, it is typically only to the extent of assuming that teaching in extensive contexts will promote understanding in intensive contexts. This paper reports a study with 963 pupils aged 7 to 12 years, which shows that this assumption is ill founded. Pupils were asked to solve 48 intensive quantity problems, presented to them by power-point demonstration. 24 problems involved fixed ratios, e.g. 'Yesterday, Billy made juice from 3 oranges and 1 pineapple. To-

day, he is using 2 pineapples. How many oranges will he need to make the juice taste the same?' 24 problems used variable ratios, e.g. 'Joe jumps 8 hurdles in 40 seconds, and Peter jumps 5 hurdles in 30 seconds. Is Joe running faster? Is Peter running faster? Are both running at the same speed? 'Pupils' reasoning about intensive quantities showed over-generalisation from extensive contexts where this was inappropriate. In particular additive or subtractive strategies were used where multiplication and division were required. This led, e.g., to pupils arguing that if you need 8 spoons of flour and 12 spoons of milk to make 8 pancakes, you will need 6 spoons of flour and 10 spoons of milk to make 6 pancakes. Reasoning also showed under-generalisation from extensive contexts where generalisation would have been in order. For instance, pupils who can be assumed to have secure knowledge of 'one-half' or 'two-quarters' in extensive contexts had great difficulty when asked what fraction of a two-part blue paint and two-part white paint mixture was made of blue paint. Based on these results, it is suggested therefore that the research highlights a need for wide-ranging reform of mathematics curricula.

J 5   25 August 2005   17:00 - 18:20   Room A018

Paper Presentation
Science Education

LEARNING IN SPECIALIZED DISCIPLINARY DOMAINS

Chair: Zacharias Zacharia, University of Cyprus, Cyprus

Multiple representation in learning about evaporation
Russell Tytler, Deakin University, Australia
Vaughan Prain, Latrobe University, Australia

This study draws on recent research on the central role of representation in learning. While there has been considerable research on Children's understanding of evaporation, the representational issues entailed in this understanding have not been investigated in depth. The study explored students' engagement with science concepts relating to evaporation through various representational modes such as diagrams, verbal accounts, gestures, and captioned drawings. This engagement entails students a) clarifying their thinking through exploring representational resources, b) developing understanding of what these representations signify and c) learning how to construct and interpret the representational aspects of scientific explanation. The

study indicates how a focus on representation can provide fresh insights into the conceptual task involved in learning science. Primary school classroom sequences and structured interviews with 12 children indicated a range of learning potentialities flowing from this focus. The findings suggest that teacher-mediated negotiation of representational issues as students construct different modal accounts can support enriched learning by enabling both a) richer conceptual understanding by students and b) enhanced teacher insights into students' thinking.

The intuitive and scientific models of the human circulatory system
Asuncion Lopez Manjon, Universidad Autonoma de Madrid, Spain
Yolanda Postigo, Universidad Autonoma de Madrid, Spain

This paper presents research on the relationship between adolescents?, and teachers' conceptual understanding of the human circulatory system. We are interested not only in describing the ideas but analyzing the representational nature of the knowledge about the circulatory system that adolescents, high-school biology teachers and high-school social science teachers (non-biology expert adults) have. For that, we are going to use a variety of tasks that request procedural knowledge such as drawing and identifying the blood path, explaining daily health questions related to the circulatory system and a sorting task of the above health questions. These can allow us to access in certain ways the implicit or intuitive nature of representations people have. We found differences between the biology teacher group on one hand and the students and social sciences teachers on the other in all tasks. The former group's answers were closer to the scientific model meanwhile the latter group's answers were more closely related to the feature of the implicit or intuitive model. This results show how the scientific model taught in the compulsory education has been modify to be adapted to the naive framework theories of biology. We will characterize the features of that naive biology framework.

Critical aspects for learning electric circuits
Anna-Karin Carstensen, Jonkoping University, Sweden
Jonte Bernhard, Linkoping University, Sweden

To learn to link theoretical concepts such as mathematical models and graphical representations to the real world is of great importance in engineering education. One of the mathematical tools is to use the Laplace Transforms to solve differential equations, and to visualise transient responses in electric circuits. In many engineering programs at college level the application of the Laplace Transform is

nowadays considered too difficult for the students to understand, but is it really, or does it depend on the teaching methods used? The aim of this paper is to show that by systematic changes in the lab-instruction it is possible to make the students elaborate the relations between theory and the real circuit.

Alternative models in second-year engineering students' understanding of electric currents
Christina Periago, Technical University of Catalonia, Spain
Xavier Bohigas, Technical University of Catalonia, Spain

Students' understanding and the difficulties they encounter in learning science at school have been comprehensively described over the last two decades. People form simple mental models to account for their knowledge of the physical world. As their knowledge of a given domain expands, they assimilate new knowledge, which is then incorporated into more sophisticated models. It is assumed that thinking involves the construction and assimilation of simplified models of reality. The aim of this research is to detect and evaluate alternative models in students' understanding of electric current in simple circuits. The study was carried out in Barcelona (Spain) and involved second-year engineering students. It should be emphasised that there is little information available about the cognitive models of the population type (university students) studied in this research. In order to find out what these alternative models were, we analysed the students' answers to two questions that were designed to test their understanding of how an electric current flows through a simple circuit. A cross-tabulation table, chi-square tests and directional measures were computed with a view to examining the strength and direction of the relationships between the answers given. The results show that one particular alternative model is deeply rooted: many students believe that an electric current diminishes as it flows round a circuit. A striking aspect of the study is the fact that the number of students who followed this alternative model (34.5%) was greater than the number of students who followed the scientific model (29.2%). The results will be extremely useful in designing and drawing up a teaching unit based on a constructivist approach to teaching and learning processes.

J 6   25 August 2005   17:00 - 18:20   Room A008

Paper Presentation
Early Childhood Education

MATHEMATICS LEARNING IN THE KINDERGARTEN

Chair: Eleni Loizou, Univesity of Cyprus, Cyprus

Doing Mathematics in the Kindergarten with Multimedia
Itzhak Weiss, Bar-Ilan University, Israel
Bracha Kramarski, Bar-Ilan University, Israel

Standards in the area of mathematical education has largely emphasized the importance of fostering mathematical skills as an integral part of doing mathematics from the kindergarten (The National Council of Teachers of Mathematics, 1989; 2000). Multimedia is an interactive computer-based environment that provides active engagement with multi-presentations as texts, voices, pictures and animations. The purpose of the study is twofold (a) to investigate the effects of learning mathematics with multimedia (M) in kindergarten on students' mathematical achievements; and (b) to compare the effects of multimedia under two conditions: Cooperative learning (CL) vs. individual learning (IL).Participants were 116 students (61 girls and 55 boys) from six kindergarten classes of two year olds. The students were randomly assigned to two experimental groups: one was exposed to M+CL (N=36) and the second was exposed to M+IL (N=40), while a Control group (N=40) was not exposed to multimedia. The multimedia included 6 stages of different level of a mathematical situation visualized by voices, animations, words and numbers. Pre/post mathematical achievement tests were used to assess students' mathematical achievements in the six different skills: Number recognition, Counting, Grouping, Comparing, Estimating, Adding and Subtracting. Alpha Cronbach Reliability for the whole test was 0.85. Anacova's results showed significant differences performed on the total score and on each skill separately. These findings indicated that the two experimental groups (M+CL & M+IL) outperformed the control group (CG) in both ages and made significant progress over time. No differences were found between the two experimental groups (CL vs. IL). These findings expand studies' results on the positive effects of the computer as a tool for using representations, visualization, making models and communication on mathematical reasoning (e.g., Yerushalmy, 1991; Kramarski & Ritkof, 2002; NCTM, 2000; OECD, 2000).

'Knowing what' and 'knowing how'! Young children constructing and communicating structural knowledge about shapes.
Chrystalla Papademetri, Institute of Education, University of London, Cyprus

This is a study that describes information gathered by thirty-two 5 year-olds in relation to their structural understandings concerning two-dimensional shapes. The research aim was to expose and glorify young Children's intuitive structural knowledge about shapes by providing the subjects with means of expressing old knowledge, new knowledge and the process of transforming the first to the latter. Based on the Vygotskian conviction that there can be no separation between 'knowing what' and 'knowing how', and that knowledge and activity are interdependent, the interviews were conducted within a cognitivist constructionism setting. During the interviews the children were involved in construction tasks, which acted as objects-to-think with and allowed the researcher to investigate thinking-in-process. Furthermore the construction tasks acted as communication tools and created a culture in which children were equipped with diverse modes of expressing knowledge and thinking. All interviews were videotaped and transcribed. The analysis procedure showed that children within a constructionism setting expose rich intuitive structural knowledge about shapes, which they express in many ways (manipulatives, gestures, conventional language, 'unconventional' language, simile, and of course construction). Patterns were identified in relation to the structural knowledge unfolded, the ways in which this knowledge was expressed and the strategies developed by the children for constructing the shapes.

Young Children's development of counting skills:Role of spontaneous focusing on numerosity and subitizing-based enumeration
Minna M. Hannula, University of Turku, Finland
Pekka Rasanen, NMI / University of Jyvaskyla, Finland
Erno Lehtinen, University of Turku, Finland

We investigated relationships between Children's Spontaneous FOcusing on Numerositu (SFON) tendency, subitizing-based enumeration and verbal counting skills. We propose that SFON is involved in the development of mathematical skills by producing practice in intentional recognition and utilizing numerosity in action. The role of SFON in learning different sub-skills of counting may differ according to how significant a role integrating cardinal values for number words has for learning the sub-skill. The participating 39 children were tested for their SFON tendency at the ages of 4 and 5 years, and for their subitizing-based enumeration,

and counting skills in separate testing sessions at the age of 5 years. Results showed that the children with a strong general long-term tendency to focus on numerosity tended to enumerate by subitizing larger numbers of items, and had better verbal counting skills at the age of 5 years. Furthermore, there was a positive direct association between spontaneous focusing on numerosity and number sequence production. The association between spontaneous focusing on numerosity and object counting skills was significantly mediated by subitizing-based enumeration. Our results have educationally important implications. Special care should be taken to make sure that all young children start to spontaneously practice their quantitative skills, and especially learn to utilize their innate mechanisms for recognizing small numerosity. In the early diagnosis of mathematical disabilities, SFON tendency and subitizing-based enumeration skills should be assessed. In educational research, it might be time to move on to exploring which aspects children themselves focus their attention on, how they interpret the tasks, and what kinds of processes follow these intentional acts. This approach might be fruitful in understanding different trajectories in several areas of cognitive development in addition to mathematical development.

Exploring teachers' beliefs about teaching mathematics at kindergarten
Despina Desli, Democritus University of Thrace, Greece
Stavroula Papapetrou, Democritus University of Thrace, Greece

The aim of the study was to describe how early childhood teachers view teaching mathematical concepts at kindergarten level given the fact that the new curriculum for primary education designed recently (2001) implies new methodological indications and teaching suggestions that affect that teaching. The sample consisted of 200 Greek kindergarten teachers with differentiations in their years of previous service in education. The teachers were asked about the necessity of teaching proto-mathematical concepts at kindergarten and the aims in mathematics teaching and mathematics teaching contents. They were also asked to indicate the extent to which they are aware of the early childhood curriculum for mathematics and the difficulties they experience in applying it. Results showed that teachers mainly believe in the necessity of mathematics teaching at the kindergarten level and seriously indicate the contribution of that teaching to the successful understanding of mathematical concepts in the first years of primary school. Aims that include emotional and motivational elements were valued the most important in mathematics teaching, while those referred to different cognitive skills and specific mathematical contents were next most highly valued. Finally, the majority of teachers reported

that their own lack of awareness of the new teaching trends that the curriculum implies kept them from venturing into the kinds of procedures that are essential in teaching mathematics at kindergarten. The results develop a framework for discussing kindergarten teachers making changes to their understandings and practices and verify the importance to improve their knowledge in mathematics teaching.

J 7　　　　　　25 August 2005　　　17:00 - 18:20　　　　　Room A109

Paper Presentation

COGNITIVE SKILLS

Chair: Paul Kirschner, The Open University of the Netherlands, Netherlands

Does working memory training have any effect on Children's self-concept?
Anna-Lena Ljusberg, Stockholm Inst. of Education, Sweden
Jane Brodin, Stockholm Inst. of Education, Sweden

This study is a part of a project concerning children with, attention deficits, the BASTA-project (basic skills, social interaction, and training of the working memory). It is an interdisciplinary project between the Stockholm Institute by Education and the Karolinska Institute in Stockholm financed of The Swedish Research Council. A research group at the Karolinska Institute has, with the starting point in a discovery that it is possible to improve the working memory, prepared an interactive training program; RoboMemo. In a study (Klingberg, Forssberg, Westerberg, 2002) seven children with the diagnoses ADHD worked with RoboMemo. The children showed significantly better results in problem solving, attention and in decreasing their hyperactivity. The aim of the current part of the project is to study if training with RoboMemo has any effects on the Children's self-concept. Self-concept is assessed with a questionnaire, This Is Me (Taube, Torneus, Lundberg, 1984) with 30 items. The different components are academic self-concept, social self-concept and personal self-concept. The children fill in the questionnaire at three times; before, direct after and six months after the working memory training program. It is a double blind, intervention study. The classes in randomised in control- and experimental group. The group being studied consist of children nine to twelve years old, attending remedial classes in a ordinary school, with Swedish as their first language, with average intelligence, deficits in attention, with or without diagnoses as ADHD, not autistic, nor with hearing or eye problems. The number of children

participating in the study will be 60 – 70.

Is Information Acquisition Still Important in the Information Age?
Sarit Barzilai, Hebrew University, Israel
Anat Zohar, Hebrew University, Israel

The distributed cognition approach argues that cognition does not reside in the individual mind but is distributed across minds, persons, and symbolic and physical environments. This paper questions one of the basic assumptions of the distributed cognition approach; that the location of information, i.e. whether it is located in the mind or in surrounding tools, is not important. But has information acquisition really become less important in the information age? Should information skills replace the acquisition of information? This paper seeks to explore these questions, and to reassess the importance of information acquisition in the learning process. We examined these questions by interviewing 24 expert academic researchers who work regularly with computerized information tools about their learning and thinking habits. Analysis of the researchers' descriptions of their own learning and thinking processes revealed that according to the majority of the researchers the location of the information does affect their thinking processes in a significant way. From the viewpoint of the researchers we interviewed, both researchers and students still need to systematically acquire large amounts of information in order to be able to search for more information and in order to facilitate knowledge construction. These findings suggest that teaching for information acquisition is more important than currently believed by most advocates of distributed cognition theories. There appear to be cognitive advantages to storing information in the mind, especially when it concerns tasks that require high-level thinking and research. An effective teaching plan should seek to find a balance between traditional lectures and reading tasks that encourage information acquisition, and student-centered inquiry tasks that help students deepen their understanding and develop their information skills.

Development of orientation skills of 6th grade primary school students using compass and map: a case study
Ioannis Parkosidis, University of Athens, Greece
Maria Drakopoulou, University of Athens, Greece
Costantinos Skordoulis, University of Athens, Greece

Many science education researchers agree on G. Holton's and the Harvard's Project Physics core idea on teaching science. They do try to transform and enrich that effort

by attempting the creation of new, attractive learning environments that can make full use of such recommendations. Within this context we investigate how History of Scientific Instruments might contribute into teaching science, since the study of the interaction between the contexts of manufacture and utilization reveals both the cultural and human nature of science and the latter's interaction with society, while it facilitates teaching and learning science at the same time. More specifically, it is argued that the study of Scientific Navigation & Cartography Instruments' History and Operation Principles, such as compass, may reinforce teachers' and students' efforts of approaching the concept of space in multidisciplinary way, comprehending orientation methods and procedures, and conceive the relation between space and time. They need to develop competences and skills related to the use of Scientific Instruments in order to understand Science through personal engagement & practice. This study describes the theoretical framework, the planning of our research, as well as the results and conclusions that are derived from the qualitative analysis of the data produced. This is the 1st part of an empirical study aiming at investigating to what extent students of the 6th grade of primary school are capable of developing the skill of combined use of educational compass and map, so that they are facilitated in conceiving the concept of space, ways of its' representation, their way of orientation and finally defining their location in it.

Memory organization for spatial layouts learned in Virtual Reality
Marios Avraamides, University of Cyprus, Cyprus
Jonathan W. Kelly, University of California Santa Barbara, United States

Results suggesting that changing perspective and switching across spatial environments held in memory are processes that take place in parallel were obtained from a task-switching experiment. Participants learned layouts of objects in two virtual rooms and then were asked to use their memories to locate the objects from various imagined viewing perspectives. Results revealed that, even after experiencing multiple perspectives, participants maintained viewpoint-dependent memories for the layouts, and that the latencies for changing perspective within and across environments followed a different pattern depending on whether participants imagined adopting the preferred view. The implications of these results for learning the layouts of novel spaces (e.g., when visiting a city for the first time) are discussed.

J 8   25 August 2005   17:00 - 18:20   Room A110

Paper Presentation
Motivational, Social and Affective Processes

MOTIVATION AND GOAL ORIENTATION

Chair: Panicos Stravrinides, University of Cyprus, Cyprus

The Internal/External Frame of Reference Model: A meta-analytical path analysis
Moeller Jens, University of Kiel, Germany
Pohlmann Britta, University of Kiel, Germany

Beside interindividual social comparisons, intraindividual dimensional comparisons in which students compare their achievements in one subject with their achievements in other subjects have an impact on their academic self-concepts. The internal/external frame of reference (I/E) model by Marsh (1986) assumes that a) math and verbal achievements are positively correlated, b) there is a moderate to zero correlation between math and verbal self-concept, c) social comparisons lead to positive paths from achievement to the corresponding self-concepts and d) dimensional comparisons lead to negative paths from achievement in one subject (e.g., math) to self-concept in another subject (e.g., English). To address the question on the generalizability of the I/E model findings of studies investigating the relation between domain-specific self-beliefs and achievement were synthesized using meta-analysis. Meta-analyses of 69 data sets (N = 126.455) confirmed assumptions a) and b). Subsequently, the effect sizes from the meta-analyses were path-analyzed. Results supported assumptions c) and d). Therefore, the I/E model is valid for different age and gender groups, achievement measures, self-concept measures, and countries. In summary, there exists a very strong body of support for the I/E model dealing with math and verbal self-concepts. We found one exception: The use of an internal frame of reference does not play an important role for the development of self-efficacy beliefs and logically the I/E model does not fit the data for self-efficacy beliefs. Further research should concentrate on research strategies like experimental manipulations or introspective studies to focus more directly on the psychological processes leading to the domain-specificity of academic self-concepts.

Intrinsic and Extrinsic Aspirations and their Effect on Academic Choice

Uta Klusmann, Max Planck Institute for Human Development, Germany
Ulrich Trautwein, Max Planck Institute for Human Development, Germany
Oliver Luedtke, Max Planck Institute for Human Development, Germany

Research has recently begun to explore the relationship between learning environments and life aspirations. The present study examines the psychometric properties of the Aspirations Index by Kasser and Ryan (1993) relates it to current and future academic environments. The Aspirations Index is a standardized questionnaire measuring seven global life goals which was developed on the basis of self-determination theory (SDT). It differentiates between intrinsic (personal growth, relationships, community, health) and extrinsic (wealth, fame, image) life goals. Intrinsic aspirations are conceptualized as being congruent with the basic psychological needs for autonomy, competence and relatedness whereas pursuing extrinsic aspirations can provide only indirect satisfaction of these needs and may distract from or interfere with their fullfilment. The sample were 4,565 German students (149 schools) in their last year of high school (mean age: 19,6). The Aspiration Index and a variety of other instruments were used, including achievement tests, measures of well-being, and future study fields. Results indicated that the seven subscales possessed good internal consistency. The factorial structure was in line with the theoretical assumptions. Moreover, as assessed in an additional sample of 78 students, there was a high four-week stability of students' endorsement of the different life goals. Using multilevel modelling, we further examined whether life aspirations as assessed by the Aspirations Index varied as a consequence of different school environments and/or different future academic choices. Whereas only a relatively small variation was found between schools (Intraclasscorrelations ICC < .05), different future study fields were meaningfully related to life aspirations (e.g., higher wealth aspirations in business students). These results support the view that life aspirations are important predictors of academic choices.

The Distinctiveness of Classroom Mastery Goal Structure and Dimensions of the Social Environment

Helen Patrick, Purdue University, United States
Allison M. Ryan, University of Illinois, United States
Avi Kaplan, Ben-Gurion University, Israel
Susan Maller, Purdue University, United States

Within goal theory, the learning environment is conceptualized in terms of goal

structures, or the reasons for doing school work and the meaning of success that are emphasized in the classroom or school. A large body of research has shown that classrooms perceived as having a strong mastery goal structure (i.e., the development of competence is emphasized) constitute a particularly adaptive learning environment. Given the unequivocal findings, motivation researchers recommend that teachers establish a mastery goal structure in their classroom. Goal theorists recommend a constellation of six categories of practices, represented by the acronym TARGET, for creating mastery-focused classrooms. These recommended practices come predominantly from a synthesis of experimental research, and questions remain about how applicable, or ecologically valid, they are to real classrooms. Furthermore, recent mixed-method research has prompted the suggestion that social aspects of the classroom, which are not included in TARGET, may comprise an integral aspect of mastery goal structure. In the current study we examined whether students view the classroom mastery goal structure as distinct from dimensions of the classroom social environment (teacher support, promoting mutual respect, promoting interaction). Using survey data from 1906 sixth through eighth graders, we tested separately competing four- and five-factor models using confirmatory factor analyses. The fit statistics indicated excellent fit for both models, and all parameter t values were significant. Correlations indicated overlap among factors in the four-factor model. The factor intercorrelations in the five-factor model indicated distinctiveness of teacher support from the other factors, which were highly correlated with each other. This suggests that mutual respect, promoting interaction, and mastery goals may constitute one factor, separate from teacher support.

Students' goal orientation profiles, educational goal appraisals, and subjective well-being
Heta Tuominen, University of Helsinki, Finland
Katariina Salmela-Aro, University of Helsinki, Finland
Markku Niemivirta, University of Helsinki, Finland

The aim of this study was to examine the relationships between students' achievement goal orientations, educational goal appraisals, and subjective well-being (self-esteem, burnout, and depression). About 15-year-old lower secondary school students (N=707) and about 17-year-old upper secondary school students (N=614) participated in the study. By means of latent class clustering, the students were first classified according to their responses to the goal orientation scales. The best fitting solution included five groups, which, according to the score mean profiles, were labeled as non-committed, success-oriented, performance-oriented, avoidance-ori-

ented, and learning-oriented. As expected, these groups differed in terms of how they appraised their educational goals. Avoidance-oriented students were the least committed, demonstrated the least effort, and experienced least goal progress, but they also experienced least stress with their current goal status. In contrast, the success-oriented students were the most committed, demonstrated the most effort, and reported most progress with their goal pursuit. Performance-oriented students experienced most stress with their goal status. Goal orientation groups differed also with respect to subjective well-being. For example, the success-oriented students and the learning-oriented students displayed significantly higher self-esteem and experienced less school-related burnout compared to the other students. The avoidance-oriented students displayed lowest self-esteem and experienced most school-related burnout. Performance-oriented and avoidance-oriented students experienced most depressive symptoms, while success-oriented students experienced least these symptoms. Compared to the lower secondary school students, upper secondary school students experienced more school-related burnout and depressive symptoms. Hence, it seems that students' achievement goal orientations are predictably and systematically related to educational goal appraisals and subjective well-being.

J 9   25 August 2005   17:00 - 18:20   Room A009

Paper Presentation
Motivation

MOTIVATIONAL ASPECTS OF LEARNING

Chair: Elbers E.P.J.M, University of Utrecht, Netherlands

Types of motivation in physics learning: a self-determination theory approach
Reijo Byman, University of Helsinki, Finland
Jari Lavonen, University of Helsinki, Finland
Kalle Juuti, University of Helsinki, Finland
Veijo Meisalo, University of Helsinki, Finland

According to the theory of Edward Deci and Richard Ryan, motivation is a process in which the person's way of thinking has an important role. Motivated behavior may be self-determined or controlled. These two types of motivated behavior involve different reasons for behaving. By self-determined or autonomous behavior,

Deci and Ryan mean freely chosen behavior which arises from one's self. Intrinsic motivation is the prototypical example of autonomous motivation. That is, when people are intrinsically motivated they are by the definition self-determined. Self-determination theory (SDT) draws distinctions between four types of extrinsic motivation based on how self-determined each type is, namely external, introjected, identified, and integrated forms of regulation. The aim of the present study was to test the factorial validity of the inventory designed to measure students' motivation to study physics in school. Based on SDT, it was hypothesized that four factors External Regulation, Introjected Regulation, Identified Regulation and Intrinsic Motivation account for the covariances among the items of the inventory. It was also expected that gender moderates the factorial validity of the inventory. A sample of 3626 Finnish students was used. This sample was divided according to sex. Multilevel confirmatory factor analysis (CFA) was used to investigate the fit of hypothesized the four-factor model. Although the overall fit of four-factor base model was quite good on the individual level, the detailed analysis of the results revealed discriminant validity problems between the Identified Regulation factor and Intrinsic Motivation factor. However, using post hoc CFA with both orthogonal and oblique factors, it was possible to find item combinations where the correlation between Identified Regulation and Intrinsic Motivation factors was only high.

Motivation in science and attitudes among high-school low achievers
Normand Roy, University of Montreal, Canada
Isabelle Plante, University of Montreal, Canada
Roch Chouinard, University of Montreal, Canada
Jesus Vasquez-Abad, University of Montreal, Canada

We conducted a study of low achievers' motivation and interest in science taking gender and socioeconomic status into account over one year. About 520 students taking the low-achiever grade-10 science course from eight schools in Montreal participated in the study. Results show lower perception of competence and more anxiety in girls than boys, who have higher avoidance goals. Moreover, girls perceived science as more valuable, and have more mastery goals; however, mastery goals decrease over time for boys and girls. Low-economic status students show greater motivation on all scales.. Finally, boys and girls have higher aspiration in science careers at the end of the year. Furthermore, boys also have higher interest than girl in science careers.

Homework: Greek primary school students' perspectives

Katerina Malamitsa, University of Athens, Faculty of Primary Education, Greece
Michael Kasoutas, University of Athens, Faculty of Primary Education, Greece
Panagiotis Kokkotas, University of Athens, Faculty of Primary Education, Greece

This paper draws attention on family involvement to Greek primary school Children's homework. We also try to explore the way Greek students manage their homework. Based on previous research projects (Barge & Loges, 2003; Cooper, Lindsay & Nye, 2000; Harniss, Epstein, Bursuck, Nelson & Jayanthi, 2001; Hong, 2001; Lacasa, Reina & Alburquerque, 2002; Levin et al., 1997; Muhlenbruck, Cooper, Nye & Lindsay, 2000) we conducted a field study asking children to complete a multiple choice questionnaire and to write an essay about how they study at home in an effort to reveal aspects of the Greek reality about homework management and family help. In this research, families and classrooms are regarded as communities of practice in which learning and understanding are assumed to take place through apprenticeship as a context-embedded process, socially and culturally constituted, and what is to be learned is intimately bound up with the forms via which it is learned (Lacasa et al., 2002). In our analysis we took into consideration the dimensions mentioned in the related research: autonomy support, direct involvement, elimination of distractions and parental interference (Cooper et al., 2000). A sample size of about 150 students was gathered from the two final grades of Greek primary schools (ages 11-12). Research results showed that Greek parents have an increased interest in helping their children with their homework, although most of the times they do not know how to help them. Another important finding was that in many houses children cannot concentrate when studying due to the distractions existing in the house environment. Many children were found to study while the TV was playing loud.

Effects of Homework Quality on Students' Homework Motivation and Behavior: Testing a Psychological Multilevel Model

Ulrich Trautwein, Max Planck Institute for Human Development, Germany
Inge Schnyder, University of Fribourg, Switzerland
Rico Cathomas, University of Fribourg, Switzerland
Alois Niggli, Paedagogische Hochschule Fribourg, Switzerland

Research on homework in school has recently shifted from an exclusive focus on time on task to incorporating self-regulation theory and theories on the quality of teaching in order to explain homework effects at the class and individual student

level. The present paper examines how teacher variables such as quality of homework and homework supervision influence students' homework motivation (belief in being able to solve homework problems and perceived utility of doing homework) and their homework behavior (time spent on homework, effort put into homework) in French as a second language. A large sample of more than 1,200 eighth graders from 62 classes in the German-speaking part of Switzerland and their French teachers took part in this study. In order to separate effects at the individual and class level, multilevel analyses were performed with students' reports of their homework motivation and behavior as the dependent variables. Results evidenced a meaningful amount of between-classes variance for several motivational and behavioral variables. Moreover, several predictors at the class/teacher level (e.g., homework quality) were found to significantly predict students' homework motivation and – as a consequence – their homework behavior. Implications for educational practice are discussed.

J 10   25 August 2005   17:00 - 18:20   Room A111

Paper Presentation
Special Education

CHILDREN WITH AUTISM

Chair: Timothy Papadopoulos, University of Cyprus, Cyprus

Coping with Young Children with Autism: Perspectives of Women-Educators
Amos Fleischmann, Achva College of Education, Israel
Sivan Tamar, University of Derby, Israel Extension, Israel
Naama Kaufmann, Achva College of Education, Israel
Ravit Kedem, Achva College of Education, Israel

Special education teachers in general (Fore et al., 2002; Gersten et al., 2001; Nelson, 2001) and teachers of autistic children in particular (Jennet et al., 2003) are targeted for emotional overload and burnout. Few studies have been done on burnout among teachers of children with autism (Jennet et al. 2003). This study investigated the coping strategies of teachers of children with autism shortly after diagnosis in an attempt to determine how conflicts affected their coping. Data collection was done by focused guided interviews which took place in a preschool for 3- and 4- years old children with autism who arrived at the preschool a short time after their initial

diagnosis. Data was analyzed according to grounded theory (Glaser & Strauss, 1967). Results revealed that coping strategies of the women educators' were affected by three interrelated elements. The first concerned the amount of emotional investment necessary for the success of the treatment. The educators were caught between the need for emotional involvement and the overload it creates. The second was described as the tension necessity of being satisfied with modest achievements. The third concerned the between striving for significant achievements of treatment and the attempt to bring the children around to cooperate with the treatment and its goals. The findings show a dilemma: The unending concern for the children and their parents creates an emotional burden. However, educators were placed in a position of having to look for ways to circumvent the antagonism of the children. Consequently, they were pulled back into the repeated concern for the children. This study points to the need to prepare teachers, and especially those at the beginning of their work in this field, for acquaintance with the child with autism.

Learning through variation -utopia or reality for children with autism?
Mona Holmqvist, Kristianstad College University, Sweden
Bengt Selghed, Kristianstad College University, Sweden

Background Children with autism are claimed to benefit from special education. Even so, it is hard to find studies which show what kinds of theoretical assumptions about learning lie behind such statements. In this study a theory named the variationtheory about learning has been used as a framework to analyse the critical aspects a learning object consists of as well as how variation among those can be used to improve learning for children with autism. The aim of the study is to describe what it takes to learn six different abilities necessary to master the participation with other people in a social context. Methods By using design experiments and video recorded observations, teaching situations are designed in six different studies related to which critical aspects are varied and which are not varied and possible or impossible to experience by the learner. The learning outcome is connected to analyse of such a variation in the learning situation. Results All six participated children developed an understanding of the learning objects concerning observable qualitative differences in how to use the abilities in natural settings. The result has been stabile over time, showing an increased ability in new situations. Conclusions The variationtheory has in this study been a powerful instrument to make explicit how to vary the critical aspects to make new learning possible. Used in planning teaching activities for children with autism, its strong focus on the intended learning object and what it takes to learn results in a movement from methodological ques-

tions to content related matters. This is the first published results concerning how to study learning based on this theoretical perspective for children with autism.

The pedagogical work with an adolescent boy with autism and severe mental retardation, during 3, 5 years
Karin Linder, Lund University, Sweden
Marie Hubel, Lund University, Sweden

Autistic Spectrum Disorders (ASD) are severe and lifelong developmental disabilities, which affect the individual's behaviour, communication, cognitive abilities and social relationships. The cognitive deficits and problems in communication imply a functional disorder demanding environment adapting including teaching methods as an important part of the treatment for making it possible to live with the disorder (Mandre, 2002). Today society's policies are that children with autism should be integrated and receive individual special teaching methods (Volkmar et al., 2004). This single reports the unique living situation of an adolescent boy with autism and severe mental retardation, over a period of three and a half years together with his four caregivers. The study was designed as a longitudinal single case study using different methods such as diary reports and semistructured interviews. The aim of this study was to describe and evaluate the working process and the staff's pedagogical work. Findings indicate that the process of establishing structure in the work was influenced by the working situation in this particular case. The staff's perceptions of the working process and the boy's life situation over time, changed from a positive to a more negative view, which seemed to affect their choice of pedagogical strategies. The use of different pedagogical strategies to improve the boy's development and communication competence turned out to be both successful and less successful. The analysis of the diary notes and the interviews showed that the staff more often used different successful pedagogical strategies during the first year when they felt more optimistic, resulting in feedback from the boy and improvement of skills. The unsuccessful strategies as threat and punishment were dominating during the later period when the staff felt resigned and mistrusted and resulted in the boy's stagnation and lack of improvement in different skills.

J 11   25 August 2005   17:00 - 18:20 Room A112

Paper Presentation
Systems in Education

TEACHERS AND SCHOOL REFORM INITIATIVES

Chair: Maria Eliophotou Menon, University of Cyprus, Cyprus

The effects of school reform on teachers and management conceptions about it
Ron Hoz, Ben-Gurion University, Israel

The study pertained to teachers' and management's conceptions about a school re-
form. We documented these conceptions and tested the effects of partaking in the
reform on them and their school. Stratified matched samples consisted of 69 teach-
ers and 28 management from 15 experimental and 10 control elementary school and
43 teachers from 13 experimental and 9 control nursery schools. The conceptions
were obtained for the experimental teachers at year start and end and for the control
teachers at year end. The conceptions and their dimensions were derived by the
analysis of the individual cognitive maps that were constructed of central and sub-
stantial concepts for the reform. A school possessed a conception if its ideas were
integrated more than a predetermined minimum, so that gain or loss of conception,
or conceptional change in all 6 crucial dimensions were identified. We found that
the implementation of ESW is almost unrelated to 1. the existence of conceptions
about it, 2. the nature of the conceptions about it, 3. the formation or disappear-
ance of conceptions about it during the year, and 4. the occurrence of conceptional
change during the year. The distributions of the conceptional dimensions in the
experimental and control elementary schools differed, and were similar in the ex-
perimental and control nursery schools. The ideational sphere is missing from most
conceptions about ESW, which pertain essentially to the practical aspects. The suc-
cess of ESW is unrelated to difficulties in its implementation. The principal's role is
significant to the success but in only a minority of experimental elementary schools.
The findings lend ample evidence for the independence of action and conception
and demonstrate that even when teachers and schools change their practices, the
very implementation may have no effect on their conceptions. Special attention is
needed to empower the ideational aspects of a program.

Teacher satisfaction as a factor of holidays and pay
Elena Papanastasiou, Intercollege, Cyprus, Cyprus
Maria Eliophotou Menon, University of Cyprus, Cyprus
Michalinos Zembylas, Intercollege, Cyprus, Cyprus

The study aims to investigate the relationship between type of teacher motivation (intrinsic versus extrinsic) and job satisfaction among school teachers in Cyprus. Specifically, the degree to which pay forms a major motive for entering teaching is investigated in relation to the level of teacher job satisfaction. The study also examines the link between the degree to which school teachers are satisfied with pay after entry into the profession and their job satisfaction. Job satisfaction is measured in general terms as well as in relation to specific aspects of the profession related to the ability of the teacher to influence student learning and achievement. The data for the study were collected through a questionnaire used in the Teacher 2000 Project, which has been used to investigate teacher job satisfaction in several countries including Australia, England, New Zealand and the USA. The results of this study have shown that although the majority of the teachers in the sample indicated that they had entered the teaching profession because of intrinsic reasons, a large number had done so for extrinsic reasons such as salary and working hours. In addition, the teachers who had entered the teaching profession for intrinsic reasons were overall more satisfied than the teachers who had entered the profession for extrinsic reasons.

Teacher Educators' ambivalence and uncertainty in face of National-Level Systemic Reform in Israel
Nitza Schwabsky, Levinsky College of Education, Israel
Miriam Mevorach, Levinsky College of Education and U of Haifa, Israel
Malka Kohen, Levinsky College of Education, Israel
Lea Spiro, Levinsky College of Education, Israel

Because Every Child Deserves More is an Israeli interim education reform recommendation document that aims at improving public education and the teaching profession in means of effective learning environments. This study examines teacher educators' attitudes toward the proposed reform in Israel. More specifically, it examines the forces that shape these attitudes and the expected changes in educators' practices. The study is based on literature of educational reform that relates to teacher education locally and globally. The importance of the study is threefold: (1) it presents teacher educators' multiple views of the proposed reform and its implica-

tions, which has not yet been researched; (2) it reveals teacher educators' perceptions of major educational issues that relate to global educational systemic reform debates; (3) it can indicate the level of teacher educators' preparation and resistance to the proposed changes.

College and school teacher educators, who serve as mentors for student teachers were studied. Semi-structured in-depth interviews lead to the formation of the questionnaire, which was also partially modeled after Conley and Goldman's (1998; 2000) studies. Quantitative and qualitative measures were used to examine educators' attitudes, and appropriate analysis measures were applied. Inductive data analysis was used to identify themes that emerged from the open-ended responses; Univariate and multivariate statistical techniques were used to analyze the quantitative data. Preliminary findings indicate teacher educators' ambivalence, a sitting on the fence approach regarding the reform implementation and expected results, but a strong agreement with the timely need of the reform. Discussion focuses on the forces that affect teacher educators' attitudes, and the implications of these forces. We will be using the uncertainty framework to explain educators' attitudes. Furthermore, we will draw on the crucial role of teacher educators in affecting the reform success or failure through their close interaction with leading teachers at the schools.

J 12   25 August 2005   17:00 - 18:20   Room E010

Paper Presentation

TEACHER EDUCATION

Chair: Charalambos Vrasidas, Intercollege, Cyprus

Practical Intelligence and Skilled Teacher Interaction
Steven Stemler, Yale University, United States
Julian Elliott, University of Durham, United Kingdom
Robert Sternberg, Yale University, United Kingdom
Elena Grigorenko, Yale University, United States

This paper highlights the fact that teaching routinely involves social interactions with students, parents, administrators, and other teachers. We believe that how a person chooses to deal with social interactions is not simply a matter of personality differences, but also involves the extent to which the person has in his or her mind

a systematic framework for choosing among different response alternatives. This paper presents one such framework that follows directly from Sternberg's theory of successful intelligence (1997; 1999). The paper presents a conceptual framework for considering skilled social interaction and outlines a measure for assessing teachers' tacit knowledge in this domain. Results from a comparative study of trainee and experienced teachers will be presented and implications for training discussed.

Comunicating to plan science units: An illustration with future science teachers
Carolina Carvalho, Centre for Educational Research, Portugal
Mauricia Oliveira, Centre for Educational Research, Portugal
Alice Rodrigues, Centre for Educational Research, Portugal
Adelaide Teixeira, Polytechnic Institute of Portalegre, Portugal, Portugal
Fernando Rebola, Polytechnic Institute of Portalegre, Portugal, Portugal
Paula Serra, General Board for Innovation, Portugal
Luis Santos, General Board for Innovation, Portugal
Isabel Chagas, Centre for Educational Research, Portugal
Maria Joao Horta, General Board of Vocational Formation, Portugal

In the context of a project underdevelopment and during a science education module, an exploratory study was outlined to understand the explanation building process during students' interactions in science classes. The review of literature shows that the classroom discourse in research education is one of the prominent areas of interest but also, one lacking analytical tools to understand the explanation building process during students' interactions in science classes (Kelly & Chen, 1999). In the current study we analyse, based on the model of Kaartinen & Kumpulainen (2002), the construction of the explanations in a collaborative situation in which future science teachers participated. The task consisted in planning a curricular unit of science, in small groups. The data shows that explaining plays a crucial role when future science teachers are planning a teaching unit. The novelty of the situation – planning a unit – makes the negotiation process around the concepts to be chosen and the methodology to be adopted, in order to facilitate pupils' learning, an important moment of appropriation of scientific and didactic knowledge by the student teachers.

Perceptions of teacher interpersonal behaviour in Turkish secondary schools
Sibel Telli, Middle East Technical University, Turkey
Perry J. den Brok, Utrecht University, Netherlands
Jale Cakiroglu, Middle East Technical University, Turkey

The purpose of the study was to adapt an existing instrument for measuring teacher interpersonal behaviour, the Questionnaire on Teacher Interaction (QTI), to the Turkish context. The questionnaire maps teacher behaviour in terms of two dimensions: teacher influence (dominance – submission) and proximity (cooperation-opposition). These two dimensions structure interpersonal teacher behaviour into eight behavioural sectors or domains: leadership, helpful/friendly, understanding, providing freedom, uncertain, dissatisfied, admonishing and strict behaviour. A sample of 674 students from 24 classes (grades 8 to 10) of experienced teachers in two secondary education schools participated in the study. Adaptation of the instrument involved several steps: translation and back translation by teacher educators, piloting a first version, interviews with students and teachers to establish the importance of teacher interpersonal behaviour in the Turkish context and a final administration of the questionnaire to the sample described. Interview data and statistical analyses supported reliability and validity of the instrument: Cronbach's Alpha coefficients of scales were above .70 and scales appeared to be able to distinguish between classes and teachers. Factor analyses indicated that two dimensions could be found in the data and that scales were ordered in terms of the hypothesized model. Turkish teachers were perceived by their students as very cooperative and dominant. Three types of teachers could be found in the sample: directive, authoritative and tolerant-authoritative teachers. The instrument will be used for future research and professional development in Turkey and for cross-cultural comparisons.

Examining the role of teacher pedagogical content knowledge in literacy
Judy Parr, University of Auckland, New Zealand
Helen Timperley, University of Auckland, New Zealand

Attention to effective teacher practice has intensified as recent analyses show teacher effects contributing a large proportion of the variance in student achievement. Teacher knowledge, specifically pedagogical content knowledge, is central to effective classroom practice. Research has attempted to link teacher subject specific knowledge to student learning outcomes with inconclusive results. The research question for this study was What is the link between pedagogical content knowledge in literacy and student achievement? Specially constructed scenarios were

written to encapsulate key aspects of content knowledge informed teaching practice in reading comprehension and writing. They reflected aspects of practice that would be readily identifiable as effective according to research literature, together with aspects considered less effective. Teachers of Years 1 to 8 (N=87) from a sample of 14 schools responded to these scenarios at two points in time. They were asked to identify effective and less effective practice and to rate, giving reasons for the rating, key aspects such as learning aims and alignment of activities to stated focus. They also rated their confidence in these aspects of practice. Correlational data are presented to relate teacher pedagogical content knowledge to self reported confidence. Extent of change as a result of professional learning is examined using related measures t tests. These data are, in turn, related to student achievement outcomes at two points in time and to measures of student progress. The study represents an innovative way to measure content knowledge in literacy. The findings have implications for modelling how pedagogical content knowledge and specific aspects of it might relate to student achievement and progress.

J 13   25 August 2005   17:00 - 18:20   Room B107

Paper Presentation

COLLABORATIVE LEARNING

Chair: Joost Lowyck, Katholieke Universiteit Leuven, Belgium

How can cooperative learning enhance effectiveness of learning to write? Illustrations in elementary school
Katia Lehraus, University of Geneva, Switzerland

Learning to write is not an easy undertaking for young pupils in elementary school. According to theoretical perspectives based on research on interactive processes, the importance of the social dimension of learning is generally acknowledged. Most school systems advocate instructional methods which rely on peer interactions to enhance learning. Interactive settings are, however, a frequent source of problems, mostly caused by the pupils' lack of basic social and communication skills. Several studies show that specific training focused on social skills can improve the interactive dynamics in learning situations. How can a cooperative learning method, that includes focused social skill instruction, favour the emergence of interactions likely to enhance the effectiveness of learning? The present research is part of a Ph. D.

project aimed at exploring the processes of social and cognitive construction in cooperative learning settings with 7-8 year old pupils. The main goals of this study are: 1) to elaborate and test an analytical framework; 2) to compare the functioning of high- and low-achieving pupils; 3) to assess the effects of social skill instruction on peer interactions. In this paper, we present some data in relation to the second issue mentioned above. Two main questions are addressed: In which ways do high- and low-achieving pupils contribute to the task of collaborative writing? What forms of cooperation can be observed? The results will contribute to a better understanding of peer interaction processes in school settings. Practically, this study will provide indications for the design of cooperative learning situations, for use in teacher professional development programmes.

Effects of group work training on attainment in specific and general Science, Mathematics and English

Allen Thurston, University of Dundee, United Kingdom
Christine Howe, University of Strathclyde, United Kingdom
Donald Christie, University of Strathclyde, United Kingdom
Keith Topping, University of Dundee, United Kingdom
Andy Tolmie, University of Srathclyde, United Kingdom
Kay Livingston, University of Strathclyde, United Kingdom
Emma Jessiman, University of Dundee, United Kingdom
Caroline Donaldson, University of Dundee, United Kingdom

This paper reports on an investigation of the effects of collaborative group work on attainment in primary science, mathematics and reading. The data presented formed part of the ESRC Teaching and Learning Research Programme as a Scottish Extension on Supporting Group Work in Scottish Schools of the TLRP Phase II project, Social Pedagogic Research into Grouping (SPRinG). The research project was a collaboration between the University of Strathclyde and the University of Dundee. The overall aim of the intervention study was to evaluate the impact of collaborative group work in selected primary school classrooms and explore the effects of class composition in urban and rural schools. Approximately 600 upper primary stage pupils were involved in the study. A two-phase intervention designed to foster collaborative group work was carried out in four different categories of schools derived from the combination of two factors: urban/rural school; straight/composite age classes. The first phase of the intervention involved social and communication skills training. The second phase focused on collaborative group work in two primary science topics: states of matter and forces and friction. The general attainment

of pupils in science, mathematics and reading was assessed using the Performance Indicators in Primary Schools (PIPS) instrument, which also included some attitudinal items. Focused science attainment tests were undertaken in the science topics (states of matter and forces and friction). Three control classes with a similar profile to the study classes were assessed with PIPS and the specific science tests. Results indicate gains in pre-post intervention in specific science attainment which could be attributable to enhanced levels of collaborative groupwork. Comparisons are made to the control classes. The transferability of core groupwork skills into curriculum areas will be discussed and the implications for practice, policy and future research are explored.

Classroom context and the quality of cooperative learning
Paul Vedder, Leiden University, Netherlands
Daphne Hijzen, Leiden University, Netherlands
Monique Boekaerts, Leiden University, Netherlands

In the present study we examined circumstances or conditions that teachers in secondary vocational education create in order to promote students' cooperative learning processes. The study is embedded in a larger project on motivational self-regulation strategies of 1920 students' enrolled in Dutch senior vocational education. Many motivation researchers focused on motivation as a characteristic of the individual. However, lately there has been increasing recognition of the importance of social variables influencing students' motivation for learning (Eccles et al, 1998). In a previous in-depth study (Hijzen, Boekaerts & Vedder, in preparation) students emphasized the importance of situational variables influencing their engagement levels in cooperative learning sessions. The present study concentrates on conditions that supposedly are related to the Quality of Cooperative Learning. We explored the relationship between several conditions, such as task characteristics, instruction behaviour and group composition on the one hand, and the Quality of Cooperative Learning processes and students attitudes towards Cooperative Learning on the other. The study had a longitudinal design allowing us to investigate whether changes in conditions were related to changes in the Quality of Cooperative Learning. Students' perceptions of the amount of cooperation skills they had been taught at their present schools predicted the Quality best at all measurement points and in all subgroups. We explored possible mediator and moderator effects of students' motivation.

Multiple levels in scaffolding primary students' collaborative inquiry efforts
Minna Lakkala, University of Helsinki, Finland
Marjaana Veermans, University of Turku, Finland

The aim of the present study was to investigate practices for scaffolding technology-supported collaborative inquiry. The scaffolding needed in such setting was examined from three perspectives: the organizing of activities, the process-level human scaffolding, and the scaffolding embedded in tools. Five Finnish teachers designed and implemented inquiry-learning units in their classrooms, in natural sciences and history, using a collaborative software tool (FLE3). In all, 126 primary level students participated in the units. The data in the study consisted of the teachers written reports and learning logs, and the teachers and students' postings in the database during the inquiry-learning units. The analysis was based both on quantitative and qualitative measures of the technology-supported activity. The results indicated that the three more-experienced teachers put more effort in the overall organizing of the inquiry activities, whereas the beginning teachers structured the process mainly around the abstract inquiry questions; the chosen scenario appears to have influenced the epistemic and social nature of the inquiry process. There was also some variation in the teacher's way of scaffolding the inquiry discourse during the process. The more-experienced teachers interfered to the discourse rather delicately, whereas the novice teachers took more active role in directing the process by generating themselves inquiry questions, or bringing in material from knowledge sources. The analysis of the inquiry-learning units proved that even relatively young students are capable of conducting basic-level inquiry. Yet it could be stated that the use of inquiry scaffolds could have been more varying, and also the content of the notes could have reached deeper level of explaining and summarizing. We may conclude that with more appropriate process-level scaffolding, especially with older students, it might have been possible to pursue more explanatory-driven inquiry that goes beyond declarative knowledge. Implications for pedagogical improvement in collaborative, technology-supported educational settings are discussed.

Paper Presentation

TOOLS IN INSTRUCTIONAL DESIGN

Chair: Elaine Munthe, University of Stavanger, Norway

Capturing design experience in pedagogical design patterns
Peter Goodyear, University of Sydney, Australia

This paper reports the outcomes of an empirical study of educational design practices. The specific context is networked (online) learning in higher education. Networked learning is a form of computer-supported collaborative learning (CSCL) where the interaction between learners and teachers is primarily mediated through computer communications tools (email, asynchronous threaded discussion tools, etc). Educational design for networked learning involves the design of good learning tasks but also the design of useful resources and of organisational arrangements that foster convivial learning relationships. Little is known about how such educational design work is actually done in practice. In addition, we know very little about how to document and share the experiential knowledge accumulated by designers. So the goals of this study were twofold: (i) to develop a preliminary model of the processes involved in educational design for networked learning, (ii) to capture some aspects of the experiential knowledge of design using a format known as a pedagogical design pattern. The study reported here draws on in-depth interviews with 20 experienced designers of networked learning courses/environments. The interviews were transcribed and references to design concepts and design methods were extracted. Pedagogical design patterns were then written as a way of capturing some recurring elements of experiential design knowledge, and of relating this knowledge to constructs from the wider research literature on CSCL. Finally, the design patterns were given back to a subset of the designers for validation and commentary.

Does the strategic activity in secondary school students vary as a function of the domain?
Ewa Czerniawska, University of Warsaw, Poland

The hypothesis was formulated that the strategic activity in different domains might

be differentiated. It was tested in two studies. 154 students from the junior high school took part in Study 1. Two aspects of the strategic activity were assessed: strategic flexibility (with the Polish version of the Strategic Flexibility Questionnaire constructed by R. Cantwell) and deep/surface strategies usage in text learning (with a questionnaire constructed especially for a series of studies concerning strategic activity in secondary school students). Subjects also responded to a questionnaire concerning intellectual helplessness, and their grades in biology and history were gathered. It appeared that the strategic activity in both domains although correlated, was significantly differentiated. A less mature strategic activity – surface processing and irresolute control of learning – was linked with lower grades and a higher intellectual helplessness. The relations between the measured aspects of the strategic activity and intellectual helplessness on the one hand, and school grades on the other were also to some extent different. In Study 2, 179 students from the first and second grade of the senior high school were the subjects. The same questionnaires concerning strategic activity were used and students' grades in biology and history were gathered. Intellectual helplessness was not assessed. The obtained results confirmed that the deployed strategic activity in both domains was correlated, but also significantly differentiated. As the relations between different aspects of the strategic activity and school grades were concerned, some differences emerged, supplying one more evidence for inter-domain differentiation of the strategic activity. The results of both studies supported the view that strategic activity might be seen as a relatively stable individual characteristic of the cognitive functioning (a learning style), at the same time it is subject to changes as a function of the domain requirements.

Individual Education Plans – tools for negotiating pupil's identities
Lisa Asp-Onsjo, Gothenburg University, Sweden

This paper reports an analysis of findings concerning Individual Education Plans (IEP) in a Swedish context. The major purpose of these documents is to match convenient learning conditions with a pupil with some kind of difficulties managing school. These documents can also be seen as tools for negotiating pupil's identities. More specific, this presentation concerns the categories and accounts produced in the meetings between the parents and the personnel from school when arriving at a decision of the IEP. This accounting practice is mirrored through two different cases, the case of Angie and the case of Tommy. This paper seeks to contribute to an understanding of the in situ use of categories and accounts in relation to certain shortcomings in school. The study has been accomplished in six schools in a minor

municipality during one year. The work units meetings at the schools are recorded, transcribed, and analysed as well as the meetings in which the parents and pupils take part. The IEP's for these pupils, ranging from early documents to the recent ones, are collected and scrutinized. Concerning the IEP of Angie and her described difficulties in school the findings show that the negotiation ends up in placing Angie in the category mentally retarded. This category is well established in a school context and therefore easy to match with certain pedagogical solutions. In contrast, the case of Tommy shows a diffuse process with constant categorization and re-categorization of Tommy and his perceived difficulties. Furthermore, the findings show that the problems are seen as residing inside the child and not in the interaction between the pupil and the context. The results show that certain accounting practices where these pupils are described, categorised and matched in to different categories have extensive consequences for these pupils.

The moderating effects of instructional conceptions on powerful learning environment with and without ICT for promoting technical expertise in secondary technical school
Frederick Sarfo, K.U.Leuven, Belgium
Jan Elen, K.U.Leuven, Belgium

This study was intended to explore the moderating effects of instructional conceptions (conceived functionality) on powerful learning environments (PLE) implemented with 4C/ID-model and with or without ICT for fostering the development of technical expertise. To achieve its goal, a one by one by two pretest posttest quasi experiment was designed. The group of participants consisted of 250 students selected from six Secondary (Technical) Schools in Ghana. Their average age was 18 years. The materials of the study included 1) specific instructional conceptions questionnaires; 2) learning tasks designed in accordance with a) 4C/ID PLE with and without ICT and b) traditional method of teaching; and 3) retention and transfer assessment tasks. Six volunteering technical teachers were trained to implement the interventions. After the pilot study, the materials were validated and reviewed by experts and teachers were retrained. The main study, consisted of of six lessons, conducted in regular classrooms of three schools. Results indicate that a 4C/ID PLE with and without ICT promote the development of technical expertise in secondary technical education better than the traditional method of teaching. Moreover, results reveal that a 4C/ID PLE with ICT promotes the development of technical expertise in secondary technical education better than a 4C/ID PLE without ICT. Finally, findings show no moderating effects of students' conceived functionality of

the learning environment.

J 15   25 August 2005   17:00 - 18:20   Room A010

Paper Presentation

LEARNING AND COGNITION

Chair: Sari Lindblom-Ylanne, University of Helsinki, Finland

Complexity theory as the building stone for a new science of learning and education
Ton Jorg, Utrecht University, Netherlands

Learning through (dialogic) interaction has long been a topic of interest in the fields of psychology and education without being understood very well. Interaction itself seems to be the problem. Its complexity has been neglected for long, both in theory and in practice as well. It kept being a kind of black box, with its inadequate conceptualizations and methods of analysis, not really being a study of change. Vygotsky was very close to the description of interaction in all its complexity. He lacked, however, the tools of explaining the complexities adequately, in terms of the recognized causal dynamics involved. Recent complexity theories in the field of natural sciences may offer the possibility of using causally generative mechanisms for conceptualising learning through interaction more adequately. It may bring the Vygotskian approach of the dialectical processes involved in interaction into focus, including their relatedness to the unexpected potentially non-linear effects on both partners. Learning through interaction becomes a kind of dynamic interweaving with evolution, involution, and revolution as fundamentally time-dependent processes (Vygotsky, 1978). Theorising on it, then, becomes a trans-disciplinary enterprise, integrating disciplines such as developmental and evolutionary psychology with approaches like Dynamic Systems Theory (DST) and the causal framework of Structural Equation Modelling (SEM) and the program of LISREL. The paper focuses on three main questions and their answers: 1. Why is there no adequate theory of interaction and/or about learning through interaction? 2. How would such a theory look like when it arrives? (Bates et al., 1999) 3. What does an adequate complexity theory of interaction and learning through (dialogic) interaction in small groups like dyads may mean for the practice of education: for the efficiency of that learning?

Inquiry and Metaskills in Higher Education
Hanni Muukkonen, University of Helsinki, Finland
Minna Lakkala, University of Helsinki, Finland

Even if learners' expertise is bound to a specific field of inquiry, there are many skills, competencies, and aspects of expertise that are generalizable and provide intellectual resources for managing new problem-solving situations. Higher-level skills that emerge through sustained efforts of advancing knowledge may be called metaskills. Development of metaskills is proposed to constitute a long-term goal for higher education. Taking part in collaborative inquiry is foreseen as a means to facilitate development of metaskills. Based on prior studies, key challenges for advancing collective inquiry were considered to lay in facilitating deepening of inquiry, skills for scientific argumentation and metaknowlegde about taking part in collaborative activities. The data for the study consisted of database discourse and students' self-evaluations from an undergraduate university course in psychology, examined by qualitative content analysis. The students (N = 12) reflected both on their personal contributions and the collective aspects of inquiry efforts. Their evaluations were reflecting a great deal of metaknowlegde about taking part in collaborative inquiry. Although some students considered that the inquiry processes were cut short by lack of time or activity, they all had met the requirements for the course in completing the collective writing. As implication for educational practices, it is suggested that although dealing with uncertainty, areas beyond one's expertise, and engaging in self-directed collaborative inquiry may seem partly over-demanding for students, they are all aspects of developing one's metaskills, and becoming an expert in a longer timeframe.

Thinking Styles and Achievement Motivations
Weiqiao Fan, The University of Hong Kong, Hong Kong
Lifang Zhang, The University of Hong Kong, Hong Kong

The present study examined the relationships between college students' achievement motivations and thinking styles. Two theoretically based measures of motivations and thinking styles were administrated among 238 Chinese college students. The Achievement Motives Scale (AMS, Nygard & Giesme, 1973) designed on principles at work in achievement motivations theory and research (Kuhl, 1981; Heckhansen, 1991) was for achievement motivation. The Thinking Styles Inventory – Revised (TSI-R, Sternberg, Wagner, & Zhang, 2003) based on Sternberg's (1997) theory of Mental Self-Government was for intellectual styles. Results showed that

there were various correlations between the dimensions of the AMS and the TSI-R. Implications for learning and identifying individual differences are considered.

Approaches to Knowledge: Epistemological Understanding, Achievement Goals, and Beliefs about Intelligence
Michael Weinstock, Ben-Gurion University of the Negev, Israel
Avi Kaplan, Ben-Gurion University of the Negev, Israel

This study explores the relationship between pupils' understandings of knowledge, that is, their personal epistemologies, and two areas of learning beliefs—achievement goals and beliefs about intelligence.
Epistemological understandings have been proposed to consist of the absolutist belief that knowledge is objective and certain, the multiplist belief that knowledge claims are subjective and represent opinion, and the evaluativist belief that knowledge contains both subjective and objective aspects necessarily requiring evaluation. These positions have been posited as developmental levels, from least to most sophisticated respectively. Achievement goal theory holds that students in learning contexts maintain either internally motivated mastery goals or externally motivated performance or social goals. Beliefs about intelligence have been posited as externally given, or fixed, or malleable. With each construct entailing internal and external dimensions, it was hypothesized that absolutists understanding knowledge as objective would be more likely to have externally-oriented achievement goals and beliefs in fixed intelligence, and that those with subjectivist multiplist or evaluativist understandings of knowledge be more likely to have mastery goals and beliefs in malleable intelligence. One hundred and twenty-one Israeli 7th graders (44% girls) completed a 59-item Likert-scale questionnaire concerning achievement goals and beliefs about intelligence and a 9-item epistemological assessment of absolutist, multiplist, and evaluativist thinking in the domains of values, social truth, and physical truth. Absolutists in all three epistemic domains were most likely to hold externally oriented achievement goals. Absolutists in the values and physical truth domains were also most likely to believe in fixed intelligence. While there is evidence that epistemological understandings develop from external to an internal orientation, what little evidence there is of development in motivation appears to point in the opposite direction as students adopt the performance goals of schools. Perhaps the transition from absolutist to multiplist understandings works against adopting a learned performance orientation.

Paper Presentation

STUDENT LEARNING IN HIGHER EDUCATION

Chair: Francis Hazel, University of London, United Kingdom

Some relationships between nature of PhD enrolment, time of candidature and thesis quality
Sid Bourke, University of Newcastle, Australia

This paper considers relationships between the nature of PhD enrolment (full-time, accounting for 53% of candidates, part-time, 15% or mixed, 32%) with candidacy time and thesis quality as assessed by independent, external examiners. Quality is based on a recommendation selected from five categories, ranging from Accept the thesis unchanged to Fail. Candidacy time was measured as the number of equivalent full-time semesters enrolled, with part-time candidature being counted as half full-time candidature. The mean candidacy time was 7.9 semesters. Candidate, candidature and examination data identified in the literature were collected and analyzed for 804 students across all ten Broad Fields of Study at eight Australian universities who submitted a thesis for examination. Part-time candidates had a mean candidacy time of 6.3 semesters, full-time candidates had 7.8 semesters, and mixed enrolment candidates had the longest at 8.7 semesters. The nature of enrolment was not associated with thesis quality. But among a number of intertwining relationships, candidate age was associated with candidacy time, but not linearly, and with thesis quality. There were significant differences between universities for candidacy time, nature of enrolment and the distributions of Broad Fields of Study. The implications of the results for national and institutional policy makers in times of economic stringency in universities are raised and discussed.

A qualitative analysis of education students' conceptions of research
Jan H.F. Meyer, University of Durham, United Kingdom
Sarah Aiston, University of Durham, United Kingdom

Research within the teaching and learning literature has suggested that a student's conception of research potentially influences the way in which he or she engages in the process of research, thereby indicating the importance of understanding such

conceptions in order to support student learning. Building on the work of Meyer et al (2005) this paper will present findings from a qualitative study designed to ask two very different student cohorts of education students about their understanding, in this instance, of educational research. Cohort one comprised full-time undergraduates who were engaged on an Initial Teacher Training degree, whilst cohort two were students (largely from the teaching profession itself) undertaking an MA in Education, largely on a part-time basis. Both cohorts were required to take a compulsory research methods module; the remit of which went well beyond simply preparing students to undertake a dissertation, requiring them to critically engage with the research base on which their profession is working (particularly pertinent with regard to the current focus on evidence-based practice) and think around such issues as, what can actually be established through educational research. The paper will discuss the findings from a qualitative analysis of open ended responses to a series of questions (presented to students at the beginning of the modules), such as, 'how would you explain to a stranger what educational research is?'

Insights on best teaching practices for promoting students' learning
Isabel Huet, University of Aveiro, Portugal
Jose Tavares, University of Aveiro, Portugal
George Weir, University of Strathclyde, United Kingdom

The Department of Educational Sciences and the Department of Electronic & Telecommunications at the University of Aveiro (Portugal) have been working together with the Department of Computer & Information Sciences at the University of Strathclyde (UK), with the aim of improving the teaching and learning of introductory programming courses. Both institutions belong to the European Consortium of Innovative Universities (ECIU), with a commitment to developing and implementing new forms of teaching, training, and research; to assuring an innovative culture within their walls; to experimenting with new forms of management and administration; and to sustaining and nurturing internationally-minded staff (ECIU).Over the past two years, data has been collected through interviews, questionnaires and class observation, to better understand the organization of the different courses and approaches to teaching and learning. Members of academic staff have been actively involved in trying to enhance the students' learning experience through reflection on teaching methods and trying new ideas to aid student success. During this process we have assimilated insights on teaching philosophies, methods and suggestions for course redesign. As an important piece of the puzzle, students also provided useful feedback on differing aspects of teaching and course organization. The present pa-

per presents a meta-analysis of our findings on the relevance of teaching practices for promoting students' learning. In addition, we discuss the impact that teaching philosophies and course organization may have on best teaching practices.

Students' conceptions of constructivist assumptions and their impact on academic achievement

Sofie Loyens, Erasmus University Rotterdam, Netherlands
Henk Schmidt, Erasmus University Rotterdam, Netherlands
Remy Rikers, Erasmus University Rotterdam, Netherlands

Conceptions that learners hold towards learning have come into attention due to the influence of new views on learning in which personal knowledge constructions and subjective beliefs of learners became more pivotal. The present study investigated students' conceptions of 4 constructivist learning assumptions (knowledge construction, cooperation, self-regulation, use of authentic problems), together with learning uncertainty and motivation to learn. More specifically, the impact and predictive value of these conceptions on students' academic achievement was examined. A 55-item questionnaire was administered and a structural equation modeling technique was used to test different models concerning the impact of students' conceptions on academic achievement. Results showed that students' conceptions of knowledge construction and learning uncertainty had a direct, positive influence on study success. Furthermore, self-study time appeared no significant determiner of achievement, while students' professional behavior in tutorial groups had a significant influence on study success. Implications of these relationships are discussed. In conclusion, students' conceptions need to be taken into account and students need to be made aware of them and their influence in education.

Paper Presentation

VOCATIONAL EDUCATION

Chair: Peter Rosseel, Katholieke Universiteit Leuven, Belgium

The Dynamics of Workplaces as Learning Environments in Vocational Education
Marit Rismark, Norwegian Univ of Science and Technology, Norway
Kitt Margaret Lyngsnes, Nord-Trondelag University College, Norway

This paper discusses learning potentials embedded in the workplace as a learning environment for apprentices. Based on four cases, each comprising one apprentice, the instructor and the work community, we explore learning processes and learning outcomes. In particular we elaborate on the reciprocity between contributions to learning afforded by the social practice of work and how apprentices interpret and act according to invitations or lack of invitations in the social practice. The study draws on concepts developed by Lave & Wenger (1991). The apprentice can be seen as a participant in a community of practice. The case study is based on two extended studies of vocational education in schools and at work places (Lyngsnes 2003, Rismark et al 2003, Lyngsnes & Rismark 2002). Although we draw on previous studies, we have selected new informants for this study. Altogether four cases, comprising a range of trades within vocational training were chosen. Each of the four cases included both the apprentice and the instructor in the workplace. Both interviews and observations were used. Two researchers worked closely throughout the data collection and observed the same settings and analyzed and discussed the observation material before developing the interview guides together. The close collaboration also continued throughout the interviews and data analysis. Through the analysis we traced themes about the significance of transparency of job tasks, job routines and feedback to enhance learning. The findings offer insights into how the interactive qualities between the work community and the apprentice do not always support the newcomer's learning processes in this particular part of vocational education.

Powerful learning environments in vocational education
Elly de Bruijn, CINOP, Netherlands

The research project focuses on the teaching and learning processes within school based vocational courses at senior secondary level in the Netherlands. The central research problem addresses the relationship between characteristics of various teaching and learning practices and course results. Eleven case studies were conducted in which a small cohort of students was observed during one year with respect to their lessons and learning activities as well as to their learning results. The concept of 'powerful learning environments' theoretically underpinned the classification of actual teaching and learning practices on several indicators of 'powerfulness'. Progress and drop out served as indicators of course results. Also the intermediate effect of motivation aspects was included in the analysis of the relationship between the teaching and learning practise of these eleven courses and the results of the approximately 200 students who attended these courses. The results show different designs of powerful learning environment between the eleven cases. It appears that promoting self-regulation has a positive effect on study progress. There is a relatively unclear relationship between characteristics of powerful learning environments, motivation of students and internal returns. During the transition to more innovative learning environments students often lack grip on the process and they have a relatively negative attitude towards their learning environment when they themselves have little opportunity to contribute to the process of innovation. Involving students and their specific interests from the beginning in the planning of the change process could well be an important factor in the degree to which powerful learning environments eventually come into being.

Relations between characteristics of learning environments with learning motivation and learning results in vocational education
Regina Mulder, University Of Regensburg, Germany
Sabine Severiens, Erasmus University Rotterdam, Netherlands

In the Netherlands, relatively large numbers of students in secondary vocational education (12-16 year olds) suffer from learning difficulties and behavioural problems, often resulting in drop-out (Harskamp, 2000). Little research has been done however on the relationships between characteristics of these students, the courses they take and schools they attend, and their school careers. The present study aims to fill this research gap. The theoretical framework describes the main determinants for school careers at three levels: the student (including characteristics of students

themselves, of family and peers), the learning environment (including the content, the pedagogy-didactics and teacher behaviour) and the school (organisation) (Heyl, Mulder & Schenkeveld, 2001). The present study focuses on the learning environment level. Because several studies have shown that learning motivation and achievement are strong predictors for successful school careers (Harms & den Boer, 1996), learning motivation and achievement are used as proxies for school career. Central Question: What are the relations between characteristics of the learning environment and learning motivation and achievement? In the school year 2003-2004, 1493 students, 213 teachers and 17 managers completed the questionnaires of a self-evaluation instrument (Mulder, De Boom, Heyl, Klatter & Severiens, 2004). Several schools in Rotterdam, as well as local government participated in the development of this instrument. The first results show that a variety of learning environment characteristics is related to learning motivation and achievement. Three important characteristics are type of assessment, quality of content of the lessons and teacher behaviour. In the paper and presentation we will elaborate on the results.

Cognitive apprenticeship as a basis for providing competence-based pre-vocational secondary education
Audrey Seezink, Eindhoven University of Technology, Netherlands
Johan Van der Sanden, Eindhoven University of Technology, Netherlands

In the Netherlands (pre) vocational schools become more and more actively involved in making their educational programs more competence-oriented. This process has substantial consequences for both the school as a labor organization and the new roles teachers have to play. We are performing a number of studies to gain insight into the way teachers give meaning to their roles, the problems they experience and the learning processes they are involved in. The cognitive apprenticeship model (Collins, Brown & Newman, 1989) provides a conceptual framework for our studies. According to this cognitive apprenticeship model learners should be guided in the process of developing gradually from novices to masters in a complex domain (Collins et al., 1989). Our study aims to find answers to the following questions: Which practical theories do teachers have regarding competence-oriented (pre) vocational secondary education? To what extent and in what way do teachers value elements of the cognitive apprenticeship model in designing and delivering competence-oriented (pre) vocational secondary education? This research is conducted in two phases: a small-scale qualitative study in which we used interviews, class observations and concept mapping and a questionnaire study. The data of the 'qualitative'-study have already been gathered and are currently being analyzed;

the 'questionnaire'-study is in progress. Most teachers currently employed within (pre) vocational education are not educated to fulfill the new roles that competence-oriented learning environments require of them. Therefore they need to these necessary competencies during work. These competencies require a change in both the views and practical theories that underlie behavior in instructional contexts. Little empirical research is conducted regarding processes of competence-development in practical settings, especially concerning teachers in (pre) vocational teaching. The proposed study aims to contribute to scientific knowledge concerning workplace learning of teaching staff within the scope of educational innovations.

J 18   25 August 2005   17:00 - 18:20   Room A107

Paper Presentation
Reading

READING COMPREHENSION

Chair: Herre van Oostendorp, University of Utrecht, Netherlands

Self-efficacy and self-regulation in children's reading comprehension
Michael Townsend, University of Auckland, New Zealand
Woon Teng Teo, University of Auckland, New Zealand

In current sociocognitive theories of motivation the concept of personal beliefs is seen as crucial in classroom learning and achievement. Two of the most explored personal belief constructs are self-efficacy (Bandura, 1997) and self-regulation (e.g., Zimmerman, 2002). In Bandura's theory, self-efficacy beliefs are central in affecting the types of self-regulatory learning strategies that students use in school. Hence, self-efficacy may play a critical mediational role in fostering academic engagement. Yet, it is self-regulation strategies that have been the major focus of intervention studies in classroom instruction. Such interventions have been common in reading instruction. This study explored the relationships between self-efficacy, self-regulation and reading comprehension in 175 New Zealand primary school children (aged 10 years). Both self-efficacy and self-regulation were found to have significant independent effects on reading performance, and in simultaneous multiple regression were found to account for some 24 percent of variance in comprehension. However, self-efficacy made the only significant contribution to the regression. These results support the 'primary' role of self-efficacy in motivational

accounts of classroom learning, although other types of personal beliefs need to be seen by educators as interconnected in achievement.

From pictures to text: Early fostering of reading comprehension
Lucia Lumbelli, University of Trieste, Dept. of Psychology, Italy
Fabiana Ritossa, University of Trieste, Dept. of Psychology, Italy

An educational approach aimed at enhancing the ability to make the inferences necessary for coherently connecting information items while reading a story made up of pictures only was defined. Since this ability is an important component of reading comprehension (Schank, 1982), it is assumed that enhancing it in early childhood means helping children learn to read later. We hypothesised that the treatment defined could be both feasible and effective. Two groups of very young children (mean age = 31 months) were formed, matched on the scores in a test of this specific ability. The instrument used as pre- and post-test was purpose-built and consisted of simple narratives made up of 4 short sequences of pictures. The scoring was given by the number of the required inferences made by each child (range = 0-8).The experimental group was presented with 10 individual sessions of a treatment chiefly characterised by Children's self-regulated exploration of picture books and by the adult's communication totally centred on the young readers' comprehension efforts and consisting of reflection-responses (Rogers, 1951). The experimental group outperformed the control one as to the special ability targeted. A t of the mean gain-scores was computed (t = 6.10; p = .0002). The treatment is discussed as a possible early compensation for the reading comprehension difficulties deriving from cultural deprivation.

Developing strategic reading abilities and reader identities within communities of practice
Deborah Rossow, Griffith University, Australia

According to Lave and Wenger (1991, p.95), learning is a social process involving participation as a way of learning within a community. Participation entitles the learner to membership within that particular community of practice. As the learner participates in the community, s/he develops ways of participating in particular activities and enacting values that are utilised by members of that particular community of practice. Accordingly, an activity may be understood, valued and utilised in different ways in different communities. In considering reading practices through this lens, reading may be identified as a social practice that may be valued and

enacted differently within each community. While participating in reading activities in a particular community of practice, learners appropriate the practices and behaviours of reading utilised in that context (Comber & Cormack, 1997). Concurrently, learners begin to develop membership status and reader identity within that particular community of practice. This paper examines how the strategic reading behaviours and reader identities of one young, male student, Karl, are constructed within two different school-based communities of practice. In order to characterise this individual's strategic reading development and reader identity construction, an ethnographic study involving observations of the student engaged in reading events in each community of practice was conducted. In addition, focused discussions with teachers and the collection of other artefacts were utilised to gain further insights into the notion of reading as a social practice.

The effect of explicit reading strategies instruction and peer-tutoring on Chinese students' reading comprehension
Jean-Pierre Verhaeghe, Ghent University, Belgium
Ling Li, Ghent University, Belgium

A quasi-experimental study involving 40 5th and 2nd grade classes in urban primary schools in China, was designed to investigate the effect of a year-long experimental program combining explicit reading strategy teaching and peer tutoring practice. Students were assigned randomly to either a control condition (CON) or one of three experimental conditions: Reading Strategies Only (SO), Reading strategies + Same-age tutoring (SA) and Reading strategies + Cross-age tutoring (CA). To test for the effect of the newly introduced reading materials on itself a condition Free reading (FR) was added. In this paper, we focus on the effects on 5th grade students' evolution in reading comprehension achievement. A total of 642 5th graders participated in this study, with about half of them in the control condition and the other half divided among the three experimental conditions. These students are from 8 primary schools, representing a mixture of different types of schools in different parts of the city, serving students from a wide range of social backgrounds. On three occasions (before, right after finishing the treatment and six months after finishing the treatment) students' reading comprehension achievement was measurement by means of an elaborated, student adaptive reading comprehension test that was translated, adapted and re-calibrated for use in Chinese primary schools. Having controlled for gender and social background, only CA students showed progress from pretest to posttest that was significantly larger than in the control condition. However, at the retention test all experimental conditions showed significantly larger progress than

the control condition, with effect sizes ranging from 0.41 to 0.54. The parallel with previously presented results of an observational study on students' interactions in the peer tutoring dyads is discussed, as well as possible explanations for the remarkable growth of the experimental students between posttest and retention test.

J 19   25 August 2005   17:00 - 18:20   Room E102

Paper Presentation

SECOND LANGUAGE ACQUISITION

Chair: Michel Caillot, Universite Rene Descartes, France

Learning to Learn by Using the Target Language Autonomously
Lap Trinh, Cantho University, Vietnam
Gert Rijlaarsdam, University of Amsterdam, Netherlands

This paper presents findings from a curriculum innovation study we conducted in Department of English, Cantho University (CTU), Vietnam from 2002-2004. The overall design of the study is the one-group pre-test and post-test in which choice of learning content and learning methodology is the independent variable and self-regulation, intrinsic motivation and attitudes to autonomous learning, dependent variables with the implementation of the curriculum monitored. Subjects are first-year students of English in semesters 1(academic years 2002-2003 and 2003-2004). The implemented curriculum was monitored by classroom observation framework adapted from Nunan (2000). Self-regulation, intrinsic motivation and attitudes to autonomous learning are measured by Pintrich et.al.,' s (1997) Self-regulation Inventory, Ryan and Deci' s (1992) Intrinsic Motivation Inventory and Camilleri' s (1997) Questionnaires to Help You Establish Your Personal Level of Autonomy respectively. The study, following the three phases of curriculum innovation: initiation, implementation and adaptation (Fullan, 1991), consists of two successive experiments. The first experiment starts from the idea of improving the curriculum in English teacher education in CTU by developing an experimental curriculum grounded in theory of task-based learning for implementation to 60 students and measuring its effects on the development of dependent variables. The second experiment includes adapting specifications proposed in the experimental curriculum to develop a two-component curriculum (task-based learning and PPP paradigm) for implementation to 40 students. The effects of the two-component curriculum on

dependent variables were measured. The study proposes the transition from learning to use the language paradigm to using to learn and to learn how to learn the language paradigm. The empirical evidence shows that the experimental curriculum contributed to students' enhancement of attitudes to autonomous learning. No curriculum effects on students' self-regulation and intrinsic motivation were observed. Both curricula showed to benefit learners with different initial characteristics for the development of dependent variables differently.

The Effects of Task-Based Instruction on the Reading/Writing Performance of Young EFL Learners
Derin Atay, Marmara University, Turkey
Gokce Kurt, Marmara University, Turkey

There has been a growing interest in early teaching and learning a second/ foreign language throughout the world. A review of literature shows that learning a second language has many cognitive, social and linguistic advantages for children as long as certain conditions are provided, e.g., exposure to the target language through gamelike activities, opportunities to use the target language for real communication. Task-based Instruction (TBI) is one of the approaches suitable for young learners since it supports real communication in the target language by creating a real purpose for language use and providing a natural, motivating context for language study. The present study aims to investigate the effects of TBI on the reading and writing proficiency of Turkish EFL learners at a state elementary school in Turkey. Data were collected from the students of two classes at the 6th grade, a total of 88 students. The classes were randomly assigned as the experimental and the control groups. During the 8-week study, the control group continued with the regular 4-hour English instruction while the experimental group allocated 1 class hour to TBI. The effects of the TBI given to the experimental group for 8 weeks were tested by the Cambridge Young Learners English Starters Test in the form of pre- and post-test. The results of the study revealed that the experimental group learners outperformed the control group learners on reading and writing tasks suggesting that the TBI can be utilized as an effective language teaching approach in young learner classes.

Bidirectional Retrieval of Foreign Language Vocabulary in the Mnemonic Keyword Method

Mirella Wyra, The Flinders University of South Australia, Australia
Michael Lawson, The Flinders University of South Australia, Australia

The mnemonic keyword method has been proved to be a successful and useful technique in foreign language learning. This study examines the effects of manipulation on the internal sections of the keyword method focusing on the bidirectional retrieval training. Learners' ability to make images, measured using Vividness of Visual Imagery Questionnaire and Ability to Make Images Questionnaire, is also examined in relation to the vocabulary recall in both directions. Grade 7 students studying Spanish as a second language learned 22 Spanish-English word pairs. Data on recall performance was gathered on five occasions and was analysed using the Hierarchical Linear Modelling procedure. The retrieval training was a significant predictor of the bidirectional recall as was the ability to make images.

J 20   25 August 2005   17:00 - 18:20   Room E113

Paper Presentation

COMPUTER SUPPORTED LEARNING IN SCIENCE AND RESEARCH

Chair: Eleni Kyza, University of Cyprus, Cyprus

Assessing Student Learning in, around, and for a Multi-User Virtual Environment

Steven Zuiker, The University of Georiga, United States
Daniel Hickey, The University of Georgia, United States
Eun Ju Kwon, The University of Georgia, United States
Rebekah Chapman, The University of Georgia, United States
Sasha Barab, Indiana University, United States
Gita Taasoobshirazi, The University of Georgia, United States

Emerging sociocultural approaches to instruction, multi-level and multi-type approaches to assessment, and design-based approaches to educational research can accomplish the ostensibly incompatible goals of increasing student understanding and ensuring high-stakes achievement. These approaches are particularly promising for advancing computer-supported, open-ended learning environments. The present study coordinates these approaches in a multi-user virtual environment called Quest

Atlantis. Specifically, a 20-hour USA middle school science curriculum situates investigations into water quality around virtual river habitats. Semi-formal classroom assessments and innovative learner-oriented formative feedback rubrics will be used to align the investigations with a formal performance examination and with the educational standards used to construct an external multiple-choice achievement test. The impact was formally evaluated by comparing external test gains with similar students in comparison classrooms where a conventional text-based curriculum continued to be used. Results will demonstrate the value of this coordinated approach for refining instructional design and enhancing student learning while also maintaining robust measures of learning.

Computer support for collaborative enquiry based research
Jos Jaspers, Utrecht University, Netherlands
Gijsbert Erkens, Utrecht University, Netherlands

In the PRO-ICT project a groupware environment has been created, to facilitate collaborative writing in inquiry based learning assignments. In this VCRI (Virtual Collaborative Research Institute) environment, teams of students collaborate on inquiry-based expository writing projects (http://edugate.fss.uu.nl/vcri). Main research question is how cognitive and meta-cognitive tools can facilitate the processes of collaborative planning, writing and coordination in research and writing projects. Subjects were 45 college track students of about 16 years of age taking classes in the subject of history. Three experimental groups worked with a base environment extended with different combinations of shared cognitive and meta-cognitive tools. Subjects were assigned to teams of three students collaborating on an essay writing project for 10 nonconsecutive hours. The base environment of VCRI included three tools: a database of relevant historical information sources (Database), a chat and a shared text processor (Co-writer). The Co-writer allows the students to work on the texts of their assignments simultaneously. Visualization of argumentative ideas (Diagram), selection within sources (Selector) and publishing of intermediate results (Publisher) were supported by cognitive tools. Meta-cognitive tools supported the planning (Planner), monitoring (Logbook) and reflective activities (Reflector) of the students. With the Coach program, the teachers could monitor the progress of their students and provide feedback to the group or to individual teams.
The results show that student teams using the environment that incorporated the meta-cognitive tools wrote essays of higher argumentative quality than the other two groups. However, the group of teams with the cognitive tools did not write better texts than the teams in the base environment condition. Furthermore, students

and teachers were generally positive about the VCRI. The different tools offered adequate support. The teachers saw the Coach program as a valuable tool to keep track of the progress of the students.

The development of conceptual understanding mediated by computational representations
Orit Parnafes, UC Berkeley, United States

This work investigates the role of external representations in developing conceptual understanding. It seeks to make a theoretical contribution by exploring learning processes at the intersections of two significant bodies of research: 1. Conceptual change, and 2. Learning with external representations. Data is collected from case studies in which pairs of students are engaged in an exploration activity, in which they try to make sense of the behavior of computational (dynamic and interactive) representations of harmonic oscillation. Multiple lines of analysis are being used: 1. Describing the trajectory of the development of conceptual understanding. 2. Characterizing the use of the computational representations throughout the learning trajectory. 3. Integrating, in fine-grained detail, the conceptual development and the representational use, by a close examination of selected episodes of change. Preliminary findings provide an initial set of mechanisms that explain the development of conceptual understanding, with a specific attention to the role or external representations. A sound set of mechanisms can potentially constitute the foundation for a model for developing understanding mediated by the use of representations. In addition to the theoretical contribution, such a model can inform the design of representations for supporting learning of scientific concepts.

Support of collaborative discovery learning using a cognitive tool
Nadira Saab, University of Amsterdam, Netherlands
Wouter Van Joolingen, University of Amsterdam, Netherlands
Bernadette Van Hout-Wolters, University of Amsterdam, Netherlands

In collaborative discovery learning students jointly perform experiments to test generated hypotheses with as a result the co-construction of knowledge by means of sharing knowledge and negotiating. In this study we introduce the Collaborative Hypothesis Tool (CHT), which guided 15 of 25 dyads through the collaborative discovery learning process. The results of this study show that working with the CHT can influence the use of communicative and discovery activities, which can lead to a better learning performance. Future research should be aimed at the stimulation of

the use of the tool, since the learners did not use the tool very frequently.

J 21   25 August 2005   17:00 - 18:20   Room E003

Paper Presentation
Multimedia and Hypermedia Learning

RESEARCH IN MULTIMEDIA AND HYPERMEDIA LEARNING

Chair: Jose Antonio Leon, Universidad Autonoma de Madrid, Spain

The effects of different graphical overviews on hypertext learning achievement
Thiemo Mueller-Kalthoff, University of Bielefeld, Germany
Jens Moeller, University of Kiel, Germany

The aim of the present study on learning with hypertexts was to examine the impact of different graphical overviews (graphical summary of content vs. graphical browser) on learning achievement as a function of prior knowledge. N = 99 students worked through a hypertext on the topic of learning and memory before answering questions tapping simple retention of facts and deeper-level comprehension of content at the global and local levels of the text. As expected, the design of the overview played an important role. Participants given access to a graphical summary of content outperformed those provided with a graphical browser. Presumably, the more complex graphical browser distracted learners from the actual task of acquiring knowledge. Participants provided with a graphical summary of content were better able than those with a graphical browser to retain information at the global, but not at the local level of the text. The graphical summary of content only had a direct effect at the local level when it was a case of processing material at a deeper level (i.e., acquiring structural knowledge). This applied to students with low prior knowledge as well as to those with high prior knowledge.

Enhancing Hypermedia Learning Through Metaphorical Priming

Neil Schwartz, California State University, Chico, United States
Michael Stroud, University of Massachusetts @ Amherst, United States
Tiffany Lee, University of Washington, United States
Brianna Scott, Indiana University, United States
Steven McGee, Wheeling Jesuit University, United States

This investigation was designed to determine the influence of metaphorical priming on learners' comprehension of issues and concepts pertaining to the US Constitution when students studied the subject matter in a problem-based hypermedia instructional system. 65 high school seniors studied the system for five days after receiving relevant, irrelevant, or no metaphorical priming each day. Results revealed deep level comprehension and personal understanding of the instructional system only for students receiving the relevant metaphorical primer. Surface level retention failed to vary between groups. Discussion focuses on theory and recommendations for instructional design and classroom use of software.

A Closer Look on Modality and Split Attention Effects in Multimedia Learning: The Moderator Function of Topic Specifity

Georg Hauck, University of Education Weingarten, Germany
Wolfgang Schnotz, University of Landau, Germany

Recent research on multimedia learning has emphasized the essential role of working memory in knowledge acquisition from multiple representations via multiple sensory modalities. In order to integrate verbal and pictorial information in multimedia learning, both kinds of information have to be held simultaneously in working memory. It seems to follow that whenever pictures are combined with text, the text should be presented as spoken rather than as written text, because two sensory modalities provide more capacity than one modality and because spoken text avoids that the eye has to switch between printed words and pictures. However, this advice might be too simplistic, because reference on pictures in a text can vary according to the local text topic. Some paragraphs of the text describe and explain the learning content, whereas others describe and explain pictures. In the first case, when the topic is the learning content, the need for text-picture integration might be lower than in the second case, when the topic is the picture. One can therefore assume that modality and split-attention effects are lower in the first case, whereas they are higher in the second case. Two experiments were conducted to test this assumption. Students read illustrated texts about the formation vulcanoes. Text para-

graphs on different topics were presented as written text or as spoken text. Pictures were combined differently with text paragraphs and were introduced at different times in the course of learning. We found that modality and split attention effects in multimedia learning depend on the topic of illustrated text paragraphs. The effects were stronger when pictures presentation time is short, whereas they were lower when pictures presentation time is long. Learners with low spatial intelligence were significantly more affected by modality and split attention effects than those with high spatial intelligence. Instructional consequences are pointed out.

The role of listening and reading comprehension in multimedia learning environments
Christian Kuerschner, Universitat Koblenz-Landau, Germany

Recent researches on learning with text and pictures found that learners learn better with listening-text than with reading-text (modality effect). However, it is not sufficiently examined yet for which mental representations (text and picture surface, propostions or mental model / situation model) a modality effect can be observed. Another question is, whether individual modality preferences influence learning with listening-text and reading-text. To answer these questions a 2x2 design with the factors modality of the text presentation (listening or reading) and educational background (persons with main communication experience in listening or reading) was used. An intelligence test and a self constructed questionnaire to measure individual modality preferences were used as pre-tests. The learning material was a story about a city and different political parties. The main ideas were also presented as pictures. The results show a highly significant main effect for the factor modality of the text presentation for the construction of a spatial map of the town. There were also significant advantages for listeners over readers in the recognition of text and picture surface. No significant differences were found for recall questions or inference questions. There were also no significant interactions between the factor modality of the text presentation and educational background or self rated modality preference. There was however a significant effect for the selected modality, dependent on the educational background and the self rated modality preference. The study indicates that further research on text and picture comprehension should examine in more detail the influence of the modality effect on different mental representations under different learning conditions.

J 22   25 August 2005   17:00 - 18:20   Room E112

Paper Presentation

WEB-BASED LEARNING

Chair: Symeon Retalis, University of Piraeus, Greece

InCAS (Interactive Computerised Assessment System)
Christine Merrell, University oif Durham, United Kingdom
Peter Tymms, University oif Durham, United Kingdom

InCAS is an adaptive, computer-delivered assessment aimed primarily at children
aged 5 – 11 years although it is also useful for older children with special educa-
tional needs. It assesses English vocabulary, non-verbal ability, word recognition,
word decoding, reading comprehension, spelling and attitudes. Rasch scaling has
been used create ordinal scales of the assessment items, which enables the program
to deliver individualised assessments tailored to each child's level of ability. The
output gives teachers a comprehensive profile of each child's strengths and weak-
nesses, and also comparative data for the whole class. From a management per-
spective, InCAS provides feedback in a convenient format for comparing cohorts
and monitoring standards across the primary years. This paper will firstly describe
the rationale for the content of the assessment and its development. The adaptive
nature of the assessment program and its structure will be then be discussed. Fi-
nally, examples of feedback produced from the assessment data will be given with
suggestions for how it can be interpreted and used diagnostically.

*Fostering metacognitive processes of college students through an online learning
environment*
Rikki Rimor, Teachers College of Technology, Israel
Rivka Wadmany, Teachers College of Technology, Israel
Einat Rozner, Teachers College of Technology, Israel

The aim of this study is to examine students' reflections in an online based course
and to determine the nature of their metacognitive processes. Metacognition has
been found to be the best predictor of academic results (Anderson, 2001). In this
study we examined college students' metacognitive components through analysis
of their reflections in an online based course. Thirty five college students partici-

pated in a web-based course for one semester. An online forum was established to support their tasks via group discussion and lecturer feedback. The forum protocols were analyzed by content analysis using the Meta Cognitive Tool for Students' Reflections (Rimor, 2002). The students' statements were analyzed and coded in accordance with the tool's parameters. We analyzed 700 statements using 20 parameters. The frequency and proportion of each parameter were computed in relation to three metacognitive components: personal, task, and strategy. The research utilizes qualitative methodology. Analyzing the content of the forums' protocols revealed a primacy of students' personal and task reflections. Parameters related to positive affect, communality and collaboration were prominent. Various negative feelings and attitudes towards learning on the web were also examined and found negligible. About half of the reflections analyzed were related to the tasks. They represent the students' reflections on various dimensions of their task, such as: content, structure, feasibility and relevance. The frequency of students' reflections on strategy were examined as well and found to be less than 10% of all reflections examined. Our findings reveal the importance of enhancing students' metacognitive activities through online forums. We explored the nature and quality of metacognitive processes, as expressed by the learners' reflections.

Using networked learning to support induction into critical reasoning: Pedagogical design and research methodology
Annamaria Carusi, e-Learning Research Centre, United Kingdom
Rupert Wegerif, e-Learning Research Centre, United Kingdom
Maarten De Laat, e-Learning Research Centre, United Kingdom

The paper uses data gathered from 'Philosophy Online', an online introduction to philosophy course for adult learners. Core instructional activities in the course took the form of student-led discussion, on the principle that argumentation skills required for philosophy are better developed in this type of collaboration. However, the notion of argumentation and the best ways of analysing it remains in need of clarification. This is also the case for networked learning in general, as much still remains unclear about the most effective forms of NL and about the most effective ways of researching NL. In order better to understand argumentation and NL, and the relationship between them, we begin with a study of the research methods used to analyse them. We contrast and compare various qualitative approaches, among which grounded theory, discourse analysis, a social semiotic approach and hermeneutics, showing the range of questions about argumentation that can be answered by using these approaches. In particular, we found a marked difference between

the findings offered using analytical techniques which focus on purely cognitive aspects, as opposed to those which are more attuned to social and broader interpretational factors in analysing argumentational discourse. These findings lead us to propose a combined methodology designed to integrate analysis of the cognitive dimension of online teaching and learning with analysis of the social dimension. These results allow us to make recommendations regarding the design of student-led discussion activities geared towards argumentation, concerning the composition of groups, role-playing within the group, and the type of question or topic which provide the springboard for good discussions.

An ethnographic analysis of conversational and publishing practices of advanced Weblog authors
Sebastian Fiedler, University of Augsburg, Germany
Priya Sharma, Pennsylvania State University, United States

The Web is a major platform of convergence for many digital artifacts, and considerable portions of the population treat the Web as their primary information source. This perception alters our information gathering habits in fundamental ways, influencing how people work, play, communicate, and learn. Recently, the popularity of personal and collaborative Web publishing tools and practices has dramatically increased. These tools radically simplify the information gathering, filtering and publishing cycle on the Web, allowing individuals in taking active roles as content collectors, editors, and authors of Web-based content, and have quickly gathered an rapidly growing user base. Descriptions of the technical and conceptual anatomy of Weblogs are many, as are are increased numbers of reports about the integration of Weblog authoring into formal educational settings. However, little is known about actual workflows and tool use of advanced practitioners. While products of Weblog authoring activities are easy to access and to monitor, much of the actual practice of consuming, creating, and (re-)using Weblog content remains invisible and implicit. An in-depth analysis of the personal meaning and social patterns attached to Weblog authoring by advanced Weblog authors would be useful in supporting our understanding of the logistical, conversational, and interactive patterns that support learning in this domain. We propose to work with a selected, international group of about 15 educational technology professionals who have authored a personal Weblog with a professional focus for at least 2 years. Our data collection will include semi-structured interviews and Weblog artifacts, and will be guided by an ethnographic approach and will use instrumental case study focus for bounding and analyzing data. We intend to present the results of this analysis, by providing themes

and rich, narrative descriptions of the practices and meanings that advanced Weblog authors employ in their utilization of Weblog authoring in daily life.

J 23   25 August 2005   17:00 - 18:20   Room E104

Paper Presentation

TEAM LEARNING AND ORGANISATIONS

Chair: Aki Enkenberg, TIEKE Helsinki, Finland

Intranet as a tool for collaboration and community building in multi-national research project
Aki Enkenberg, TIEKE, Information Society Development Center, Finland
Jorma Enkenberg, University of Joensuu, Finland

Project intranets have become increasingly popular in multi-national research and development projects. In principle such systems can support in many ways the work of the research community e.g. by structuring the work processes, offering tools for elaborating of ideas and knowledge sharing, allocating resources and enhancing the feeling of community. Can intranets serve as relevant and beneficial environments to support learning and community building in multi-national research projects remains to some extent an open question. This study aims to find out how researchers will take into use the affordances of designed intranet and how they experience and apprenciate the value of them. TEDIP (Technology, Economics and Diversity in the Periphery) as a multi-national project funded by European Commission has served as a project case. For finding answers to the questions the use of an intranet for the TEDIP project has been analysed, with focus on transactional interactions and work processes between the members of the research community during different phases of the project and the functionalities of it to enable, support or hinder the research and learning activities. A combination of interviews, log data collection and member survey was used as methods in data collection. Also, both qualitative and quantitative content analysis were applied to model the discussion processes. Results demonstrate that the designed system was flexible and powerful enough for supporting necessary research processes. Data also indicate that in the development of intranets for these kinds of research goals, there is need to put more emphasis on management of group discussions. Affordances and openness seem to challenge structured management in online work. Projects should have articulated a shared

collaborative work model from the beginning integrated into the use of the system for enhancing community building and activities typical in productive research community of practices.

Learning and Knowledge Building in Distributed Work Environment
Saija Maki-Komsi, Nokia Corporation, Finland
Paivi Poyry, Software Business and Engineering Institute Helsin, Finland
Eero Ropo, University of TampereDepartment of Teacher Educati, Finland

Learning in work places is facing changes due to the diversifying customer requirements and continuously changing business environment. To be able to fulfil customer needs globally, organizations tend to turn to more flexible ways of working and designing organizations. As a consequence, also work is often done in a distributed manner in global networks and in virtual teams. Especially in knowledge-intensive companies, information and knowledge become out-dated fast, and formal training is not capable of providing the needed information as quickly as needed. Need for learning is often driven by a problem at hand. Subsequently, there is an evident need to leverage the newest information and knowledge in an informal way straight to the colleagues who need it. Technological tools and applications can support the data handling across countries and time zones. Acquiring new information and knowledge is not enough, however. Being able to communicate and construct new knowledge with remote colleagues in technology-mediated co-operation is the emerging trend. Most of all learning will happen through learning-by-doing methods and only a minority by attending to traditional classroom learning, e-learning or other formal virtual learning sessions. In this paper we report findings from a case study focusing on learning with and from remote colleagues. The total of 19 semi-structured interviews with employees working in distributed ways were carried out in a globally operating telecommunications company. The interview data were analysed with qualitative content analysis. The results indicate that learning in informal ways from and with the colleagues is the predominant way of learning at the workplace. In addition, the colleagues have formed communities of practice for sharing the experience-based knowledge and for solving problems collaboratively. Several challenges were also identified, e.g. the need to support knowledge creation with the remote colleagues more efficiently. The paper discusses these results in more detail.

The Endeavor of Boundary Crossing: multivoiced discussions in an inter-organisational research group

Sanne Akkerman, Utrecht University, Netherlands
Wilfried Admiraal, Utrecht University, Netherlands
P. Robert-Jan Simons, Utrecht University, Netherlands

Collaborative research projects often set aims for shared outcomes. To reach these outcomes professionals need to understand each other's views, negotiate and develop a shared mind of the group towards the object of activity. This enables the group to coordinate their actions and thoughts. However, the situational aspects of inter-organisational projects, make it difficult to develop shared mind, for there are several socio-cultural boundaries to be expected, for example different institutional cultures and professional experiences that inform the views of the professionals in the group. Boundary crossing collaboration is argued to offer potential for moving beyond private worlds, but at the same time it entails a huge challenge. This article aims to understand the nature of this challenge by looking at an inter-organisational academic research project, and studying the processes through which multiple voices were negotiated. To advance the study of these processes in such a boundary crossing group, we developed a rationale that accounts for the socio-cultural context of the participants and of the group, and that at the same time considers the social processes as dialogical in nature. The paper reports on a project that has been followed for two years. Data consists of video tapes and observations of the meetings, e-mail and documents, and interviews with the participants about their views. The interview data is used as a framework in the discourse analysis. Based on the extensive data gathered, it is expected that the results will indicate the difficulty of voices appearing in action, while the broader contexts that inform them are left implicit during the negotiation. Moreover, it seems that it is only later in the collaboration process when the most crucial boundaries to be crossed are faced.

The formation of shared understanding: How individuals assess their own and others' knowledge?

Piritta Leinonen, University of Oulu, Finland
Sanna Jarvela, University of Oulu, Finland

This study focused on shared understanding, which is critical for successful outcomes of collaboration both in educational and working situations. The semi-structured interview with 23 manager-level workers was used to investigate how individuals assess their own and others' knowledge and working processes, when they

work in distributed collaboration context. The analysis of assessments was guided by the assumption that to reach shared understanding in collaborative learning and working individuals try to evaluate their own and each others' cognitive goals and task-specific knowledge, and this evaluation is effected by dispositional factors such as an assessment tendency (Higgins et al., 2003). Also, it is assumed that if evaluation of own and others' knowledge is supported with an external assessment tool (Paris & Paris, 2001), it promotes individual's planning and engagement in working and learning around the goal (van Kraayenoord & Paris, 1997). The subjects worked as two distributed groups for two months around the shared task, and their working was supported with the visualizations which presented how each member of the group endorsed on some issue considering their shared task. In addition to the semi-structured interviews, the data were gathered by using the assessment tendency scale (Higgins et al., 2003) in order to understand more deeply why some individuals assess their collaboration differently than others. Qualitative analysis showed that assessment tendency prevailed how the subjects evaluated their working around the shared task. The high assessors described collaboration as seeking of shared understanding and tried to understand others' perspectives and views in collaboration more often than low assessors. This research adds our understanding of how individuals assess others' knowledge when they work around the shared task, which has practical implications for the conduct of collaborative learning situations and learning through and for work.

K 1   26 August 2005   08:30 - 10:30   Room A108

Symposium
Multiculturalism in Education

TEACHING AND LEARNING MATHEMATICS IN MULTIETHNIC CLASSES

Chair: van Eerde Dolly, Freudenthal Institute, Utrecht University,
              Netherlands
Organiser: van Eerde Dolly, Freudenthal Institute, Utrecht University,
              Netherlands
Discussant: de Abreu Guida, Dep. of Pscyhology, Oxford Brookes University,
              United Kingdom

Most European countries face the challenge to find effective approaches to deal

with the growing ethnic diversity in their schools. Teachers in multi-ethnic class-rooms are trying daily to find sensible solutions for the complicated questions they are confronted with. While much research into this field concentrates mainly on the macro level of education, many questions at micro level remained unanswered. This symposium aims to offer a contribution to this area by examining empirical research into the micro-context of the class, the heart of education: the process of teaching and learning. The studies, conducted in Portugal, Spain and the Netherlands, share a socio-cultural approach (defined in a broad sense), the subject area of mathematics, and a focus on teachers' and students' interactions and cognitions. Data consist of classroom observations, students written work and interviews. The contributors explore teaching and learning math in multiethnic classes from different angles. Van den Boer explored which mechanisms lead to the lacking math results of minority students in comparison with their native peers. Planas & Gorgorio studied the role of social norms and discourse when learning mathematics. Teles and Cesar studied issues of learning mathematics in a handicraft activity in an artistic context, Van Eerde focusses on students' talking, writing and thinking in integrated math and language lessons.

Dancing with Mathematics: Reports of a project with color and movement...
Teles Lucilia, University of Lisbon, Portugal
Margarida Cesar, University of Lisbon, Portugal

Facing more multicultural realities, Portuguese school needs to become meaningful to all students. But this is not an easy process. Each culture has its patterns, ways of being and thinking, and a particular way to face school. Thus it is not so easy to promote learning practices which are adapted to everyone. In Portugal we also face another reality: Social minorities that are valued by society, like Dance School which is a public school but an artistic one, and for this reason it has particular characteristics. Teachers assume an important role as mediators and facilitators of the learning process (Vygotsky, 1978). The didactic contract (Schubauer-Leoni, & Perret-Clermont, 1997) and the nature of tasks (C?sar, Oliveira, & Teles, 2004) are other relevant elements to students' academic performance, namely in Mathematics. In multicultural settings intercultural tasks are essential tools to promote knowledge appropriation and citizenship (Bishop, 1988). This research consisted in the study and implementation of a micro-project: a handcraft activity from Cape Verde – batiks. The study links two projects: Interaction and Knowledge and IDMAMIM. The participants were sixteen 9th grade students (Dance School). Data were gathered using observation (audio and/or video taped), students' protocols, question-

naires and interviews. As students were from an artistic community, the project was elaborated in a different way: They used the school name to create a lettering for T-shirts shown during the school exhibition. The initial micro-project was adapted to this community's characteristics and thus valued by students as a very interesting learning experience, and a fine way to learn mathematics and social competencies. The analysed episodes are about a dyad performance and some excerpts of its interaction when students were solving tasks related to inverse proportionality. The students' engagement on the batiks' project was very important to their mathematical performance as illuminated by its analysis.

The multiethnic mathematics classroom as a discourse
Planas Nuria, Autonomic University of Barcelona, Spain
Nuria Gorgorio, Autonomic University of Barcelona, Spain

Teaching and learning within the mathematics classroom requires, both on the side of the teacher and the students, learning to deal with dilemmas regarding norms and forms of practice. It is also related to coping with dilemmas concerning fundamental values such as the right to expression. The way these dilemmas are approached leads to the particular culture of the classroom with its specific discourse contents. We will critically examine the notion of discourse understood as an essential element in the analysis of social interactions in the mathematics classroom, and as a tool to study the role of norms when learning mathematics. The role norms play in promoting a certain discourse becomes very important in communities such as the mathematics classroom, where neutrality and commonality are mostly taken for granted. Although we are primarily interested in discourse and norms, we also explore valorizations as patterns of communication by which participants assess both classroom practices and other participants. In the mathematics classroom, the issue is not merely how certain practices and norms arise, are maintained and communicated, but how they are (not) made visible enough to all participants, and how the diversity of perspectives is assessed. We will present data from a multiethnic mathematics classroom in Barcelona, Spain. In the analysis of our classroom episodes, what counts as legitimate mathematical knowledge is deeply related to who has and shows appropriate ways of dealing with school mathematics in that particular classroom. A few local students and the teacher are the ones to decide normative issues. They easily undertake the role of recognizing and legitimating certain practices and people on behalf of 'the' mathematical knowledge, because other participants, mostly immigrants, do not complain about what they may (not) perceive as a differential treatment.

Minority students' hidden problems in mathematics education
van den Boer Corine, Freudenthal Institute, Utrecht University, Netherlands

Ethnic minority groups in the Dutch education system find themselves in a disadvantaged position. Minority students do not take as many science-based subjects as Dutch students with the same grades, and they take them at a lower level, failing their exams more often. In 1993 a new mathematics program was implemented known as 'realistic mathematics'. The growing number of contexts made the subject more language-based, while students were also required to talk more, listen to each other and consult each other. This strained the vocabulary and communicative abilities of both students and teachers. The students needed to actively work with mathematics: they were no longer passive consumers, but active participants who constructed their own mathematical tools and insights during the educational process. In 1995 we started an exploratory study to find out how second-language students in Dutch secondary schools function within (realistic) mathematics education and what problems they encounter. One explanation we found for lagging achievements of minority students in this context lies in several mechanisms which arise from interaction between the problems of minority students, their learning behaviour, and teachers' teaching behaviour. Learning through problem solving, reasoning and reflecting all have a central place in Dutch mathematics education. Due to minority students' lack of linguistic skill they often assume a passive role and concentrate on calculations and answers. These students' learning strategies are not effective in mathematics education. As a result of their strategy, their problems do not come to light. Teachers and students believe they are talking about the same thing, when in reality they have different ideas in mind. To clearly reveal these misunderstandings, intensive interaction is essential. Only then will problems be visible and will minority students be given the chance to develop mathematics and (mathematical) language for themselves.

Student's talking, writing and thinking in multiethnic math lessons
van Eerde Dolly, Freudenthal Institute, Utrecht University, Netherlands

A recent study showed that poor linguistic ability is at the core of the poor math results of Dutch ethnic minority students. However, the real problem goes beyond language issues: students' ineffective strategies and teachers' strategies reinforce each other (Van den Boer 2003). Moreover, the problem is hidden and underestimated by both teachers and students. Due to the lack of interaction between teacher and students, and students' minimal verbal participation, barriers for learning do

not come to light. In multi-ethnic math classes, language is not only an important tool for learning but should be a target at the same time. The main target, however, remains teaching and learning mathematics. Like language and thinking, language and math are intertwined. Promoting students' learning processes in mathematics means giving them the opportunity to develop mathematical concepts and strategies by putting their thoughts into words and discussing these with others. Teachers should help their students to bridge the gap between their use of informal language and the more formal mathematical language that will be increasingly required from them. To assist teachers in this process a design experiment was started combining the development of theory and instructional materials directed towards the improvement of teaching math in multi-ethnic classes. Math lessons were designed aimed at the integrated learning of math and language by promoting students' participation and interaction, and providing opportunities for teachers to get insight into students' learning processes. We will present data from Dutch multi-ethnic math classes. We will analyse transcripts of classroom interaction, students' written work, and questionnaire data of students' reflections on these lessons and their own learning processes.

K 2   26 August 2005   08:30 - 10:30   Room B107

Symposium
Mathematics Education

INTERVENTIONS TO IMPROVE CHILDREN'S MATHEMATICAL KNOWLEDGE AND THINKING

Chair: Jarkko Hautamaki, University of Helsinki, Finland
Organiser: Michael Shayer, King's College, London, United Kingdom
                    Terezinha Nunes, Oxford Brooke's University, United Kingdom
Discussant: Christine Howe, University of Glasgow, United Kingdom

In spite of differences between theories that focus on individual Children's development and those that focus on social influences, the applications of these theories to teaching tend to converge. Constructivists and social constructivists would agree that teaching mathematics should aim to boost pupils' mathematical thinking and provide them with cultural tools that are potential sources of movement upwards in Children's cognition. In order to design such forms of teaching, we need an understanding of how the learner reaches an understanding of the cultural tools. Hans

Freudenthal has contributed greatly to this, proposing an approach that considers the importance of realistic problem situations, from which children can derive logico-mathematical insights important for their own experiences. This approach is markedly different from views of mathematics taken by mathematicians, whose interest may be in the mathematical structures themselves and their abstract nature. In this symposium four ways of achieving the task of boosting Children's thinking and providing them with tools will be discussed. Demetriou starts with research related to metacognition and mathematical processing and presents an intervention with 8 to 11 year-olds. Hautamaki reports research on a cognitive intervention in three different contexts among 5 to 8 year-olds and their effects on mathematical understanding. Shayer reports a two-year intervention with 5 to 7 year-olds, mainly in the context of mathematics, aimed at increasing their cognitive development. Finally, Nunes et al. present an analysis of the different meanings of fractions across types of problem situations and the arguments that children provided during a small group intervention when judging the equivalence of fractions in two types of problem situations. The discussant, Howe, will examine in what ways these different interventions converge in the identification of principles that can support the development of innovative practices in mathematics teaching.

Cognitive intervention fot 5 to 7 year-olds through mathematics
Michael SHAYER, King's College, London, United Kingdom
Mundher ADHAMI, King's College, London, United Kingdom

This paper reports a research project aimed at enhancing the cognitive development of children in the first two years of Primary school but working mostly in the context of mathematics. The 5/6 year-olds were given two types of interventions lessons, the first being the Piaget-based Let's Think activities, and the second being a set of 10 Thinking Maths lessons (TM), designed to address what lies beneath ordinary procedural learning. Next year the children now aged 6/7 got a further set of TM lessons at a rate of one a fortnight. The methodology of the TM lessons was derived from theory both from the work of Piaget and of Vygotsky. From Piaget, and from the work of maths researchers such as Vergnaud and Nunes, comes a hierarchical analysis of the relative difficulty of different underlying strands of mathematics such as multiplicative relations and measurement in relation to ratio. This enables different levels of understanding to be addressed within the same mathematical context. But from Vygotsky comes a view of cognitive development as related strongly to social collaboration with peers. The mediation that the teacher has to practise is not that of 'scaffolding'—that is, putting herself between the maths

concept and the child—but instead is to manage the process by which children interact in small groups on maths problems, and then further interact in whole-class plenaries so that they mediate each other's construction of their own learning. Other Children's expressions and formulations are much closer to the quick of a child's developing learning than a teacher can ever be. This leads to a style of class-management which promotes collaborative learning. Pre-and post-test data on cognition and maths achievement shows substantial gains on both—up to a standard deviation in some classes.

Testing the Let's Think and Math! programmes in Finland: results from several studies
Pirjo Aunio, University of Helsinki, Finland
Jarkko Hautamaki, University of Helsinki, Finland

The study was conducted to promote the development of young Children's number sense in Finnish pre- and primary schools. We used two intervention programmes Math! (Van Luit & Schopman, 1998) and Let's Think!(Adey & al., 2001) in three educational settings. In the first setting all participating children had low number sense (n = 8 children), in the second (n = 8 children) and the third (n = 10 children) settings the groups were the original teaching groups in the particular schools. The controls (N=28) were matched according to their ability, age and gender. The preliminary analysis in the first setting demonstrated that the children in the test group had better number sense in the immediate post-test than did their peers in the control group. In the other settings the interventions are in process while writing this proposal.

Children's insights and difficulties in understanding fractions
Terezinha Nunes, Oxford Brookes University, United Kingdom
Peter Bryant, University of Oxford   , United Kingdom
U Pretzlik, Oxford Brookes University, United Kingdom

We investigated Children's understanding of the most basic aspect of number, equivalence, when they encounter rational numbers in two types of problem situation: part-whole and division. These situations were considered distinct because the digits that compose the fractions have different referents across the situations: in part-whole problems, the digits refer to parts (e.g., eating 1/3 of a chocolate means dividing a chocolate in 3 parts and eating one part). In division problems, the digits refer to different variables (e.g., 1 chocolate bar divided by 3 children is

represented as 1/3 or 1 divided by 3). Through quantitative surveys and qualitative analysis of Children's discussions during small group teaching sessions, we found evidence that children think differently about these two situations. They perform significantly better in equivalence problems when these involve division rather than part-whole. In part-whole problems, they use almost exclusively perceptual strategies: draw and compare visually. In division situations, they most often establish correspondences between the quantity to be shared and the recipients, and conclude that fractions are equivalent when the division was fair and exhaustive. We conclude that Children's insights from their understanding of division can be used in teaching fractions and show that learning fractions in this way has long lasting effects on their performance in standardised tests.

The development of mathematical reasoning: Its interplay with processing efficiency, self-awareness and self-regulation
Andreas Demetriou, University of Cyprus, Cyprus

The human mind is described as a three level hierarchical system involving domain-general and domain-specific processes and functions. Specifically, it involves, first, a domain-general system of processes and functions that define processing potentials and efficiency at a particular point in time. Second, another domain-general system involves processes and functions that define self-awareness, self-regulation, and planning. Finally, the mind involves a set of environment-oriented systems that specialize in the representation of different types of information and relations in the environment. They are the systems of categorical, quantitative, causal, spatial, propositional, and social thought. Each of these systems is itself a three-tier hierarchy that involves core processes, operational systems, and conceptual knowledge. In quantitative thought, for instance, subitization and an internal numerical accumulator are examples of these core processes. Examples of operational processes are the four arithmetic operations and proportional reasoning. All number knowledge is conceptual knowledge in the domain of quantitative thought. The two higher tiers of quantitative thought develop through a series of developmental levels that differ systematically in the complexity and type of mathematical concepts that can construct and the mathematical problems that can solve. They are as follows: Proto-quantitative thought, coordination of proto-quantitative schemes, fundamental mathematical concepts, proportionality, number conceived as a variable, formal relations. The procedural, symbolic, and logical characteristics of each level will be specified. Each of these levels places particular demands on processing efficiency which will also be specified. Finally, the kind of self-awareness and self-regulation

associated with each level will be specified. An acceleration study that implements the theory as a learning model will be summarized. The implications of this model for general and developmental models of intelligence and also for education will be discussed

K 3   26 August 2005   08:30 - 10:30   Room A007

Symposium
Multimedia and Hypermedia Learning

AFFORDANCES FOR LEARNING IN MULTIMEDIA LEARNING ENVI-RONMENTS

Chair: Ton De Jong, University of Twente, Netherlands
Organiser: Ton De Jong, University of Twente, Netherlands
Discussant: Paul Ayres, University of New South Wales, Australia

In this symposium a set of research projects is presented that individually and in combination examine the relations between external representational codes (pictorial, arithmetical, and textual), modality (visual or auditory), learning processes, and learning outcomes in technology based learning environments. The research question for these research projects focuses on the affordances of representational codes in terms of facilitation or hindering of specific learning processes, and the effects of representational codes and modality on learning results in specific instructional contexts. The theoretical approach that is used combines theories of 'computational effectiveness', 'dual coding', 'cognitive load', and 'multimedia design'. The final goal of the research programme is to translate the findings into a coherent set of instructional design guidelines. Each of four individual projects in the programme examines a specific instructional approach: collaborative discovery learning, observational learning, explorative hypermedia learning, or learning from worked-out examples. Within each of the research projects, comparisons on learning processes and learning outcomes between different external representations for the chosen instructional approach are made. To permit comparison between instructional approaches, the research projects share a number of commonalities. First, the domain that is chosen, stochastics/statistics, is the same for all four instructional approaches. This is a domain that is suited for the use of different representational codes (pictorial, arithmetical, textual) and that generally has a relative high difficulty level. Second, the same set of learning outcome measures (tests) is used in

all four projects. Third, a shared database of basic learning processes is used in the analysis of the learning behaviour of learners in all four projects. Fourth, all projects use the same measures for assessing cognitive load. A fifth, overarching projects integrates the results of the individual projects. In this symposium the set-up of the overall research programme is presented together with the first result.

Affordances for learning in multimedia learning environments; a research program

Tessa Eysink, University of Twente, Netherlands
Pascal Wilhelm, University of Twente, Netherlands

In this presentation the overall set-up of the research programme affordances for learning in multimedia learning environments is discussed. This set-up shows how four different research projects are integrated to produce the answers to the general research questions in the programme. These questions focus on the relations between external representational codes (pictorial, arithmetical, and textual), and modality (visual or auditory), learning processes, and learning outcomes in four instructional contexts (collaborative discovery learning, observational learning, explorative hypermedia learning, and learning from worked-out examples) in the domain of stochastics/ statistics. The target group of learners involves high school students at the pre-university level. The joint effort of the four research projects involved is co-ordinated by a fifth, overarching, project with its own unique output. This separate project has as its main goal to enhance, reconcile, and integrate empirical findings and to gain a clearer view on how representational codes can foster or hinder learning processes. Data from the four research projects and additional empirical studies serve as input for the fifth and overarching project to accomplish its tasks. In this overarching project, an analysis was performed to identify concepts within the domain (stochastics/statistics), types of representations suitable for the domain, and categories of knowledge that a learner can acquire within the domain. For the different instructional contexts learning processes that a learner can be engaged in while learning were identified. Pre and post-test items that were developed in collaboration with all projects in the programme were tested in two pilot studies. Data from these studies, combined with a description of learning processes in the different instructional contexts will be presented to illustrate the integration of the different projects.

Exploration of hypermedia environments: Learner control and adaptive user strategies

Maria Opfermann, University of Tuebingen, Germany
Peter Gerjets, University of Tuebingen, Germany
Katharina Scheiter, University of Tuebingen, Germany

This project investigates promises and drawbacks of hypermedia exploration for acquiring knowledge on mathematical solution procedures. Hypermedia environments are information networks that are capable of being explored in multiple ways thereby allowing for learner control and adaptive information utilization. However, research has demonstrated that learners can face problems in selecting and integrating relevant information that may reduce the possible benefits of self-controlled learning by hypermedia exploration. Accordingly, one research focus of the project is on improving hypermedia design and on testing whether principles of efficient multimedia design will also apply to self-controlled hypermedia learning. Another objective is to augment the prevailing presentation-oriented approach by a utilization-oriented perspective. In particular we are interested in the issue of how learner characteristics like epistemological beliefs, attitudes and metacognition influence learner activities and navigational decisions. In sum, the aim of the project is to yield insights into the learning processes afforded by providing hypermedia environments with multiple external representations and into learners' strategic abilities with regard to adaptive information utilization. These issues are addressed in two experimental studies that investigate how learning-outcome measures as well as learners' strategies of information utilization are affected by the degree of learner control, by different representational codes (textual, arithmetical, pictorial), and different sensory modalities (visual and auditory). Experiment 1 compares linear (system-controlled) environments that force learners to study a predefined set of instructional materials in a given order to nonlinear (learner-controlled) hypermedia environments that allow for specific choices with regard to the selection and sequencing of external representations. Experiment 2 investigates the role of sequencing instructional materials in different way in order to test the assumption that it may be useful to change instructional materials in the course of learning. Experiments are currently being conducted and results will be presented at the EARLI 2005.

Learning from worked-out examples: Fostering the integration of multiple representations
Kirsten Berthold, University of Freiburg, Germany
Alexander Renkl, University of Freiburg, Germany

There is hardly any research on worked-out examples in which it was investigated how to exploit the potential of multiple representations in order to foster deep understanding. Instructional support procedures in this respect are the integrated format and the prompting of self-explanations. The effects of the integrated format and self-explanation prompts on integrating multiple representations and thereby fostering a deep understanding were investigated in two experiments. In both experiments, worked-out examples (domain: stochastics) were presented in two representational codes in a computer-based learning environment (arithmetical and pictorial solutions). In Experiment 1 (N = 60), it was asked to what extent specific prompting procedures enhance the quality of self-explanations and learning outcomes. Two prompting procedures and a control group were implemented. Participants of the condition scaffolding-fading received fill-in-the-blank explanations in first worked-out examples. In following isomorphic examples, this support was faded out, and they received open self-explanation prompts. In the condition self-explanation prompts, the learners were provided only with open self-explanation prompts. A control group included no support. Both the scaffolding-fading procedure as well as the self-explanation prompts fostered procedural knowledge in comparison to the control group. In Experiment 2 (N = 160), the effects of using self-explanation prompts in combination with multi-representations in an integrated format vs. non-integrated format and with mono-representations are investigated. Four mono-representational and four multi-representational conditions are implemented: (1) Pictorial solutions only; (2) Pictorial solutions / self-explanation prompts; (3) Arithmetical solutions only; (4) Arithmetical solutions / self-explanation prompts; (5) Pictorial and arithmetical solutions / non-integrated format; (6) Pictorial and arithmetical solutions /integrated format; (7) Pictorial and arithmetical solutions / non-integrated format/ self-explanation prompts; (8) Pictorial and arithmetical solutions/ integrated format/ self-explanation prompts. Results in respect of learning processes, learning outcomes and cognitive load will be presented.

Observational learning from multimedia expert models: The relation between modality, pacing, and segmentation
Pieter Wouters, Open University of the Netherlands, Netherlands
Fred Paas, Open University of the Netherlands, Netherlands
Jeroen van Merrienboer, Open University of the Netherlands, Netherlands

Modern educational theories advocate the application of cognitive modelling in learning environments that focus on authentic tasks. Cognitive modelling with animations, which is referred to as multimedia expert models, has been identified as a useful means to externalize mental processes that are unobservable and difficult to verbalize. In the domain of problem solving, multimedia expert models are used to display an expert constructing a solution for a problem and explaining how and why this is done in this particular way. Split-attention effects can pose problems to novices as they lack the prior knowledge to attend to the relevant aspects of the model. Moreover, they may watch animations passively whereas active processing is necessary for meaningful learning. According to cognitive load theory (CLT), multimedia expert models should optimize the load on the learner's cognitive system. This study used a 2*2*2 factorial design to investigate the relation between three promising instructional techniques, that is, the modality of explanatory text (written vs. spoken), the pacing of the presentation (learner vs. system controlled), and the segmentation of the multimedia expert model (step-by-step vs. continuous). In total 160 novices from secondary school observed eight multimedia expert models in which an expert explained how problems in probability calculation were solved and why this particular solution procedure was chosen. Subsequently participants engaged in a transfer test of eight problems and a post-test in which conceptual, procedural, and structural knowledge were measured. It was hypothesized that participants in the condition with written explanatory text and learner control in the presentation of a segmented multimedia expert model would show highest transfer performance. Preliminary data support this hypothesis. The analysis of all data will be completed in January 2005 and final results are presented at the EARLI.

Scientific discovery learning in multimedia learning environments
Bas Kolloffel, University of Twente, Netherlands
Tessa Eysink, University of Twente, Netherlands
Pascal Wilhelm, University of Twente, Netherlands
Ton de Jong, University of Twente, Netherlands

Scientific discovery learning (SDL) is an instructional method that aims at facili-

tating constructive knowledge acquisition. However, until now, empirical findings do not univocally support the high-strung expectancies with regard to the learning outcomes of SDL. This may be due to the fact that most studies of SDL use traditional measures of learning outcomes. It is argued that SDL may promote structural knowledge in particular. Therefore, the traditional measures of learning outcomes may fail to detect the gains from SDL. Our first research question aims at investigating this assumption: does SDL indeed lead to enhanced levels of structural knowledge? SDL often uses simulation-based learning environments. The representational codes of the simulation are found to influence knowledge construction processes. It is argued that pictorial representations emphasize structural and intuitive aspects of the domain, whereas textual representations emphasize propositional, qualitative aspects and arithmetical representations emphasize quantitative aspects. Our second research question is: which representations help students best in discovering the domain? In an experiment, 90 participants are randomly assigned to one of three conditions. Each condition uses an electronic simulation-based learning environment. All environments are informationally equivalent, but differ with regard to the representational code of the simulations. These are either pictorial, or textual, or arithmetical. A pre-test post-test design is used, with (M)ANOVA and post-hoc analyses as the main approach. Time on task is semi-fixed and is registered and used as a covariate in the analysis. The pre-test aims at controlling for prior knowledge. The post-test contains items that are sensitive to different types and aspects of knowledge. The analyses of our data will be completed in January 2005 and final results will be presented at the EARLI.

Symposium
Teacher Professional Development

DEVELOPING SCHOOL-BASED CURRICULUM FOR TEACHER PRO-FESSIONALISATION

Chair: Jaap Buitink, University Centre for Teacher Education,
                Netherlands
Organiser: Jaap Buitink, University Centre for Teacher Education,
                Netherlands
Discussant: Frances Rust, Steinhardt School of Education, New York Universit,
                United States

This symposium belongs to SIG 11 Teaching and Teacher Education. In the symposium the Effective Learning Environment will be looked at from the perspective of learning, the perspective of teaching and instructional design and from the perspective of life long learning and professional development. The symposium is about the learning and development process of teachers. The context in which this learning process takes place is the collaboration of schools and teacher education programs in which there is genuine partnership and mutual ownership of teachers' professionalisation. Our focus is on the influence of these collaborative contexts as a learning environment on the learning process of both student teachers when they learn to teach in a school-based teacher-education curriculum as teachers professionalisation. The papers in this symposium draw on both qualitative and qualitative research and have two foci. One set of papers concerns research on constructing school-based curricula in teacher education and on the effects of such curricula on new teachers' conceptions of teaching and learning. The other set concerns research on the learning process of teachers and student teachers in the context of their everyday work and interactions in classrooms and schools. The objective of the symposium is to enrich understandings of the dynamics of collaboration between teacher education programs and schools, of the role of teacher education in school development and professional development, and of the consequences of the such collaboration for the learning process of teachers and their students.

The use of the Research Lesson Approach involving a Knowledgeable Other
Chris Dowson, Hong Kong Institute of Education, China, Peoples Republic of

There has been recent interest in active ways of raising teacher effectiveness through techniques such as teacher coaching and direct guidance. (Staub, 2004; Fischler, 2004). One methodology for examining and improving teaching in schools that is emerging in western settings is the use of research lessons, also known as lesson studies. The research lesson approach has its origins in Japan. It is essentially a process of professional development for groups of teachers who engage in critical analysis of the teaching of a topic or education aspect of a subject through observation with an objective of creating the most effective way of teaching the identified critical elements of the topic or education aspect... (Lewis, 2000). Case study methods best suit the collection of data in this type of study as they describe and illuminate the activities of teachers in the contexts in which they operate. This enables a realistic review and analysis of the strengths and constraints of a method such as the research lesson as a research tool and professional development device for a group of teachers. In this study of the teaching of ESL to deaf Cantonese speaking learners, data gathering includes direct observation, video recordings, discussion, interviews and open-ended survey. There is extensive involvement of the researcher in this study. This has been referred to as the involvement of a knowledgeable other. In research lessons the functional roles of facilitator, teacher and lesson observer are shared by the researcher and teacher. The initial barriers, solutions and findings in a research project using a knowledgeable other and the research lesson approach, as a research instrument and professional development device with groups of teachers teaching English as a second language to deaf Cantonese speaking students are reported.

Chemistry teachers's training according to the competence-based Bologna model
Kornelia Zaric, University of Maribor, Faculty of Education, Slovenia

The main aim of University Double Major Educational Study Program ''Chemistry and … '' is the passage from theory to practice. It includes different curricular forms which are incorporated in methodological subject module consisting of Didactics of Chemistry, Experiments and Mentorship (shortly DCEM) and are realised as Lectures, Seminars, Didactic /Laboratory Practical Courses, Mentor work, classroom Observations, Assessed Teaching Lessons and Teaching Practice (shortly L, S, D/LPC, M, O, ATL, TP). In fact, considering student-teacher's feedback some realization implementations of above mentioned curricular forms take place continuously. Considering the general lines of Bologna model such as Tuning Project 2000-2004 we are now (in academic year 2004/05) about to start the formal renovation of our methodological subject module which is an essential part

of our pedagogical program. In the round table contribution in Stavanger we have presented some competence innovations introduced by traditional curricular forms, such as lectures and seminars. This symposium paper is intended to review some innovative changes of modified and classical curricular forms of practical training (L, S, D/LPC, M, O, ATL, TP). Great attention will be paid to generic and subject specific competences which are own to above mentioned particular forms of micro- and macro - training of student-teachers. Our methodological approach includes the following steps: (1) defining the Lists of Competences for actual training form; (2) planning the realisation plans of particular competence activities; (3) preparing the needed instruments for a realisation of particular activities defined by these plans; (4) evaluating of performed activities actual for making student's own Bologna; (5) Competences, which are own to individual realisation forms of methodological subject module DKEM. For this purpose the proper evaluation instruments have to be prepared, used and analysed.

The need for compatibility between practical and reified knowledge;The co-emergence of personal and institutional knowledge.
Malka Gorodetsky, Ben Gurion University, Israel

This presentation centers on the co-emergence of professional identities of pre-service and in-service teachers as a result of collaborative learning within a joint community of a high school and a teacher-education program. Within the newly established joint context both groups started as peripheral participant within the other's community of practice and gradually emerged as full legitimate participants. The conceptual framework that guides the teacher education program – ACE (Active Collaborative Education) regards praxis in terms of being in varied situations. It is an ontological approach that highlights the complexity of teaching as an existential everyday activity of being (Dasein) in schools with children. Professionalism in teaching in this respect emerges from processes of negotiation of meaning within communities of practice. The high school community that was part of this partnership was an experimental school that had developed a new pedagogy based on the conception of knowledge and learning as a social participative process, which is similar to the ideas of the ACE program. Within the joint community a unique blend of different kinds of practical as well as formal knowledge were negotiated and gave rise to new collective horizons and new ways of being. The emergence of professional identities is discussed in Wenger's terms of compatibility between the underlying educational assumptions regarding practice and those of the reification processes that the school teachers, the pre-service teachers from the college

and faculty were participating within. The emerging professional identities and the accompanied educational changes within the school and the college will be discussed.

Creating a Collaborative School-Based Teacher Education Program: a selfstudy
Ilana Margolin, Levinsky College of Education, Tel Aviv, Israel

This self study focuses on a four-year project aimed to build an alternative, school-based, teacher education curriculum. The ultimate goal of the project is to devise a sequential model for teacher professional learning, in which the student teachers start their journey at the college and end it at the end of their professional careers. The study conducted by the leader of this project, is theoretically framed in the literature on collaborative learning communities casting the community as both a means and an end for educational change. The assumption is that such communities create collegial and safe environments in which the participants can take risks, respond to external changes; or share knowledge in creative ways that foster new approaches to problems. This literature emphasizes, however, that the establishment and nurturing of such communities is not easy for teachers and teacher educators, who are accustomed to work on their own, or for their leaders who do not know yet the elements that constitute such communities and what is required for their long-term sustainability. In this study I addressed the following questions: • How do I build a professional learning community for the cooperating teachers and teacher educators? • How do I involve the participants in inquiry? • What is the role of ICT in facilitating learning in our community? The study describes the iterative process of constructing a professional learning community and shows how teacher educators transform their stance toward their own professional roles, teaching and learning and the educational systems they are part of. The significance of the study is in its critical point of view achieved through observing and interpreting my own leadership as well as in its ability to trace the prospects as well as pitfalls of such a project.

Teacher Education: learning while working
Jaap Buitink, University Centre for Teacher Education, Netherlands

The paper is about the learning process of student teachers who work as a teacher in schools while they follow their initial teacher training program at the University of Groningen. After describing the curriculum, based on the combination of working as a teacher and learning to teach, and the role of the Centre of Teacher Education

and the role of the Schools within that curriculum the paper will focus on results of two studies on the learning process and learning environment. Finally in the paper some questions will be raised on learning process and the concept on learning to teach.

K 5   26 August 2005   08:30 - 10:30   Room A008

Symposium
Conceptual Change

CONCEPTUAL CHANGE IN MATHEMATICS: A CLOSER LOOK

Chair: Kaarina Merenluoto, University of Turku, Finland
Organiser: Kaarina Merenluoto, University of Turku, Finland
                Lieven Verschaffel, University of Leuven, Belgium
Discussant: Margarita Limon, Autonomous University of Madrid, Spain

The aim of this symposium is to take a closer look on the problems and processes of conceptual change in mathematics. Although the empirical research from the conceptual change perspective has been abundant on the fields of science during the last two decades, there has not been a lot of research from this perspective in mathematics. The crucial idea in conceptual change is the need for a radical reconstruction of prior knowledge in learning new mathematical concepts; which has not been observed very well in traditional teaching of mathematics. From the experts' point of view, mathematics is considered to form a hierarchical structure where all the new concepts logically follow from prior ones. When new objects are constructed the prior ones are integrated to the larger system to form a logical whole. For a learner, however, who at this phase of learning does not understand the mathematical logic, it seems unclear and fragmented. In addition, the prior mathematical knowledge, strengthened in everyday experiences, seems to be exceptionally resistant to the teaching attempts. The four papers in this symposium deal with different aspects of these learning problems. Konstantinos Christou and Stella Vosniadou describe the resistance of student's prior knowledge based on natural numbers in their learning of the literal symbols of algebra. Wim van Dooren and his colleagues explain how, due to the extensive attention paid to proportional reasoning in elementary and secondary mathematics education, many students tend to over-rely on proportional reasoning. Xenia Vamvakoussi and Stella Vosniadou use an experimental design to promote the students' growing meta-conceptual awareness in a CSCL environment.

Kaarina Merenluoto and Erno Lehtinen analyze the systemic dynamics of increasing sensitivity and tolerance of ambiguity in the process of conceptual change in mathematics.

Searching for the origins of the overreliance on proportionality
Wim Van Dooren, Center for Instructional Psychology and Technology, Belgium
Dirk De Bock, Center for Instructional Psychology and Technology, Belgium
Dirk Janssens, Center for Instructional Psychology and Technology, Belgium
Lieven Verschaffel, Center for Instructional Psychology and Technology, Belgium

Previous research showed that many students overrely on the proportional model and apply it beyond its applicability range. This paper unravels the origins of the overreliance on proportionality. Due to its usefulness in interpreting real life situations, proportional relations receive a lot of attention throughout the primary and secondary mathematics and science curriculum. In the long run, these schooling experiences – along with the intrinsic simplicity and self-evident character of the proportional model as such – may cause a deeply entrenched tendency in students to apply the proportional model anywhere, also in situations where this is inadequate. The ubiquity of proportional relations may become part of students' framework theory, and proportional strategies become a panacea for solving a wide variety of mathematical and scientific problems. This way, the overreliance on proportionality starts to function as a conceptual obstacle for students, and hinders their future learning and problem solving. We conducted a study aimed at investigating when the tendency to overrely on the proportional model originates and how it develops with students' age and their emerging proportional reasoning skills. A test containing 2 proportional and 6 non-proportional word problems was given to 1062 2nd to 8th graders. The results showed that unwarranted applications of proportionality were already present as early as in 2nd grade, but their number increased considerably up to 5th grade, in parallel with students' growing proportional reasoning capacities. From 6th grade on, the number of proportional errors decreased, but even in 8th grade still a considerable number of proportional errors were made. These findings confirmed our expectation that throughout primary school, students not only acquire the skills to solve proportional problems; they also learn to activate this knowledge on the basis of superficial problem characteristics, and apply it in settings where it is neither relevant nor valid.

Conceptual change in understanding the use of literal symbols in algebra
Konstantinos Christou, University of Athens, Greece
Stella Vosniadou, University of Athens, Greece

In the transition from arithmetic to algebra, literal symbols are used to stand for the generalized number which is every number. The univocal form of the literal symbol (for example a) could affect students to interpret the use of literal symbols as standing only for natural numbers, because it's form would easier refer to a natural number than for example a decimal number. According to conceptual change research in number concept, students tend to identify all numbers as natural numbers and they assign to them properties of the natural number set. This is one of the reasons that mistakes and misunderstandings appear when they are dealing with other kind of numbers as fractions or real numbers. According to these remarks and the theoretical framework of conceptual change, we would expect that students think that the literal symbols in algebra represent only natural numbers. They would also think that different literal symbols represent different arithmetical values because when the form changes, the referendum should also change. In this study we applied four types of questionnaires asking students to assign numerical values to algebraic objects which contain literal symbols. 128 8th and 9th graders participated in this research. From our results it came out that students tend to assign natural numbers to the literal symbols and more rarely fractions or decimals. When students assign numbers to the algebraic objects they are greatly affected by the form of the literal symbol which they try to maintain. It seems that assigning natural numbers to the literal symbols is stronger than the tendency to maintain the form in both grades in all algebraic objects. They appear to believe that different letters represent different arithmetical values. This belief constitutes a fundamental presupposition which obstructs students from understanding the use of literal symbol as generalized number.

A CSCL environment to facilitate conceptual change in the number concept

Xanthi Vamvakoussi, University of Athens, Greece
V. Kollias, University of Thessaly, Greece
N. G. Mamalougos, University of Athens, Greece
Stella Vosniadou, University of Athens, Greece

The idea of discreteness is a fundamental presupposition of students' initial theories about numbers that constrains their understanding of the number concept. In previous work, we have argued that number concept is further constrained by students' belief that different symbolic representations of a rational number refer to different numbers and their tendency to group numbers according to their symbolic representation. These constraints shape students' understanding of the density of rational numbers. We have argued that understanding of density requires conceptual change. In this study, we designed and implemented a CSCL environment to support 9th graders to externalize their ideas about numbers and the number line and to reflect upon their own and their fellow students' ideas. In line with the conceptual change literature, we expected that these factors would facilitate conceptual change. The experimental group and the control group consisted of 16 and 14 students respectively. Both groups took a pre and a post test with density-related questions and worked in pairs on the same tasks. The control group did not work in the CSCL environment, but students discussed their answers in the classroom. The added value of the CSCL environment was that it supported students to develop a structured discussion and to reflect upon their and their fellow students answers. According to our results, only the performance of the experimental group improved significantly.

The systemic processes of conceptual change in mathematics – dynamics of increasing sensitivity and tolerance of ambiguity

Kaarina Merenluoto, University of Turku, Finland
Erno Lehtinen, University of Turku, Finland

Especially during the last few years there has been a growing interest in and discussion about the processes of conceptual change. This study analyses the dynamic processes of six student teachers who participated in problem solving interviews, where problems with rational numbers were used. These students had been high achievers in mathematics on secondary level. Each one worked with problems involving sorting of decimal numbers and fractions, adding the density of numbers on the number line, identification of different representations of rational numbers and

mechanical tasks involving multiplication and division between two fractions. In the tape-recorded interviews that lasted about 1.5 hours each, the participants were asked to think aloud while working with the tasks. The analysis of the think-aloud protocols showed that the students had a dominating strategy for working with the different tasks, but that most of them were able to change it to another after a while if the first one did not lead to a solution. However, the uses of strategies were clearly restrained by students' beliefs in the foremost use of algorithms (Help! I've forgotten the formula/ rule), rules of discrete numbers (add one), and by the belief that there is a numeric to every question in mathematics. Because conceptual change is a slow process, observing a construction or observing the increasing or the decreasing sensitivity might be problematic. It is possible that these kinds of processes occur when students are sitting alone and think hard, or struggle to tackle a difficult problem. The result of this study suggest that with using this kind of method it is possible to observe and analyze on-line the processes of increasing sensitivity to the cognitive demands of the tasks, dealing with the ambiguity caused by a recognized cognitive conflict, and the dynamics of experienced certainty during the process.

K 6   26 August 2005   08:30 - 10:30   Room A112

Symposium
Self regulation

THE ASSESSMENT OF SELF-REGULATION AS A PROCESS

Chair: Monique Boekaerts, Leiden University, Netherlands
Organiser: Monique Boekaerts, Leiden University, Netherlands
                   Eduardo Cascallar, Assessment Group International, Belgium
Discussant: Eduardo Cascallar, Assessment Group International, Belgium

Rather than to measure self-regulation as a trait or an aptitude with self-report instruments, new forms of assessment try to capture students' attempts at self-regulation in action. Observation of instrumental and cognitively-mediated expertise development (e.g., writing scientific texts, reading comprehension in a foreign language) as well as stimulated recall, interviews, and diaries provide a wealth of data as well as a means of verifying students' reported appraisals. Interestingly, these alternative assessments provide a window on a level of self-regulation that has been inaccessible so far, namely how self-regulation as a capacity develops over time. At the same time, self-regulation researchers try to identify features of the class-

room environment, particularly social cues that seem to affect self-regulation in a favorable or unfavorable way. Social cues have the power to impede or facilitate self-regulation. The question is now how reliable and valid are the assessment instruments that measure the impact of these cues on the different components of the self-regulation process? The major aim of the symposium is to achieve a better understanding and further our insights of the fragmentary research findings on the assessment of self-regulation as a process. We want to promote scholarly discussions among researchers about the nature and processes involved in self-regulation and the valid and reliable ways to assess these processes. The field of self-regulation would be most effectively served when multiple methods and multiple levels of analysis were used to provide greater clarification of the different components of self-regulation and more detailed description of the interrelations between the components in different settings

Learning from Learning Kits: gStudy traces students' self-regulated engagements with computerized content

Nancy E. Perry, University of British Columbia, Canada
Philip H. Winne, Simon Fraser University, Canada

Researching self-regulated learning (SRL) as a process that evolves across multiple episodes of studying poses large methodological challenges. While self-report data provide useful information about learners' perceptions of learning, these data are not reliable indicators about studying tactics learners actually use while studying, especially when learners are young children. We argue that self-reports about SRL need to be augmented by fine-grained traces that are records of learners' actual activities as they study. In the Learning Kit project, we are developing a new software technology, called gStudy (Winne, Hadwin, Nesbit, Kumar, & Beaudoin, 2004). gStudy unobtrusively collects detailed trace data about which studying tactics learners use as they engage with new content presented in Learning Kits. Each learning kit is a collection of content documents (e.g., texts, graphics, video clips) and tasks (observation logs, notes, concept maps) on which learners operate to study. We suggest trace data can advance research about how learners select, monitor, assemble, rehearse, and translate information to learn it. In addition, trace data provide raw materials for mapping SRL and its effects. At the EARLI conference, we will demonstrate how gStudy collects trace data while students work on two Learning Kits: (a) the Lifecycles Learning Kit that supports grade 1 students learning about the lifecycles of humans and frogs (Perry & Colleagues at UBC) and (b) the Educational Psychology Learning Kit that supports undergraduate students

studying educational psychology (Winne & Colleagues at SFU). Then we present trace data showing how students use features of gStudy to study and learn. Finally, we show what gStudy and the Learning Kit logs can teach researchers and practitioners about students' SRL.

Motivational effects on self-regulated learning with different tasks
Vollmeyer Regina, Johann Wolfgang Goethe Universitat, Germany
Falko Rheinberg, Universitat Potsdam, Germany

In our cognitive motivational process model (Vollmeyer & Rheinberg, 1998) we assume that initial motivation affects performance via motivation during learning and learning strategies. These variables are also central for self-regulation theories (e.g., Boekaerts, 1996), although self-regulation includes even more variables. However, as a first step it was necessary to choose which motivational aspects we wanted to focus on. We decided on challenge, probability of succes, interest, and anxiety, in addition, we started to assess Flow (Csikszentmihalyi, 1975). In our talk we will describe the questionnaires with which these motivational factors and flow were measured. We will discuss some results as well as their reliability and validity. The Questionnaire on Current Motivation (QCM; Rheinberg, Vollmeyer, & Burns, 2001) was also used to measure motivation during learning. Participants were interrupted to fill in the questionnaire. Thus we had an indicator of how initial motivation changed while working with the task. When we studied learning with a linear system we could measure knowledge acquisition (participants had to fill in graphs; Vollmeyer & Rheinberg, 2000), and we rated their learning strategy. These variables (initial motivation, motivation during learning, learning strategy and knowledge) were analysed with a path analysis to detect mediating variables. In a second research line we wanted to find a similar model with a different task, that was a hypermedia system. Again we measured initial motivation, motivation during learning. However, with this task we used several indicators for learning strategies leaving open the problem of validity. Finally we developed a questionnaire to measure Flow (FKS; Rheinberg, Vollmeyer & Engeser, 2003). Flow is a variable of the functional state during self-regulated learning. It mediates the effects motivation has on performance (Engeser, Rheinberg, Vollmeyer & Bischoff, in press).

Self-regulated learning processes: Tracking thoughts, actions and feelings that serve personal learning goals
Mary D. Ainley, University of Melbourne, Australia

Self-regulated learning involves systematic patterns of thoughts, actions and feelings directed to attainment of personal learning goals (Boekaerts, 2002). In this presentation we describe the design and findings of a number of investigations experimenting with measures at the micro-process level to access students' learning experiences. Our aim has been to monitor and record in real-time, sequences of interactive processes, and to identify patterns of thoughts, actions and feelings associated with productive learning experiences in secondary students. Because we are recording transient states typical forms of reliability and validity are not appropriate. The basic measurement strategy involves accessing students' thoughts and feelings about themselves in relation to a task, sometimes one assigned to them, sometimes one they have chosen. Decisions and choices are monitored as they occur. On-task probes prompt students to report thoughts and feelings. Reflective judgments are made when the activity has been completed. Analysis involves identification of patterns of goal setting, and the choices between alternative paths toward achieving those learning goals. Test-retest and internal consistency forms of reliability assessment are clearly inappropriate for what is by definition the student's goal at a specific point in time. Replication is a more appropriate indicator of the reliability of associations detected. Individual measures are not considered in isolation but are part of within-person sequences. Issues of validity are addressed by testing for predictable relationships between within-person sequences and other on-task variables, as well as achievement outcomes. Examples from our research studies will be described to show some of the patterns connecting goals, strategic behaviour and achievement, and how the quality of measurement is consistent with the standards required to inform educational research and practice.

K 7   26 August 2005   08:30 - 10:30   Room E002

Symposium
Technology in Education and Training

DIGITAL VIDEO AS A COGNITIVE TOOL TO SUPPORT INTERACTIVE LEARNING

Chair: Carmen Zahn, Knowledge Media Research Center Tuebingen,
              Germany
Organiser: Carmen Zahn, Knowledge Media Research Center, Tuebingen,
              Germany
              Rolf Ploetzner, University of Education, Freiburg, Germany
Discussant: Gavriel Salomon, University of Haifa, Israel

Digital video offers new perspectives on interactive learning. Some technologies using digital video allow for the interactive selection and creation of video sequences by learners. Other technologies focus on the construction of non-linear information structures that integrate dynamic links (to texts, graphs), or even communication tools into digital video. Today, the potential use of digital video reaches far beyond the dynamical presentation and illustration of instructional information. It additionally encompasses the collaborative exploration of video-based information as well as the collaborative analysis of and reflection on video-based information in distributed communities of learners. Learners may zoom into and out of digital video sequences, they may interactively index digital video sequences for future reference, they may insert hyperlinks into digital video in order to relate visual information to other instructional materials and they may arrange digital video sequences for discussion and reflection in groups. Although research on effective learning with video has a long tradition, only recently researchers became aware of the innovative potentials of advanced digital video technologies for individual as well as collaborative learning. This symposium aims at presenting this new line of empirical research on how digital video can support individual and collaborative learning. The main focus of this research is on digital video as a cognitive tool that may encourage and sustain individual and collaborative knowledge construction. Thereby, the various presentations range from investigating digital video as a tool for the observation of and collaborative reflection on teaching experiences, to experimental work on using video as a means for teaching in e-lectures, and to experiments and field studies concerning the design of and learning with hypervideo structures. Furthermore, the

potential of digital video for learning as well as the cognitive requirements of learning with digital video will be discussed.

DIVER: Making video on computers effective as a reflective collaboration medium for researchers, teachers, and learners
Roy Pea, Stanford University, Stanford, United States
Michael Mills, Stanford University, Stanford, United States
Joe Rosen, Stanford University, Stanford, United States
Ken Dauber, Stanford University, Stanford, United States
Robb Lindgren, Stanford University, Stanford, United States
Paula Wellings, Stanford University, Stanford, United States
Sarah Lewis, Stanford University, Stanford, United States
Lori Takeuchi, Stanford University, Stanford, United States

Digital video is increasingly used in K-12 and higher education. But it is primarily used in teacher-centered approaches, whereby videos on curriculum topics are watched by individual learners or in whole-class models. Yet we know that video can serve as a powerful medium for teacher learning via reflection on video-records of teaching practices, for analyzing interactions involved in learning activities, and for learners to construct videos as artifacts. Although digital video capture, editing, and sharing has become more accessible with developments in consumer electronics and streaming web media, it is still unusual for teachers to capture video of their teaching for reflective analysis with mentors and peers, or for learning researchers to collaboratively analyze videos to deepen our science of learning. The Stanford DIVER Project is tackling these problems. We've developed a new paradigm for users to Dive into video by controlling a virtual camera window with a mouse on a computer screen to point to video parts of interest to the user as the video is playing—then to make text annotations about the video being pointed to, and publish them on the web so that others can experience such points-of-view, make comments, and search for related Dives. Every DIVER user, whether teacher, researcher, or learner, can thus express their unique visual and interpretive point of view on what they believe is happening in a video. We call this guided noticing—an important new tool useful for: (1) learning researchers to develop multi-perspective explanations of learning-teaching interactions, (2) helping teachers and other experts share expertise in viewing and reflecting on video content with learners, (3) collaborative learning using video, and (4) teacher educators and mentors to help guide improvements in teachers' practices. In this paper, we illustrate uses of DIVER in learning sciences research and in film studies education.

Vshare – Video-based analysis and reflection of teaching experiences in virtual groups
Ute Massler, University of Education, Freiburg, Germany
Peter Huppertz, University of Education, Freiburg, Germany
Rolf Ploetzner, University of education, Freiburg, Germany

Reflection on practice enables practitioners to assess, understand and learn through their experiences. Sharing experiences and articulating reflective thinking processes with instructor and fellow students seems to foster students' reflection skills and attitudes. Time and place independent teacher training is increasingly gaining importance. Experiential and inquiry-based learning suggest that planning, carrying out of lessons and inquiry-based reflection on teaching experiences should be learning activities of blended learning teacher training courses, too. Due to long distances between students and limited amount of time for reflection during face-to-face-sessions, cooperative reflection on shared teaching experiences by engaging in a focussed inquiry dialogue with instructor and peers is difficult. The research project v-share therefore is developing the technical support and the methodological concept for video-based analysis and reflection of teaching experiences in virtual groups. The underlying assumption is that the purposeful observation and the instructed sharing of analyses and reflection on video-recorded lessons foster students' capacity for reflection-on-action. v-share allows students to share lesson videos and to select and link video-sequences for joint online analysis and reflection. Currently, a three-term long field study (2004 - 2005) is being carried out in teaching practice and accompanying courses at the University of Education, Freiburg. We first research the assumed additional benefit of using lesson videos to foster students' reflection processes instead of only their memories and written notes of the observed lesson. To achieve this, we devised characteristic features of beneficial reflections and developed and evaluated diagnostic instruments measuring the quality of students' written reflections, which will be presented in the talk. Secondly, we investigate how we can further enhance and support the reflection process itself. Starting points are the variation of methodological instructions and the use of different activity structures for the individual und cooperative analysis and reflection process.

Using interactive, video-based e-lectures for knowledge acquisition
Stephan Schwan, Knowledge Media Research Center, Tuebingen, Germany
Astrid Gruber, Johannes Kepler University, Linz, Austria
Tanja Jadin, Johannes Kepler University, Linz, Austria

Video-based e-Lectures have become a popular alternative to traditional, more text-based types of e-learning materials, promising more vivid and personalized forms of self-regulated knowledge acquisition. But how such e-Lectures should be properly designed and how they are used by learners, is largely an open question. In order to get first insights into the interplay of e-lecture design and usage, an experimental study was conducted where 28 participants used a digitized, video-based e-lecture to prepare for a test on foundations of corporate success. Half of the participants saw a version of the e-lecture which included an additional window showing a synchronized written transcript of oral presentation (multimodal presentation, both oral and written), whereas for the other half, this window was missing (unimodal presentation, oral only). Additionally, based on their strategies of usage, two types of learners were identified, namely repeaters, whose primary focus was on the lectured material, and surfers who spent less time on the lecture itself and instead used bookmarks and links for getting additional external information. After finishing the learning session, participants completed both a knowledge test and a questionnaire concerning and their evaluation of the e-lecture and their learning strategies. According to the findings, the modality in which the learning content was presented (multimodal vs. unimodal) did not substantially influence the usage strategies of the learners. Additionally, a 2x2 (form of content x learner strategy) ANOVA showed that the learning outcomes were significantly influenced by learner strategy (with repeaters outperforming surfers), but not by presentation modality. Overall, in line with previous findings (Zahn, Barquero & Schwan, 2004), it can be concluded that in the present study, knowledge acquisition depended to a large extent on the individual strategies of self-regulated learning with the complex material, whereas variations in the form of presentation did only play a minor role.

Knowledge acquisition with hypervideos - Issues of cognitive load
Carmen Zahn, Knowledge Media Research Center, Tuebingen, Germany
Teresa Chambel, University of Lisbon, Portugal

Hypervideo combines digital video and hypertext: Videos may be structured through dynamic links and be integrated with other media, thus forming a non-linear information structure. Recently, such advanced hypervideo technologies have been suggested as cognitive tools for interactive learning, because they hold great potentials to support the deep understanding of a given topic: They can support different learning styles and different phases in the learning process and foster the construction of flexible mental representations. However, there are some open questions concerning the actual - as opposed to the potential - effectiveness of hypervideos.

Cognitive load is an important challenge to be addressed in this context, because the dynamic nature of video might increase specific forms of extraneous cognitive load. However, it might also be that navigation tools and interactive devices included in hypervideo designs help to reduce this cognitive load. In the present contribution, we report results from an experiment conducted with 53 participants navigating through a complex hypervideo structure, which existed in four versions differing in number and position of embedded dynamic hyperlinks. Participants were asked to learn the facts and relations presented in the hypervideo. Two types of measures were applied: 1) objective measures of performance (knowledge acquisition) and indicators of navigation behaviour (activation of hyperlinks, use of video player functions), and 2) direct subjective measures of self-perceived cognitive load and disorientation (multidimensional ratings). On the level of objective measures, results revealed significant and positive correlations between indicators of navigation behaviour and knowledge acquisition. Concerning subjective measures, significant correlations were found between indicators of navigation behaviours and self-perceived cognitive load (positive) and disorientation (negative) - but not with performance. We interpret these results as indicating that the use of navigation tools and interactive devices goes along with reducing extraneous cognitive load and increasing task relevant cognitive load.

Designing hypervideos within university courses – using visual-dynamic representations to foster knowledge acquisition

Elmar Stahl, University of Muenster, Germany
Carmen Zahn, Knowledge Media Research Center, Tuebingen, Germany
Matthias Finke, Computer Graphics Center, Darmstadt, Germany
Stephan Schwan, Knowledge Media Research Center, Tuebingen, Germany

In our contribution we present empirical field studies that we carried out to investigate the potential of hypervideo design within university seminars. Hypervideo is a term referring to videos including links (in form of spatial-temporal hotspots) to additional information nodes like texts, graphics, or further videos. Therefore, hypervideos consist of a dynamic-visual representation based on a non-linear information structuring. The main idea was to introduce the process of hypervideo design into regular seminars. We developed a method to foster students` knowledge about how to design learning environments - with the focus on visual-dynamic representations - and their deep processing of the content to be presented within the hypervideos. The theoretical background of this idea relates to the knowledge-transforming model of Bereiter and Scardamalia (1987), which was adapted to the

design of hypervideos. We conducted a series of three seminars with students' collaboratively designing hypervideos about predefined topics. The hypervideos had to be designed from scratch, i.e. students had to plan all video materials and the additional information, to write storyboards and text nodes, to film and to edit the videos and to integrate the different video and text nodes in a coherent hypervideo structure. After each seminar the design process and the products were analyzed together with the students using interviews, questionnaires and group discussions. The evaluations were used to successively improve the usability of the hypervideo learning environment as well as the course design in terms of its didactical issues. In our contribution we present results from this evaluation and give concrete examples of the improvements. In these seminars students gained substantial experiences with the design of hypervideo and understood more about the topics to be presented. Concerning future perspectives, controlled experiments need to be conducted to investigate selected aspects of collaborative hypervideo design in a laboratory learning setting.

K 8   26 August 2005   08:30 - 10:30   Room A109

Symposium
Development of Expertise in Specific Domains

STATISTICAL LITERACY AND NEW LEARNING ENVIRONMENTS FOR STATISTICS LEARNING

Chair: Mari Murtonen, University of Turku, Finland
Organiser: Mari Murtonen, University of Turku, Finland
Discussant: Iddo Gal, University of Haifa, Israel

The need for statistical literacy is growing in our society. The increasing amount of information produced and made available by computers requires skills to handle this information in many occupations and life roles. The goal of university research instruction is to produce graduates capable of handling research information. Unfortunately, the outcomes of statistics and methodology courses often seem to be only the acquisition of a set of isolated facts and skills without a deeper understanding. Many students face problems when studying statistics and quantitative research method courses. Students have high levels of anxiety, are not well motivated to learn, and learning outcomes are not as good as expected, even after several courses. The planned presentations and discussion in this symposium will evaluate what is learnt

in statistics and research courses, and examine what kind of new learning environments could support students' learning better than the traditional environments. The results of the studies presented indicate that students' statistical literacy is poor even after instruction, and that they have problems with using quantitative methods in research projects. Students express a variety of misconceptions about basic ideas, and have negative feelings towards the subject matter and the need for research skills in their future careers. New learning environments, namely, the statistical software package Fathom, a mixed methods framework, and a researcher workshop, were implemented and tested. The results show improvement in students' construction of mental models of basic statistical concepts, and a change towards more positive attitudes regarding statistical skills. These studies present new ideas for teaching and learning environments, such as the mixed methods framework for bridging the gap between qualitative and quantitative methodology, thereby reducing the anxiety towards quantitative methods. Suggestions for future research and instructional models will be discussed as well.

Statistical literacy and its position within the English curriculum
Michela Gnaldi, Ministry of Education, University and Research, United Kingdom

The visibility statistical literacy is gaining in the international debate on the teaching of statistics is associated with a growing concern over its position within both the formal education system and the sphere of basic skills. From early stages of instruction, pupils in the UK are taught how to use and apply data handling, and how to process, represent and interpret data. At higher levels, statistics has become a graduation requirement in many university courses.
In this paper, the results of an observational study give rise to a discussion about the difficulties students experience in developing statistical literacy and the effects of poor numeracy at baseline on the subsequent level of mastery of statistical literacy. The context for the study is an introductory (Level-1) Statistics course for students in a Faculty of Psychology. A Baseline test was administered at the beginning of the course to assess students' numeracy and their ability to interpret simple tables and graphs. Another test, the Follow-up test, was administered near the end of the course to the same classes and students. With this last test we assessed students' mastery of statistical concepts and their ability to evaluate critically data-related arguments (e.g. newspaper reports).
In the light of the results, the responsiveness of the secondary and higher education

syllabuses to the needs of a broader citizenship will be considered. The need for a wider appreciation of statistical literacy in the context of basic skills will be also discussed.

Misunderstanding all you see? Quantitative Research Methods in Education
Juhani Rautopuro, University of Joensuu, Finland
Pertti Vaisanen, University of Joensuu, Finland
Antero Malin, University of Jyvaskyla, Finland

Studies on statistics instruction suggests that statistics courses are challenging, especially in social sciences and education. Students' poor performance may be caused by many factors, say weak mathematical background, misconceptions and emotional blocks. Many students don't understand elementary concepts even they have passed courses in statistics. The probabilistic nature of statistical inference is hard to understand and significance testing is often wrongly interpreted in theses, for example. This presentation focuses on the errors, misunderstandings and misconceptions that are noticeable in education students' course performances and quantitative educational theses. Existing situation has been examined by looking at the education of quantitative research methods in educational studies as a whole. By using diagnostic tests in various statistics courses in education during 2001 – 2003 students' misconceptions about essential concepts of elementary statistics (say, proportions, variation and linear association) were measured. This presentation also concentrates on the typical errors and deficiencies in students' quantitative theses when results are presented by using formulae, graphs, figures and models. This data consists of a sample of educational theses carried out during 2000 – 2004 in Finnish universities. According to results of the diagnostic tests from introductory statistics courses, students have difficulties in understanding proportions and linear association. Similar tests in subsequent advanced statistics show that courses misconceptions are widely hold. In addition to the misconceptions discovered earlier, the students in advanced courses had enormous difficulties in understanding the idea of variation. Furthermore, the misconceptions observed in course performances remain in educational thesis. The way of expression is not convincing and a reader can be completely confused of the methods and results.

Effects of technological tools on introductory statistics students' understanding of sampling distributions
Maria Meletiou-Mavrotheris, Cyprus College, Cyprus
Carl Lee, Central Michigan University, United States

While technology has become an integral part of introductory statistics courses, the software typically employed are professional packages designed primarily for data analysis rather than learning. Findings from several studies indicate that incorporation of such software in the introductory statistics classroom might not be very effective in building student intuitions about sampling distributions and other important ideas related to statistical inference. The paper describes an instructional experiment which explored the capabilities of the dynamic statistical software package Fathom, one of several newly developed packages explicitly designed to enhance learning of statistical concepts. The study, which took place in a college-level introductory statistics course in Cyprus, was designed to examine the role of the dynamic statistics tool in shaping students' understanding of the fundamental idea of sampling distribution. Because particular attention was paid to the processes students used when they were actually solving statistics problems with the help of Fathom, the study conveys more than just general notions concerning whether or not technology might aid in the understanding of sampling distributions; the findings reveal some of the ways in which students used technology to perform specific tasks when solving problems and how technology influenced their thinking.

Utilizing Mixed Methods in Teaching Environments to Reduce Statistics Anxiety
Anthony J. Onwuegbuzie, University of South Florida, United States
Nancy L. Leech, University of Colorado at Denver, United States
Mari Murtonen, University of Turku, Finland
Juhani Tahtinen, University of Turku, Finland

An important goal of many teacher education programs is to graduate teachers who have the necessary skills to be both consumers and producers of educational research. Consequently, many teacher education programs worldwide require their students to enroll in at least one quantitative-based research methodology course. Unfortunately, many students deem these courses to be the most difficult in their programs of study, culminating in these courses providing negative experiences characterized by high levels of anxiety. Thus, several researchers have examined antecedent correlates of this phenomenon—the majority of those identified being student-related. Further, recent research on statistics anxiety has identified several teacher characteristics that help reduce students' statistics anxiety levels. However, little attention has been placed on the role that the research-based curriculum plays in reducing anxiety levels. Thus, the present paper introduces a curricular framework for alleviating students' negative feelings towards statistics. This framework, which utilizes findings from a research workshop, is based on the premise that de-emphasizing statistics reduces anxiety levels. Building on the work of Onwuegbuzie and Leech (in press), we contend that the best way to accomplish this is by eliminating statistics courses from curricula and replacing these with research methodology courses at different levels that simultaneously teach students both quantitative and qualitative techniques within a mixed methodological framework. We illustrate how quantitative and qualitative research courses can be re-designed as courses in exploratory and confirmatory techniques that teach quantitative and qualitative methodologies within each course, either simultaneously or sequentially. Because few statistics instructors currently are adept at both quantitative and qualitative research, we advocate that qualitative and quantitative research methods faculty team-teach these mixed-methods courses. Finally, we present sample courses in exploratory and confirmatory methods.

K 9   26 August 2005   08:30 - 10:30   Room A107

Symposium
Research Methodology

INSTRUCTIONAL PROCESSES IN THE CLASSROOM: METHODOLOG-ICAL QUESTIONS AND CHALLENGES

Chair: Mareike Kunter, Max Planck Institute for Human Development, Germany
Organiser: Mareike Kunter, Max Planck Institute for Human Development, Germany
               Oliver Luedtke, Max Planck Institute for Human Development, Germany
               Tina Seidel, Leibniz-Institute for Science Education, Germany
Discussant: Erno Lehtinen, University of Turku, Finland
               Jaap Scheerens, University of Twente, Netherlands

The EARLI 2005 conference theme Integrating Multiple Perspectives on Effective Learning Environments stresses the importance of the learning context as a determinant for students' cognitive and motivational development. Accordingly, it calls not only for theoretical variety, but also for the use of diverse methodological approaches to represent these learning contexts in an appropriate way. In classroom research, the complex nature of the learning environment – with its multiple participants, their perceptions and interactions – poses a particular challenge to researchers. Studies examining instructional processes in naturalistic classroom settings usually employ either student ratings or teacher questionnaires, or rely on observational data. From a methodological perspective, the general reliability and validity of each of these methodological approaches have been established in various studies. From a theoretical and empirical perspective, however, the relevance and explanatory power of the chosen classroom factors and analysis levels are still to be confirmed. To be able to identify the instructional features most relevant for student learning, a critical discussion of the specific advantages and disadvantages of each method seems warranted. This symposium unites researchers interested in key features of effective learning environments, whose work focuses on the interplay between the level of individual student characteristics and class-level constructs. All presenters will employ multi-level methods to assess instructional processes and use their data to highlight and discuss the specific methodological challenges inherent in

their chosen approach. The papers deal with issues of reliability and agreement of students' perceptions, the changing validity of constructs when using data on the individual vs. class level, agreement between students' and teachers' ratings, and use of individual student data in video-based instructional research. By covering an interesting set of recent insights in instructional research, we hope to stimulate lively discussion on the challenges, but also the potentials of classroom research.

Validity testing in research on student perceptions of learning environments
Perry den Brok, Utrecht University, Netherlands
Mieke Brekelmans, Utrecht University, Netherlands
Theo Wubbels, Utrecht University, Netherlands

Student perceptions of learning environments are used in numerous studies. In most studies different levels of education (school, teacher, class, student) are involved. In this paper we will elaborate on the consequences of this multi-level situation for validity testing of measurements that are used to obtain data on students' perceptions of their learning environment. Conceptualisation of student perceptions can focus either on the idiosyncratic view that each student has on his or her learning environment or on the shared view that students as a group (e.g. class, school) hold about their environment. The idiosyncratic and shared view refer to different concepts, which do not necessarily share the same theoretical framework and operational definition. This has to be taken into account in validity testing. Because in most studies on student perceptions of learning environments clustered sampling is used the nested structure of the data has also to be taken into account in deciding on the method of analysis for validity testing. To elaborate on consequences of conceptual and methodological considerations for validity testing we use data from our research on the interpersonal behaviour of teachers. The structure of the concept, measured by means of a questionnaire (QTI), was studied by means of regular and multilevel covariance structure modelling approaches in case of conceptualisation of the construct at the aggregated teacher class level, conceptualisation at the individual level, and conceptualisation at both levels. The data set consisted of 44364 students, located in 1913 classes, from 1913 teachers. Multilevel and single level covariance structure analyses were performed using Mplus. Analyses showed that different structures were needed for conceptualisation at the individual and group level.

Reliability and agreement of students' perceptions of their classroom environment – A reanalysis of the TIMS Study
Oliver Luedtke, Max Planck Institute for Human Development, Germany

The majority of studies in educational research rely on student ratings to assess characteristics of the learning environment. Asking students to rate features of their lessons is a simple and efficient research strategy, and these student ratings can be analyzed from two different perspectives. At the individual level they represent the individual student's perception of the learning environment. The aggregated scores at the classroom level, in contrast, reflect perceptions of the shared learning environment, corrected for individual idiosyncrasies. This second approach is often pursued in studies on teaching effectiveness and quality, in which student-level ratings are aggregated on the class level to obtain general information about the learning environment. Although this strategy is often applied in educational research, neither the reliability and validity of the aggregated student ratings nor the amount of within-group agreement between the students in a class have been subject to much investigation. Several papers in the field of organizational psychology have dealt with this subject over the last two decades, however (e.g., Bliese, 2000; Burke & Dunlap, 2002; James, Demaree & Wolf, 1993). The authors argue that aggregating individuals' ratings to assess the climate of work groups and organizations is only justified if a reliable and valid assessment of the group characteristics is guaranteed. The present study introduces and discusses different procedures for assessing the reliability and agreement of students' ratings of their instruction. The proposed indices will be illustrated by reanalyzing the students' ratings of their mathematics lessons in the TIMS Study (N = 2064 students in 100 classes). The main focus is on whether or not there is a substantial degree of within-group agreement between the students in a class.

Who is the expert? Construct and concurrent validity of student and teacher ratings of instruction
Mareike Kunter, Max Planck Institute for Human Development, Germany
Juergen Baumert, Max Planck Institute for Human Development, Germany

In this paper, we examine the construct and concurrent validity of student and teacher ratings as indicators for instructional features. As parsimonious measures, student and teacher reports are frequently used to assess aspects of the learning environment. From a methodological perspective, however, both approaches have been questioned. Whereas student ratings are occasionally criticized as being undif-

ferentiated and easily influenced by personal preferences (Aleamoni, 1999), teacher reports are sometimes considered to be biased by self-preserving strategies or teaching ideals (Wubbels et al., 1992). Instead of pitting one method against the other, our study aimed at establishing the specific value of each approach. The analyses are based on data from a German extension to the 2003 PISA assessment, in which 303 mathematics teachers and their students (n = 3697) completed questionnaires including a set of almost identical scales on various aspects of instruction. Students' mean ratings were used for each class. Explanatory and confirmatory factor analyses revealed specific conceptual structures from each perspective, with teachers elaborating on the use of tasks and methods, and students focusing on their teacher's support in personal and learning matters. Three shared dimensions were also established: occurrence of classroom management problems, the degree of cognitive activation during lessons, and the adequacy of pacing. Teacher/student agreement on these dimensions varied between constructs, with marginal agreement on classroom management, low agreement on cognitive stimulation, and no significant agreement on pacing. Accordingly, correlations with external criteria (additional variables for student motivation, teacher motivation, math achievement scores, and characteristics of the tasks set in the class) also varied between constructs. We thus conclude that each perspective represents different aspects of the learning environment, and recommend that the data source is chosen carefully, depending on the construct to be measured.

Student Aptitudes and Adaptivity in Classroom Interactions – The Role of Multi-Criteria Methodological Approaches in Video-Based Instruction Research
Tina Seidel, Leibniz-Institute for Science Education, Germany

This paper explores the role of multi-criteria methodological approaches in video-based instruction research. For this purpose, findings on the interplay of student aptitudes and teacher behaviour in classroom interactions are presented. Aptitudes refer to the students' pre-requisites as they are brought into the instructional situation. They are comprised of cognitive, conative and affective factors. Numerous studies have pointed out the extraordinary role that aptitudes play in learning outcomes. The majority of studies, however, focus on cognition and neglect multi-criteria aptitudes. This study addresses the consideration of multi-criteria in video-based instruction research and addresses three research areas: 1) identification of multi-criteria aptitude patterns, 2) teacher adaptivity in classroom interactions according to student aptitudes, 3) effects of adaptivity on cognitive, conative and affective student development. The sample comprised 90 randomly selected science classes

in Germany and Switzerland. One teaching unit was video-taped over the school year and additional student data was collected at the beginning and the end of the school year. The LCA analyses showed distinct student aptitude patterns that vary due to cognitive and conative-affective dimensions. The video codings for teacher-student interactions included the quality of questions and statements, the function of student statements in classroom discourse as well as teacher feedback on student responses. Due to the fact that each student had been identified on the video, further analyses were able to link aptitude patterns to the analyses of teacher-student interactions. Furthermore, the classes were grouped according to adaptive and non-adaptive teaching and the effects of adaptivity on learning developments were then investigated. The findings show the special value of latent-class analyses for video-based instruction research: they make it possible to take multiple aptitude criteria into account and to focus on the individual student as an analysis level.

K 10   26 August 2005   08:30 - 10:30   Room E112

Symposium
Student Learning in Higher Education

ISSUES IN FIRST YEAR TEACHING AND LEARNING IN HIGHER EDU-CATION

Chair: Rosina Mladenovic, University of Sydney, Australia
Organiser: Rosina Mladenovic, University of Sydney, Australia
Discussant: Mark Freeman, University of Sydney, Australia
                   Christopher Poullaos, University of Sydney, Australia

Understanding student learning and developing effective learning environments is particularly challenging for first year university educators. First, there are increasingly diverse student populations entering higher education bringing with them a variety of cultural backgrounds, approaches to learning, prior knowledge and differing academic capabilities. Second, research into higher education shows that the quality of the first year experience is a crucial factor affecting retention, completion and overall course satisfaction of university students (McInnis, James & McNaught, 1995; Evans & Peel, 1999). This symposium brings together 4 research papers from a number of discipline areas to explore issues in first year teaching and learning. The presentation and discussion of the various research methods employed (including both qualitative and quantitative methods) and the research findings will sup-

port cross-disciplinary sharing of insights into ways to improve first year learning environments. Employing a phenomenographic research method, Barry elicits the variation in academics' understandings of generic graduate attributes and the consequences of this variation for the teaching (curriculum design) and learning of such attributes in the first year of university. Byrne and Flood explore the learning experiences (learning intentions and study activities) of first-year accounting students based on in-depth student interviews. Lucas and Mladenovic employ an inventory research method to investigate the usefulness of an accounting discipline specific model of learning to facilitate the early identification of students at academic risk of failing and to guide educators in the development of effective interventions in the learning environment. Finally, based on student feedback from focus groups, Sainsbury and Walker describe curriculum innovations designed to address some of the issues faced by first year pharmacy students, namely, the students' struggle to identify with the profession and their difficultly in seeing the relevance of many of their subjects.

Starting the journey towards generic graduate attributes for a super-complex world
Simon Barry, University of Sydney, Australia

One way in which universities have sought to articulate the outcomes of a university education is through a description of the generic attributes of their graduates. In recent years many Australian universities have re-examined the generic graduate attribute outcomes they have espoused for the past two decades. In part this review has been prompted by calls for universities to renew their curricula to better equip graduates to work and live in our uncertain modern world. In part it has been an inevitable consequence of increasing calls to demonstrate and assure the quality of their educational outcomes. As university communities struggle to identify what combination of skills, attributes and knowledge to include in these statements of graduate outcomes, and begin to come to terms with how to develop curricula to effectively achieve such outcomes, the fundamental nature of these is a vital preliminary question to address. The research described in this paper used phenomenographic analysis to explore academics' conceptions of generic graduate attributes in the context of contemporary teaching and learning practices at one Australian university. The findings are presented as a description of the key aspects of variation in academics understandings of the concept of generic attributes. The nature of the key aspects of the variation in academics' understandings of the concept are interpreted in terms of the implications for policy and curricula and teaching practice.

In particular the paper focuses on the consequences for the teaching and learning of such attributes in the first year of university. In exploring these implications the paper draws on case studies of various curriculum and teaching initiatives seeking to communicate the relevance of these key generic learning outcomes to students and start students on the path towards the development of such attributes during the remainder of their university studies.

A qualitative exploration of the learning experiences of first-year accounting students

Barbara Flood, Dublin City University, Ireland
Marann Byrne, Dublin City University, Ireland

There is an increasing body of research examining the learning of accounting students in higher education in Europe and elsewhere (Duff, 2001). However, a considerable portion of this empirical research has been quantitative, as opposed to qualitative, in orientation (Paisey and Paisey, 2004). Consequently, the objective of this study is to use a qualitative research approach to rigorously explore the learning experiences of first-year accounting students at an Irish university. More specifically, the study analyses aspects of students' learning approaches and factors which influence those approaches. The data for the study was gathered from in-depth, semi-structured interviews with first-year students and was thematically analysed using template analysis. The findings reveal that the students' learning intentions and study activities are framed by their perceptions of assessment demands. Interestingly, students expend considerably less time studying than is recommended for their degree course and they experience little or no personal enjoyment from their studies. Nevertheless, they are confident in their ability to succeed. The paper reports that, in addition to learning context issues, personal factors, such as conceptions of learning and prior learning experiences, influence students' approaches to learning. In summary, this paper provides a rich, holistic understanding of many aspects of accounting students' learning experiences.

Developing an accounting-specific learning inventory for use as a diagnostic tool within first year teaching

Ursula Lucas, University of the west of England, United Kingdom
Rosina Mladenovic, University of Sydney, Australia

The aim of this paper is to address the following questions: why do students fail accounting or fail to learn appropriately within accounting, and are there mechanisms

to facilitate the early identification of students at academic risk, that is before they fail their introductory accounting unit? The study utilises the Reflections on Learning Inventory (RoLI10a) and the Expectations of Learning Accounting Inventory (ELAcc1.4). A combined inventory was administered to 1730 students of introductory accounting in two Australian universities. The RoLI seeks to operationalise a model of learning that is primarily defined in terms of prior knowledge and learning processes. The ELAcc draws on phenomenographic work in accounting to operationalise conceptions of accounting and processes of learning accounting. Students were also asked to provide the following data: gender, major/non-major, English-speaking background, UAI (pre-entry overall academic score), country in which the last 2 years of schooling took place, prior study in business/accounting. The findings indicate that first year accounting students bring with them subject-specific prior knowledge and conceptions of learning as part of their personal learning history; and some of them do so in a form that predisposes them to risk of failure at the very outset of their course. These findings are consistent with findings in first year economics (Meyer and Shanahan, 2001). However, further work is needed to develop policies and procedures for the administration of the inventory as well as the development of effective interventions that will enable students to achieve improved learning outcomes and improve progression rates.

Beginning to become: forging identities and the first year at university
Erica Jane Sainsbury, University of Sydney, Australia
Richard Walker, University of Sydney, Australia

The first year at university, which marks a transition period from secondary to tertiary study, has been identified as a critical phase in the process by which students adapt to higher education, and as pivotal in facilitating their retention (McInnis, James & McNaught, 1995; Evans & Peel, 1999). Aspects such as a sense of purpose on commencing university, personal identity issues, interest in the subject studied, adaptation to being a university student, and perceptions of good teaching and workload have been shown to contribute to students' satisfaction in first year, and to influence their choice to remain at, or leave, university. Key suggestions to assist the transition phase have included using curriculum as an organising device, and paying attention to the social as well as the academic needs of students through such approaches as creating learning communities (McInnis, 2001; Willans, Harreveld & Danaher, 2003)). Research amongst Pharmacy students at the University of Sydney has confirmed these findings, and has contextualised the issues to the specific milieu of the Bachelor of Pharmacy degree. Curriculum innovations designed to

address the identified issues were implemented, and were associated with an enhanced student experience in first year. Specifically, students reported a high level of perceived relevance together with a sense of belonging to a group committed to learning. The course content was seen as interesting, and the staff helpful – both in terms of providing clear direction and in the provision of timely feedback. The learning environment was considered beneficial for promoting learning, and in particular learning from other students who were often of vastly different backgrounds. Importantly, students also described an emerging identity with the pharmacy profession, and an excitement about learning to become pharmacists. This paper discusses and evaluates the preliminary research, curriculum changes and subsequent outcomes in terms of student experience.

K 11   26 August 2005   08:30 - 10:30   Room E102

Symposium
Epistemological Beliefs

CURRENT RESEARCH IN CHILDREN'S PERSONAL EPISTEMOLOGY: IMPLICATIONS FOR DEVELOPMENTAL ASPECTS OF LEARNING AND INSTRUCTION

Chair: Floria N Haerle, Carl von Ossietzky University Oldenburg,
                Germany
                Lisa Bendixen, University of Nevada, Las Vegas, United States
Organiser: Lisa Bendixen, University of Nevada, Las Vegas, United States
                Florian Haerle, Carl von Ossietzky University Oldenburg,
                Germany
Discussant: Deanna Kuhn, Columbia University, New York, United States
                Barbara Moschner, Carl von Ossietzky University, Oldenburg,
                Germany

The goal of this symposium is to examine the current and relevant research in the development of children's personal epistemology and how this relates to learning and instruction. Personal epistemology (i.e., beliefs about knowledge and knowing) has been a focal point of educational research in learning and instruction in the last thirty years. In terms of educational implications, epistemological beliefs have been found to be related to a variety of factors including cognitive processing, conceptual change, and argumenative reasoning. There is general agreement regarding

the developmental pattern of epistemological thought in late adolescence and early adulthood that includes absolutism, relativism, and evalutivism. However, there is little theoretical and empirical support for epistemic development in children. In the past, in was assumed that children were unable to think about epistemological issues due to insufficient cognitive and verbal abilities. Leading edge research has provided evidence to support the notion that children are capable of epistemological understanding and that this is somehow linked to Children's theory of mind. There are a number of pertinent questions associated with this new inquiry into the understanding of Children's personal epistemology that need to be investigated including: Are the developmental patterns associated with the personal epistemology of adolescents and adults similar in children? How does the personal epistemology of children impact learning? What are the educational implications of this knowledge? Are the epistemological beliefs of children domain specific or domain general? How does what we know about Children's personal epistemology aid in the proposed recursive nature of development in general? This symposium will provide greatly needed empirical work that will address the aforementioned questions regarding the development of Children's personal epistemology. In addition, how this body of work will enhance our understanding of learning and instruction will be further clarified.

An Interactive Measure of Children's Personal Epistemology
LisA Bendixen, University of Nevada, Las Vegas, United States
FloriaN Haerle, Carl von Ossietzky University, Oldenburg, Germany

The validity and reliability of an interactive online measure of Children's personal epistemology (IPEQ-C) were investigated. The study of personal epistemology (beliefs about knowledge and knowing) is a growing area of interest for both researchers and educators who focus their attention on learning and instruction. Personal epistemology includes beliefs about a) the certainty of knowledge, b) the simplicity of knowledge, c) the source of knowledge, and d) the justification for knowing. Epistemological beliefs have been found to be related to a variety of educational factors. There is general agreement regarding the developmental pattern of epistemological thought in late adolescence and early adulthood that includes absolutism, relativism, and evaluativism (Kuhn, Cheney & Weinstock, 2000). There is little theoretical and empirical support, however, for epistemic development in children. The IPEQ-C contains a combination of Likert items, a meta-ranking of these items, and open-ended questions. All of the questions focus on ill-structured domain-specific problems. The design of the online questionnaire is highly personalized, inter-

active and intuitive. The aim is to tap into children's beliefs about: 1) complexity, 2) certainty, 3) source, and 4) justification of knowledge. In addition, information about the developmental patterns of personal epistemology can be gleaned. The current study included three phases of piloting on 78 elementary-aged students (Kindergarten, second, and fourth grade) in the U.S. were completed. The results indicated that that the design of the IPEQ-C successfully combines the strengths of interview and survey methodology and is appropriate for elementary-aged children. In addition, a large-scale, cross-sectional study using the IPEQ-C to examine the developmental aspects of Children's personal epistemology is planned for early spring 2005. Providing an easy-to-use and understand measure for teachers and researchers interested in the epistemic climate of classrooms can lead to positive benefits for both learning and instruction.

The Diversity of Epistemic Beliefs in German 4th Graders
FloriaN Haerle, Carl von Ossietzky University, Oldenburg, Germany

Personal epistemology research shows that learners' epistemological beliefs have an important influence on learning and instruction. Most of the research undertaken thus far has been focused on adolescents and adults, as the ability of Primary School students to both have epistemological beliefs and be able to verbalize them has been denied (Kuhn & Weinstock, 2002). However, new research studies hypothesize that students begin to develop epistemological beliefs at the beginning of their schooling (Elder, 2002). This large-scale qualitative research study shows that 4th graders (N = 98) have a diversity of epistemic beliefs. The semi-structured interviews conducted clearly show that students around the age of 10 have epistemic beliefs and are able to verbalize them. Nearly all students at this age were able to define knowledge. These definitions encompassed different levels of abstract thought. All students described different implicit and explicit strategies of knowledge acquisition in detail. They pointed out distinctions between these strategies related to different subject domains. Most of the students had a differentiated understanding as to which sources are more reliable and valid when answering a specific question. Most of the teachers interviewed underestimated the epistemic beliefs of their students. Teachers' epistemic beliefs were found to be reflected in the students' beliefs. Developmental aspects of epistemic beliefs were identified such as, (a) the shift from the belief in omniscient authorities towards a more independent view on knowledge sources, and (b) the beginning of a more domain specific understanding of knowledge. Therefore, the calibration of students' epistemic beliefs towards more elaborate and domain specific nature should be considered as an important

aspect of classroom teaching. As 4th graders are influenced by the epistemic beliefs of their teachers epistemic calibration is not only a key issue for learning and instruction in school education but also in teacher education.

Personal epistemology and the mode of informal reasoning of the 6th graders
Fang-Ying Yang, National Taiwan Normal University, Taipei, Taiwan
Chin-Chung Tsai, National Chiao-Tung University, Hsinchu, Taiwan
Hsin-Chung Ting, Chia Nan University of Pharmacy and Science, Taina, Taiwan

Previous studies found an association between the personal epistemology and the modes of informal reasoning in the 10th graders when reasoning the socio-scientific issues. The informal reasoning in discussion included the use of theory and evidence and views about evidence and expert. In the current study, an attempt is made to reveal if a similar association can be found in 6th graders. To assess the personal epistemology, one of the studies used Moore's LEP questionnaire. Since the LEP questionnaire was developed based on previous interviews with college students, the descriptions of items would be too advanced to be fully understood by children at the age of 12. Therefore, to probe 6th graders' personal epistemology, an interview protocol concerning students' educational experiences will be employed instead. To study the mode of informal reasoning, similar to the previous design, young participants of this study will be encouraged to criticize some issue-based, controversial information. For this part of research, data will be collected by either the interview method or a survey. The final decision will depend on the future evaluation over the two methods. The first pilot study is scheduled in early February.

Grade-level, Gender, and Ethnic Differences in Epistemological Understanding within Domains
Michael, P. Weinstock, Ben-Gurion University of the Negev, Beer-Sheva, Israel

An analysis of series of recent studies allows a partial replication of an earlier study (Kuhn, Cheney, & Weinstock, 2000) using a larger number of participants and more specific exploration of response patterns (1) within a shorter age range, (2) in different domains, and (3) by gender and ethnic group. Within a period of a year, 390 Israeli school students had received an epistemological assessment. A study of 130 Bedouin students included grades 7 and 9. One study of Jewish students included grades 9 and 11 (n = 79), and another included grades 7, 9, and 11 (n = 181). Among the Jewish students, there were greater numbers of multiplists in all domains with increasing grade, and higher levels of evaluativists in the truth domains

in 11th grade. The grade-level patterns also pertained among the Bedouins in the truth domains. However, they had greater percentages of absolutists than the Jews in all domains, particularly in values. All students tended to be more absolutist in the values domain than in either truth domain. Among Jews, the differences in the epistemological levels between all three domains became larger moving up grade level. Gender differences appeared in both groups, but in different domains. Among Jews, girls more than boys were multiplists in values, and boys more than girls were absolutists. Among Bedouins, girls more than boys were multiplists in the truth domains, and boys more than girls were absolutists. In both groups, gender differences moderated with increasing grade level. Grade-level changes, consistent with the earlier study, across ethnic groups suggest that schooling is a factor in changes in epistemological understanding. However, ethnic differences, and the fact that the gender differences varied by ethnic group suggest that cultural values might also be a factor in epistemological understanding.

K 12   26 August 2005   08:30 - 10:30   Room E111

Symposium
Teacher Education

EUROPEAN APPROACHES TO THE INTEGRATION OF EDUCATIONAL MEDIA INTO TEACHER AND STUDENT TRAINING

Chair: Michael Henninger, University of Education Weingarten,
              Germany
Organiser: Michael Henninger, University of Education, Germany
Discussant: Hans Gruber, University of Regensburg, Germany

Competence in using modern multimedia is an important part in teacher and student education. To provide students with adequate skills, teachers must acquire media-expertise of their own. But still both the training of teachers and the training of pupils lack of theoretically based concepts of media-integration and a systematic instructional-design. The symposium provides an opportunity to learn from each other and to identify best practices among implementation e-learning based projects in school-environments. The projects are based on different theoretical backgrounds and focus on specific aspects of implementing educational media. Innovative approaches with explorative characteristics are presented in different stages, ranging from conceptual programs to first empirical results. The aim of the symposium is to

outline the importance of educational media in teacher and student training and to create a shared expertise in using and implementing educational media. Walczak's contribution is dealing with the use of 3D-adventure-games in evaluating the progress of learning and teaching in mathematics. He focuses instructional and evaluating questions in his research and reports empirical data resulting from pupils-inquiries. Vrasidas et al. present a program about integrating ICT into teacher education in Asia Pacific. Their work aims at the establishment of a teacher-community using digital educational media. Gros et al. describe the creation of practitioners' communities in teachers' professional development. Their project focuses the reflection of teachers' learning and teaching habits with the help of a virtually-supported exchange among practitioners. Henninger et al. also aim at the reflection of teaching behaviour but with teacher trainees. By the use of an e-learning tool with videotaped examples of trainee's own teaching, students reflect their teaching-skills and establish new strategies with the support of an online coach. All contributions describe field studies and report results from empirical research surrounding the projects.

EmpowerICT™: e-Learning for teacher education in Asia Pacific
Charalambos Vrasidas, CARDET Intercollege, Cyprus
Michalinos Zembylas, CARDET Intercollege, Cyprus
Vincent Quah, Microsoft, Singapore

This paper will discuss the theoretical framework and the vision behind empowerICT™, a professional development program that focuses on integrating ICT in teaching and learning in primary and secondary education. The program has been launched May 2004 as a pilot in 5 schools in Thailand and 5 schools in the Philippines. It consists of teacher training modules, support documents, suggested activities integrating ICT in education, outcomes based assessment, an online portal, and ongoing support. The project is funded and managed by Microsoft. The vision behind this project is to develop a community of teachers integrating ICT in their classrooms and who will share expertise and support each other in the Asia Pacific region. During this presentation we will discuss the theoretical framework on which the project is based including issues relating to policy, curriculum, pedagogy, assessment, technology infrastructure, the culture of schooling, research, and evaluation. The major evaluation focus of the pilot implementation is of formative nature. That is, we are interested to collect data to improve the project and fine tune the framework on which empowerICT™ is based.

Evaluation and teaching by 3d adventure games
Szymon Walczak, University of Lodz, Poland

The main question of our research is if it is possible to use the computer interactive 3D adventure games in evaluating the progress of learning and in the teaching. Due to form offinal exams after elementary school stage of education in Poland we focus on the elementary school level. Our research has started in April 2004 and is planned for 30 month (up to September 2006). It is divided into parts. First of all we have prepared an appropriate adventure game. We focus only on one topic of the math-science part of the elementary school final exams. In the second part of our research we ask pupils of the elementary schools to play our game. Next, they fill in an inquiry about the game. During this stage of the research we gather empirical materials for further explorations. Next part of the research is based on the materials from previous parts. We try to answer following questions: 1. How we should formulate the tasks to have the game still interesting, 2. How the game should be constructed to be interesting for pupils. The penultimate part of the research is to prepare the game appropriate for final elementary school exams and to distribute it among teachers of our region. Having all data from the previous parts we try to answer the question if it is possible to use the adventure games not only in evaluation but also in teaching. We will prepare the Constructor of 3D Adventure Games which can be used by teachers in their work. On EARLI 2005 Conference we would like to present the results from first two parts of our research.

Teachers Professional Development: creating communities of practitioners
Begona Gros, University of Barcelona, Spain
Isabel Alvarez, University of Barcelona, Spain
Iolanda Garcia, University of Barcelona, Spain

In this paper, we describe the use of Knowledge Forum as a support for the creation of professional development based on collaborative process. The main idea is to create a community of practitioners that will be able to use new competences related to the construction of knowledge This project is promote by the Government of Catalonia in collaboration with the University. The study shows the first outcomes and both the theoretical and educational significance of working with a wide range of teachers

Virtual supported soft skill training as a part of teacher education in Germany
Michael Henninger, University of Education Weingarten, Germany
Christine Hoermann, University of Education Weingarten, Germany
Georg Hauck, University of Education Weingarten, Germany

The disposal of soft skills is fundamental for teachers. At least PISA revealed strong deficits in classroom communication and social interaction between teacher and student in German classrooms. Teachers lack of soft skills and often are not able to deal with conflicts or even recognize them. The current training of soft skills (communication) in teacher education in Germany causes several problems. A theoretical reflection of the training leads to an introduction of a new training concept using digital media. The virtualization of soft skill training modules includes the development and scientific investigation of a blended teaching format for school-practical training. At the moment this is an important face-to-face part of teacher education. Teacher trainees give lessons in cooperating schools. In this real environment they learn in a practical way how to prepare and how to conduct a lesson. During their performance they are watched by some fellow students, a training supervisor from the University and a teacher from the cooperation school. After the lesson all of them feedback the trainee according to his or her teaching quality. In our project we support the reflection of one's own teaching by integrating additional virtual learning phases. The core of this project is optimizing observation, analysis, feedback and training regarding soft skills in teaching behavior. For this purpose, video-sequences of teaching are implemented into a web-based learning environment and are integrated into a blended teaching format. Due to the enabled differentiated analysis of various aspects of teaching, the student is supported in generating alternative behavioral patterns and in developing his communicative behavior.

K 13   26 August 2005   08:30 - 10:30   Room A010

Symposium
Motivational, Social and Affective Processes

THE DEVELOPMENT OF INTEREST AND SELF-CONCEPT IN MULTI-PLE DOMAINS: RESULTS OF LARGE-SCALE LONGITUDINA

Chair: Ulrich Trautwein, Max Planck Institute for Human Development, Berlin, Germany
Organiser: Juergen Baumert, Max Planck Institute for Human Development, Berlin, Germany
              Jacquelynne Eccles, University of Michigan, United States
              Ulrich Trautwein, Max Planck Institute for Human Development, Berlin, Germany
Discussant: Ulrich Schiefele, University of Bielefeld, Germany

Motivational theories such as expectancy-value theory (Eccles et al., 1983) highlight the role of self-concept and interest in the learning process. As many studies have shown, self-concept and interest are powerful predictors of achievement-related choices (e.g., course choice) and behavior (e.g., effort and persistence on a specific task). Moreover, several studies have indicated that self-concept and interest are affected by context variables such as the characteristics of the learning environment and feedback from important others. Despite the educational relevance of interest and self-concept and increased attention to these variables in the educational field, there has been relatively little investigation of self-concept and interest in multiple domains over a period of several years. The present symposium brings together longitudinal research on the development of interest and/or self-concept from three countries (the U.S., Australia, and Germany). Jacquelynne Eccles (University of Michigan) and colleagues will present data from her longitudinal studies of the Expectancy-Value model of achievement-related choices; they summarize the nature of the developmental changes from age 6 to age 18, show the predictive power of self and task beliefs for engagement and achievement and analyze predictors of the developmental trajectories. Helen Watt (University of Michigan/Monash University, Australia) reports developmental trajectories for intrinsic value and perceived talent in boys and girls. Specifically, she examines the opposing predictions derived from gender intensification and gender convergence models. Juergen Baumert and his colleagues from Max Planck Institute for Human Development (MPI), Germa-

ny, examine interest trajectories in multiple domains in secondary school, finding support for developmentally appropriate differentiation processes. Finally, Gabriel Nagy and colleagues from MPI focus on course choices as factors of the educational context that potentially contribute to increased gender differences in academic interests. The discussant will be Ulrich Schiefele from University of Bielefeld.

Developmental Changes in Expectancy and Subjective Task Value Beliefs
Jacquelynne Eccles, University of Michigan, United States
Janis E. Jacobs, Pennsylvania State University, United States
Jenny Fredricks, Connecticut College, United States
Jessica Garrett, University of Michigan, United States
Sandi Simpkins, University of Michigan, United States

Jacquelynne Eccles will present data from her longitudinal studies of the Eccles et al. Expectancy - Value model of achievement-related choices. She will summarize: (a) the nature of the developmental changes from age 6 to age 18 in both ability self concepts and subjective task value components (interest, perceived importance, and perceived utility value) for math, literacy, sports, and instrumental music; (b) what influences these developmental trajectories; and (c) how these self and task beliefs predict both engagement and achievement in these domains across time. She will draw on data from the Childhood and Beyond Study done in Southeastern Michigan – a longitudinal study of approximately 800 children followed from the beginning of elementary school through the end of high school. Using HLM, she and her colleagues have found a steady decline in both ability self concepts and the subjective task value components for all four achievement domains. The exact nature of these declines do vary somewhat across domains in ways that relate directly to the amount of choice children have in participating in the domain, how good their parents think they are in the activity domain, the Children's gender, and the Children's internal comparisons of their abilities across the four activity domains. Turning to the predictive utility of these beliefs, Dr. Eccles and her colleagues have found that both ability self concepts and the subjective task value components predict both engagement and achievement in each domain; that the predictive utility increases with age; and that the predictive utility is higher for sports and instrumental music than for mathematics and literacy. The implications of these findings for educational interventions and for theory development will be discussed.

Developmental Trajectories for Intrinsic Value and Self-Perceptions of Talent: An Australian study with secondary school boys and girls in maths and English
Helen Watt, University of Michigan/Monash University, Australi, Australia

Intrinsic values and self-perceptions of talent have been identified as important factors which influence achievement-related choices within the Eccles et al. Expectancy-Value framework. We need then to understand their developmental trajectories within key academic domains. Maths and English have been the topic of much research within the Expectancy-Value framework, and the present study estimated latent growth models for Australian adolescents for both domains. Longitudinal data from a cohort-sequential design spanned grades 7 to 11 (N=1323). Gendered trajectories were estimated, given evidence to suggest sex-typed processes in maths and English. Gendered processes which have been suggested and which the present study tested, relate to gender intensification (see Hill & Lynch, 1983) and gender convergence (e.g., Jacobs et al., 2002). Gender intensification theories posit increasingly divergent gendered trajectories, as gender differences become more pronounced, while gender convergence posits increasingly similar trajectories for boys and girls, based on their increasingly 'realistic' perceptions. Gender differences favoured boys for maths talent perceptions and intrinsic values, and the magnitude of gender difference remained stable through grades 7 to 11. In contrast, and consistent with sex-typing hypotheses, girls had higher intrinsic values than boys for English, although both genders had similar English talent perceptions. There was no evidence to support either gender intensification or gender convergence hypotheses. Talent perceptions and intrinsic values declined through secondary school. Importantly, declines in intrinsic values appeared to relate to curricular changes in both domains, with domain-specific patterns implying domain-specific explanations. Explanations reference socialisation and social-cognitive developmental theories and features of the curricula.

Self-concept and Interest Trajectories in Secondary Education: Differentiation and Selective Optimization
Juergen Baumert, Max Planck Institute for Human Development, Berlin, Germany
Ulrich Trautwein, Max Planck Institute for Human Development, Berlin, Germany
Gabriel Nagy, Max Planck Institute for Human Development, Berlin, Germany

In the present study, we address the popular claim that low-quality learning environments are the main cause of declining interest in school subjects during secondary education. Building on the internal/external frame of reference model (I/E; Marsh, 1986) and the expectancy-value model (EV; Eccles & Wigfield, 2002), we conceptualize the decrease in interest over the secondary school years as a developmentally adaptive process of differentiation and selective optimization fueled by contrasting performance feedback in different domains and by inter- and intraindividual comparisons. This conceptualization was tested using a subsample (four waves spanning grades 7 to 10; 1124 students from 81 classes) of the large-scale longitudinal BIJU project. Interest and self-concept in mathematics and English as a second language were measured using reliable multi-item inventories. The results were as follows. First, students' domain-specific self-concepts were highly stable over time, whereas their interest was much more variable. This suggests that adolescence is a formative period for interest development. Second, selective optimization was observed to be taking place: Correlations between students' levels of interest in the two domains decreased from .29 at the beginning of grade 7 to .17 at the end of grade 7 and to .00 by grade 10. Third, a positive self-concept in a subject promoted interest development in that domain. Moreover, comparison processes at the intraindividual level promoted the differentiation of interest, as evidenced by negative cross-lagged coefficients. Finally, students with a high level of interest and a relatively positive, stable self-concept in one domain tended to maintain or increase their interest in that domain. To conclude, processes of interest differentiation and selective optimization will inevitably result in a decline in mean interest within an age cohort in practically all school subjects. Unless teachers understand these developmental dynamics, they will fail to respond to them as an inevitable professional challenge.

Gender and Course Selection in Upper Secondary Education: Effects of English and Mathematical Self-Concept, Interests, and Multiple Frames of Reference
Gabriel Nagy, Max Planck Institute for Human Development, Berlin, Germany
Ulrich Trautwein, Max Planck Institute for Human Development, Berlin, Germany
Olaf Koeller, University of Erlangen-Nuremberg, Germany
Juergen Baumert, Max Planck Institute for Human Development, Berlin, Germany

Prior research on gender differences has shown that males and females differ substantially with respect to their academic and job-related choices. Theories such as expectancy-value (EV) theory highlight the role of students' domain-specific academic self-concepts and interests, which are assumed to mediate the effects of gender on achievement-related choices. Furthermore, the internal/external frame of reference (I/E) model predicts intraindividual cross-domain comparisons to impact on domain-specific measures of academic self-concept. In this paper, we propose a unified model that combines central aspects of the EV and I/E models. In line with the EV model, we assume that academic achievement, self-concepts, and interests are important predictors of students' achievement-related choices. Following the I/E model, we expect negative cross-domain relations between these constructs, representing processes of intrainidvidual comparisons across different academic domains. The predictions were tested for the domains of mathematics and English as a foreign language using data from N = 915 students attending academically oriented secondary schools in Germany. Males outperformed females on the mathematics assessments, and reported higher math self-concepts and interests. Females demonstrated somewhat higher English achievement, and reported higher English interest than males. Consistent with our expectations, domain-specific gender differences in achievement, self-concepts, and interests in grade 10 mediated the effect of gender on course enrolment in grade 12. In line with the EV model, self-concepts and interests had substantial effects on subsequent course choices. As predicted by the I/E model, domain-specific self-concepts and interests were positively related to course choices in the same domain, but negatively related to choices in the other domain. The results are discussed in relation to the I/E and EV models.

Symposium
Educational Innovations

INNOVATIONS IN PROBLEM BASED LEARNING

Chair: Remy Rikers, Erasmus University Rotterdam, Netherlands
              Henk Schmidt, Erasmus University, Netherlands
Organiser: Remy Rikers, Erasmus University Rotterdam, Netherlands
              Henk Schmidt, Erasmus University Rotterdam, Netherlands
Discussant: Silvia Mamede, Medical School-Federal University of Ceara, Bra
              zil
              Paul Wimmers, Erasmus University Medical Center, Netherlands

Problem-based learning is an attempt to create a learning environment for students enabling them to (1) learn in the context of meaningful problems, (2) actively construct mental models that help in understanding these problems, (3) learn through sharing cognitions about these problems with peers, and (4) develop self-directed learning skills (Norman and Schmidt, 1992). Problem-based learning thus can be considered an example of the current contextualist and constructivist perspective on learning and instruction (e.g., Wittrock, 1990). It was developed initially in the context of medical education (Barrows & Tamblyn, 1980), but is applied now in a broad array of other learning environments as well, including business administration, law, biology, and physics (e.g., Boud & Feletti, 1992). This symposium presents studies that are all examples of the diversity of contemporary research within PBL: from qualitative to quantitative or experimental approaches, and from medicine to psychology. The study by O'Neill and Duplock shows a theoretical model based on the elaboration to explain how students integrate their understanding of the paper cases used in the PBL discussion groups with real patients and other types of clinical contact. The study by Verkoeijen, Rikers, and Schmidt, investigated the role of student-generated learning issues on individual study, literature search, and tutorial group meetings using an experimental approach. The presentation by Newman concerns two distinct empirical research projects. The first empirical project consisted of a systematic review and meta-analysis of the effectiveness of PBL. The second evaluated the effectiveness of PBL in a Continuing Nursing Education programme using an experimental design. Loyens, Rikers, and Schmidt compared students' conceptions of knowledge construction, cooperation, self-regulated learn-

ing, the use authentic problems, motivation to learn, and learning uncertainty in a problem-based and a traditional curriculum.

Linking Problem-Based Learning with Clinical Experience
Paul O'Neill, University of Manchester, United Kingdom

How do students link the discussion in PBL groups with their expanding clinical experience? Using free text comments, we developed a theoretical model based on elaboration to explain how students integrate their understanding of the paper cases used in the PBL discussion groups with real patients and other types of clinical contact. In the reported study, it was shown that elaboration could occur either through a subsequent clinical encounter (i.e. outside the group) or through group discussion (i.e. inside the group). Building on this, a detailed qualitative exploration of how students discuss and use clinical experience within PBL groups is reported. We observed and recorded the PBL discussion of third-year groups during the second group meeting on one of five separate PBL paper cases. Findings indicate that discussion of clinical experience appeared to encourage students to become more involved and connected to the affective domain of learning as well as bridging between the tutorial room and real clinical contexts. Almost half of the discussions about a clinical experience continued into some other clinical incident or medical area. Thus, discussion can be seen as being used as an information resource and also elaborating conceptualisation of clinical problems. In many cases, the introduction of a clinical experience was a pivotal point in a discussion that either confirmed, extended or refuted what was being described from other sources of information. Thus, it was very powerful and has implications as to the development of clinical expertise.

Do students in a PBL curriculum have different conceptions of learning than students enrolled in a traditional curriculum?
Sofie Loyens, Erasmus University Rotterdam, Netherlands
Remy Rikers, Erasmus University Rotterdam, Netherlands
Henk Schmidt, Erasmus University Rotterdam, Netherlands

Problem-based learning is designed to help students construct an extensive and flexible knowledge base, become effective collaborators, develop self-directed, lifelong learning skills, develop effective problem-solving skills, and become intrinsically motivated to learn. However, little is known about students' conceptions of these learning principles implemented in a PBL curriculum. The present study

investigated students' conceptions of knowledge construction, cooperation, self-regulated learning, the use authentic problems, motivation to learn, and learning uncertainty in a first-year problem-based and a first-year traditional, lecture-based curriculum by means of a questionnaire that was developed. Results revealed that both student populations acknowledge the importance of the learning principles mentioned above as distinct influences on their learning process. The questionnaire developed appeared an adequate instrument to investigate students' conceptions of these six factors. Latent means analysis demonstrated that students in a problem-based curriculum scored significantly higher on cooperative learning and authentic problems, but significantly lower on motivation to learn, compared to the lecture-based group. It appears that students who chose to be enrolled in a PBL environment, although they have just started, are more aware of the emphasis that is laid on cooperative learning and the practical application of knowledge, represented by authentic problems, and therefore, agree more on statements underlying these assumptions. With regard to the lower score of the PBL group on motivation to learn, a possible explanation is discussed. Concerning learning uncertainty, it can be concluded that a PBL environment is not perceived as discouraging.

Evaluating the impact of Problem Based Learning: Issues and controversies
Mark Newman, University of London, United Kingdom

The Project on the Effectiveness of Problem Based Learning (PEPBL) was a three-year project (2000-2003) funded by the ESRC Teaching & Learning Research Programme. The project comprised of two distinct empirical studies. One empirical research project consisted of a pilot systematic review and meta-analysis of the effectiveness of Problem Based Learning (PBL). The second study evaluated the effectiveness of PBL in a Continuing Nursing Education programme using a randomized experimental design. The reactions of various sections of the PBL communities to the questions posed in the studies, the research designs used and the results highlight a number of contested issues in the design of evaluation studies for PBL. This presentation will use the project and reactions to it to identify and discuss some of these issues and to argue that the various PBL communities have to address them in order that cumulative knowledge about the effectiveness of different kinds of PBL in different contexts can be developed.

The influence of Student-generated learning issues in PBL: An experimental approach

Peter Verkoeijen, Erasmus University Rotterdam, Netherlands
Remy Rikers, Erasmus University Rotterdam, Netherlands
Henk Schmidt, Erasmus University Rotterdam, Netherlands

The present study investigated the influence of providing useful learning issues in a problem as compared to a problem in which no learning issues are (explicitly) mentioned. It was expected that providing students with useful learning issues has important implications for the discussion in the tutorial group and the student's individual study. Findings showed that providing learning goals has an important impact on the students' individual study and the extensiveness of the tutorial group meeting.

K 15   26 August 2005   08:30 - 10:30   Room A111

Symposium
Learning and Cognitive Science

DEVELOPING SCIENTIFIC EXPERTISE: EXPLAINING IDIOSYNCRATIC AND FREQUENT INTUITIVE IDEAS

Chair: Marcia Linn, University of California, Berkeley, United States
Organiser: Marcia Linn, University of California, Berkeley, United States
                James Slotta, University of California, Berkeley, United States
Discussant: Giyoo Hatano, Univerity of the Air, Japan

Determining how individuals develop expertise in complex science domains has challenged researchers. Piaget drew attention to the intuitive ideas students developed based on experience, observation, and hypothesized developmental constraints. Considerable subsequent research has identified the intuitive ideas held by individuals in a vast array of scientific topics and stimulated researchers to develop frameworks to account for the observed behavior. This symposium brings together five individuals who have studied student learning and understanding of scientific phenomena. Each participant in the symposium will briefly report on a case study of an individual or group of students grappling with a complex scientific topic, such as electricity, thermodynamics, circulation, evolution, chemical reactions, genetics, or plate tectonics. Each presenter will articulate a theoretical framework to explain

the development of expertise in this topic. The presenters will discuss frequent and infrequent intuitive ideas and instructional implications. Along with their explanations for the range of ideas held by individual students, presenters will explain the trajectories that students follow at they develop expertise. The presenters hold diverse views concerning the development of expertise. Some of the presenters emphasize the primary idea that students use to explain the phenomena at a given time, while other presenters focus on the repertoire of ideas held by the students. Some of the presenters view the development of expertise among students as having important similarities to the development and continued explanation of scientific ideas by expert scientists. Other experts see students' efforts to make sense of scientific phenomena as quite distinct from those of experts. The symposium will present these diverse perspectives and provide an opportunity for the presenters to comment on the perspectives of their co-presenters. A discussant will point out the similarities and differences between the perspective's theories and frameworks put forth by the presenters.

The framework theory and synthetic models approach to learning science
Stella Vosniadou, National and Kapodistrian University of Athens, Greece

According to the framework theory and synthetic models approach to learning science children start the knowledge acquisition process by organizing the multiplicity of their sensory experiences under the influence of everyday culture and language into narrow but coherent explanatory frameworks that are different from the currently accepted science. Thus, naive physics constitutes a complex, although relatively simple, knowledge system that includes perceptual information, beliefs, presuppositions, and mental representations. Naive physics represents Children's attempts to organize their perceptual experiences and information they receive from the culture into coherent explanatory frameworks. The process of learning science appears to be a slow and gradual one during which elements of the scientific theory are assimilated to this initial explanatory framework enlarging its scope but also destroying its internal coherence and creating synthetic models. This is the case because the currently accepted scientific explanations and concepts have evolved over thousands of years of scientific discovery to become rather elaborate, counterintuitive theories that differ in radical ways both in their structure and in the range of phenomena they explain from the initial explanations of the physical world that are based on everyday experience. Thus, from the point of view of the framework theory and synthetic models approach many misconceptions in science can be explained as attempts on the part of the learner to synthesize the new incompatible

information with what is already known using mainly the mechanisms of addition and replacement of beliefs. These mechanisms result in misconceptions between of the incompatibility of the two knowledge systems. It is important to understand the nature of misconceptions because this may influence greatly the design of curricula and of instruction. We will use developmental data but also excerpts from the protocols of young and older students in the area of mechanics to support the above arguments.

Developing Expertise in Thermodynamics: A knowledge Integration Perspective
Marcia Linn, University of California, Berkeley, United States

The knowledge integration framework helps explain how students develop expertise in complex, scientific topics. Students typically develop a repertoire of ideas about any scientific phenomena. This repertoire includes idiosyncratic ideas stemming from personal experiences. For example, students might explain that metals have the capability of imparting cold because leaning against a metal wall on a hot day has made them feel cooler. In addition many students hold similar views about thermal phenomena, such as the view that air has the unique property of transmitting heat. The knowledge integration framework recognizes the importance of this repertoire of ideas and illustrates how students take advantage of the variability among their ideas to develop more sophisticated perspectives on scientific phenomena, as well as to develop criteria for distinguishing among their ideas. In addition, the knowledge integration framework offers insight into the trajectory of student ideas, illustrating what happens when distinctive perspectives bump up against each other and motivate learners to sort out their ideas, promote more generative ideas, and demote others. The perspective also helps interpret instructional situations, illustrating why carefully chosen examples that help students distinguish among alternative views and enable students to identify promising criteria for selecting among ideas can enhance student learning. This presentation will illustrate the knowledge integration framework and discuss how pivotal cases contribute to student understanding.

Understanding our cognitive frameworks in a classroom context
James Slotta, University of California, Berkeley, United States

It is important to understand our frameworks of conceptual change as they apply to learning within a classroom setting. Learning in K-12 school contexts includes important social and metacognitive factors that may interact with our cognitive

descriptions of learning (i.e., as detailed in other presentations). In order to fully describe a student's conceptual trajectory in coming to understand difficult science concepts, we must account for the interactions between the student with peers and teachers, as well as innovative learning materials. We researched student learning in the Web-based Inquiry Science Environment (WISE), a technology-based learning environment that present students with learning materials designed according to the Scaffolded Knowledge Integration framework. WISE provides an Internet-based platform for middle and high school science activities where students work collaboratively on inquiry projects, making use of Evidence from the Web. As the students work through the sequence of steps within a WISE project, the teacher circulates within the classroom, interacting with one small group of students at a time, helping them interpret Web materials, reflect on the topic and interact with their peers. WISE seeks to enhance the teacher's ability to engage in close exchanges with students concerning their ideas about science and science learning. We analyze WISE in terms of its capability to scaffold students from diverse classroom contexts as they develop along conceptual trajectories, describing the varying role of technology, curriculum, teacher, mentor, and peers. We describe effective teaching with WISE in terms of numerous practices and exchanges of ideas that promote conceptual development of students and teachers. Analysis of students' project work reveals some capacitance of WISE to accommodate diverse teaching styles, but with required contributions from mentors. However, distinct classroom settings (e.g., traditional vs. inquiry oriented) do have a differential impact on students' ability to reflect deeply in WISE activities.

Knowledge integration strategies and physics learning
Bat-Sheva Eylon, Weizmann Institute, Israel

How can one support learners as they develop expertise in science during school years? Research shows that active construction of knowledge is a key element in the development of expertise. A central focus of this presentation is to identify some effective ways to support this process of knowledge construction. We identify deficiencies in two areas of students' knowledge. One area is conceptual understanding as realized in understanding performances: the ability to flexibly use conceptual knowledge to form explanations, predictions and arguments; to carry out inquiry and design projects; and to learn new related ideas. The other area is knowledge integration: the process of connecting knowledge acquired in different contexts, in diverse activities, and within and across domains of science. We shall describe three instructional studies that illustrate how one can support students' conceptual

development and knowledge integration. The first study was carried out with junior high school students who studied the qualitative application of Newton's laws to explain and predict common situations encountered in the natural environment (e.g. tug war). The study shows that it is not sufficient to employ learning tasks where students demonstrate understanding through performance assessments. It is also essential to teach students a set of thinking tools (i.e. a qualitative problem-solving strategy) that can guide their process of solving qualitative tasks. Students in this study outperformed high school and college level physics students that did not employ this strategy. A second study explores how pre service teachers incorporate self and collaborative diagnosis of concepts. It illustrates the importance of incorporating meta-cognitive activities that explicitly address students' conceptions. The third study is being carried out with high school physics teachers and their students and shows the importance of implementing knowledge integration routines in the classroom as an integral part of instruction.

K 16   26 August 2005   08:30 - 10:30   Room E003

Symposium
Comprehension of Text and Graphics

COMPREHENSION AND PRODUCTION OF DISCOURSE STRUC-TURES

Chair: Wolfgang Schnotz, University of Koblenz-Landau, Germany
Organiser: Irene-Anna Diakidoy, University of Cyprus, Cyprus
Discussant: Wolfgang Schnotz, University of Koblenz-Landau, Germany

The general aim of this symposium is to present, contrast, and synthesize research on the comprehension and production of discourse structures which are commonly associated with particular text types. One unifying characteristic of all the papers included in this symposium is their explicit focus on particular discourse structures or types. In addition, all the papers explore the development of comprehension or production skills. Two of the papers explore the relationship of narrative comprehension skills to basic reading skills and later reading comprehension levels. One paper contrasts directly the development of narrative comprehension skills to that of expository comprehension skills across input modalities. Finally, one paper relates the production of argumentative discourse to prior structural knowledge and instructional methods that may facilitate its acquisition. Taken together, the papers

contribute to our understanding of the nature of discourse comprehension and production processes, their development, and the factors that may influence it. From a practical perspective, the research reported has both direct and indirect implications concerning the acquisition of reading comprehension and writing skills in educational contexts. The EARLI 2005 Conference Theme that is most closely associated with this symposium proposal is that of Knowledge Acquisition and Expertise in Specific Domains: Text Comprehension and Production.

The relation between basic language skills and comprehension skills from kindergarten to second grade
Panayiota Kendeou, University of Minnesota, United States
Paul Van der Broek, University of Minessota, United States
Ashley Lewis, Universit of Minnesota, United States
Catherine M. Bohn, University of Minessota, United States
Julie Lynch, Saginaw Valley University, United States

In a longitudinal study we investigated the relation between basic language skills and narrative comprehension skills. In Phase I, 113 4-year-old and 109 6-year old children received a battery of comprehension tests using memory and inference-making tasks for aurally and television presented narratives. In addition, the children were tested on their basic language skills (i.e., phonological awareness, letter and word identification, vocabulary). In Phase II two years later, the same children (now 6 and 8 years old) were again tested on their comprehension and basic language skills. In addition, the 8-year olds were tested on a set of reading comprehension tests specifically designed for this purpose. The results showed that basic language skills (e.g., phonological awareness, letter and word identification) were highly interrelated. Comprehension skills in different media were also highly interrelated. Vocabulary was related to both basic language and comprehension skills. More importantly, there were not any relations between basic language and comprehension skills. These results suggest that comprehension skills in different media (e.g., aural and TV comprehension) develop independently from basic language skills. These findings have important implications for instruction and assessment of narrative skills in young children.

The relationship between listening and reading comprehension of different types of text at increasing grade levels

Irene-Anna Diakidoy, University of Cyprus, Cyprus
Polyxeni Stylianou, University of London, United Kingdom
Christina Karefillidou, University of Cyprus, Cyprus
Panayiota Papageorgiou, University of Cyprus, Cyprus

The study examined the hypotheses that derive from a unitary process view, namely, that (a) the relationship between listening and reading comprehension becomes stronger after decoding mastery, (b) the difference between listening and reading decreases with increasing grade level, and (c) similar patterns of relationship and difference are obtained with narrative and expository texts. The sample included 612 students in Grades 2, 4, 6, and 8. Students read and listened to two narratives and two expositories and completed the corresponding comprehension tests. The findings provided partial support for the first two hypotheses but not for the third one. In the case of expository text, the relationship between listening and reading was weaker than the corresponding one with narrative text and did not strengthen with increasing grade level. Moreover, expository listening and reading levels were comparable at all grade levels. However, expository comprehension levels (both listrening and reading) increased steadily, whereas narrative comprehension levels showed a decrease at Grade 8. The implications of these findings concern both the dominant unitary process model and the assessment and instruction of oral and written language comprehension.

Argumentative Discourse: Learning and Transfer

Alina Reznitskaya, Montclair State University, United States
Richard Anderson, University of Illinois at Urbana-Champaign, United States

The importance of argumentation in people's lives, combined with well documented deficiencies in argumentative knowledge, makes it imperative to identify effective educational models that support its development. In this paper, we outline a theory of learning and transfer in the domain of argumentation, which integrates what are typically opposing views of cognition. Our theory was empirically evaluated in a quasi-experimental study with 128 elementary school children. The study utilized a well-researched instructional approach called Collaborative Reasoning (Clark et al., 2003). Two instructional activities derived from our theory were systematically examined. These activities were 1) group discussions about the social and moral issues raised in selected readings and 2) explicit instruction in general principles

of argumentation. Following the instructional intervention, students in different treatment conditions completed the same three tasks: 1) an interview, designed to assess the knowledge of abstract principles and criteria of an argument, 2) a persuasive essay, and 3) a recall of an argumentative text. Interview results indicated that students who participated in discussions supplemented with explicit instruction demonstrated a more sophisticated awareness of argumentation principles. Essay quality was positively affected only by participation in discussions. The recall of argumentative text was largely insensitive to the treatment variations. The results reveal an intricate picture of knowledge acquisition and transfer in the domain of argumentation, suggesting multiple directions for future research and various implications for educators.

K 17　　　　26 August 2005　　　08:30 - 10:30　　　　Room E005

Symposium
Motivation

ANTECEDENTS AND CONSEQUENCES OF THE ACHIEVEMENT GOALS IN THE TRICHOTOMOUS AND 2 X 2 MODELS

Chair:　　　　Andrew Elliot, University of Rochester, United States
Organiser:　　Andrew Elliot, university of Rochester, United States
Discussant:　　Markku Niemivirta, University of Helsinki, Finland

Achievement goals are of central interest in contemporary accounts of achievement behavior. Although initial models of achievement goals posited a mastery/performance dichotomy, more recent models have expanded this dichotomy to include the approach-avoidance distinction. The trichotomous achievement goal model comprises the following goals: mastery-approach (striving to attain task-based/intrapersonal competence), performance-approach (striving to attain normative competence), and performance-avoidance (striving to avoid normative incompetence). The 2 x 2 achievement goal model additionally includes mastery-avoidance goals (striving to avoid task-based/intrapersonal incompetence). The trichotomous model has received support from over 70 published studies, nearly all in educational settings; the 2 x 2 model is of more recent origin, and has received minimal empirical attention to date. The proposed symposium focuses on research designed to examine antecedents and consequences of the trichotomous and 2 x 2 achievement goals. The first presenter, Yngvar Ommundsen, will report findings from a study examin-

ing mastery and performance climates as distal, and the trichotomous achievement goals as proximal, predictors of student self-regulation. The second presenters Olaf K?ller and Horst Zeinz, will report findings from a study examining the influence of verbal and written performance feedback on student adoption of the 2 x 2 achievement goals. The third presenter, Nico Van Yperen, will report findings from three studies designed to examine performance and perceived competence as both antecedents and consequences of performance-approach goals. The fourth presenter, Christopher Spray, will report findings from a study designed to examine the consequences of the 2 x 2 achievement goals for ongoing motivation and performance in a physical education context. These presentations are important in that they discuss cutting edge research on state-of-the art achievement goal frameworks. In keeping with the main theme of the conference, several of the presentations focus on environmental factors that promote optimal learning and motivation.

Perceived motivational climates and differential achievement goals:Direct and indirect relations to meta-cognitive and motivational indices of self-regulation in physical education
Yngvar Ommundsen, Norwegian University of Sport and Physical Educati, Norway

Based on the trichotomous achievement goal model (Elliot, 1999, Pintrich, 2000) the present paper examines direct and indirect influences of pupils' perceptions of motivational climates and their achievement goals on self-reported indices of self-regulation in physical education. Two hundred and seventy three students, fifteen to sixteen years old, attending 10th grade physical education classes in three junior high schools in a suburban area in Norway participated in the study. Results based on full regression models revealed that the motivational climates and achievement goals altogether explained between 16 and 46% of the variance in the adaptive and maladaptive self-regulation indices. Goals were generally shown to be stronger predictors of pupils' self-regulation than were motivational climates. In mediation regression analyses, a performance and a mastery climate were in several cases found to exert indirect influences on pupils' self-regulation strategies, mediated by their task achievement goals and to a lesser extent their performance-approach goals. Results suggest that achievement goals exert significant direct influences on pupils' self-regulation in PE, whereas motivational climates mainly influence pupils' adaptive and maladaptive self-regulation indirectly, mediated by their achievement goals. Selected findings add support to the revised trichotomous achievement goal model (Elliot, 1999; Pintrich, 2000) and suggest that climates operate as distal

influences and achievement goals as proximal influences in the motivation – self-regulation relationship (Pintrich, 2000).

Effects of marks on students' achievement goals in elementary schools
Olaf Koeller, University of Erlangen-Nuremberg, Germany
Horst Zeinz, University of Erlangen-Nuremberg, Germany

The purpose of the present study was to investigate effects of the introduction of marks (instead of verbal reports) in German elementary schools on students' achievement goals. We expected that students obtaining verbal reports on their accomplishments should prefer mastery and approach goals, whereas students in classes with marks should have higher performance and avoidance goals. The data came from one German federal state (Bavaria). In the school year 2003/2004, teachers of 30 Bavarian elementary schools were asked to provide marks already in grade 2 (treatment schools), while all other schools were allowed to proceed with verbal reports (control schools). To investigate effects of marks on students' goals, we administered questionnaires to approximately 4000 students (50.5% female) from 44 schools and 200 classes. About 51% of the students were at the end of grade 3, the rest at the end of grade 2. Approximately 48 % of the second graders were in classes with verbal reports while all other students received marks. Students' goals were measured for German (mother tongue) and math separately; each subject was represented by four items. A PCA revealed a two-factor structure, the first factor consisting of all items on performance goals, whereas the second factor included all items on mastery goals. Enforcing a four-factor solution resulted in a structure representing the 2 x 2 framework by Elliot. Multi-level analyses showed that students from classes with verbal reports had slightly lower performance goals (M = 11.12; SD = 3.67) than students in classes with marks (M = 11.43; SD = 3.46). No such differences occurred with respect to mastery goals or the approach-avoidance distinction.

The purpose of performing better than others: Antecedent or consequence of perceived competence and actual performance?
Nico Van Yperen, University of Gronigen, Netherlands

In achievement goal research, performance-approach goals (the purpose of performing better than others) have been found to be positively related to both actual performance and perceived competence. However, actual performance is typically posited as a consequence rather than an antecedent of goal adoption, whereas the

reverse has been proposed for perceived competence. Three studies were conducted in which participants were asked to adopt one of the four achievement goals representing the 2? 2 achievement goal framework (Elliot & McGregor, 2001). Across the three studies, the present data suggest that both performance and perceived competence are antecedents rather than consequences of performance-approach goals. Furthermore, regardless of the nature of the achievement goal, goal attainment appears to be a strong predictor of an individual's perceived competence.

To whom are performance goals addressed? Test of a differentiation of performance approach and performance avoidance goals respecting several addressees

Markus Dresel, University of Ulm, Germany
Barbara Schober, University of Vienna, Austria
Heidrun Stoeger, University of Ulm, Germany
Albert Ziegler, University of Ulm, Germany

State-of-the-art-models of goal orientations include a 2-x-2-framework, crossing learning and performance goals with approach and avoidance goals. As it is constitutive for learning goals, that they be directed to the learning process, this distinction seems to be sufficient. However, as performance goals include the aim of procuring acknowledgement of own abilities as well as the avoidance of perceptions revealing a lack of own abilities, they can be directed to different addressees. For example, a student may be concerned about the perceptions of his or her classmates, but he or she may not care about his or her parents. We hypothesized that students hold specific performance goals for different addressees, and that there are specific correlational patterns with other motivational constructs. We analyzed a dataset of N=2.675 pupils attending grades eight and nine in German public schools. Students completed a questionnaire consisting of 12 items measuring performance approach goals and 12 items measuring performance avoidance goals. In each subset four groups of addressees were differentiated: Parents, teachers, peers, and the acting individual itself. Additionally, learning goals and other motivational constructs were measured. We tested concurrent theory-driven structural equation models. Results indicated that, for all four groups of addressees, the distinction between performance approach and avoidance goals is valid. Furthermore, it could be shown that, for both approach and avoidance goals, the four-addressee-groups-model fits the data well. Testing second-order CFA-models revealed insightful views in the addressee differentiated structure of students' performance goals. Additionally, specific patterns emerged from the correlational analyses with external criterions. In sum, the results indicate that the distinction between different groups of addressees

is meaningful. This distinction provides a perspective that can be added to the 2 x 2 framework of goal orientations and trigger a deep understanding of the social processes accompanying learning in scholastic contexts.

K 18   26 August 2005   08:30 - 10:30   Room A018

SIG Invited Symposium
Computer-supported Learning Environments

HOT AND COLD COLLABORATION: AFFECTIVE AND EFFECTIVE COMPUTER SUPPORTED COLLABORATIVE LEARNING

Chair: Paul Kirschner, Open Universiteit Nederland, Netherlands
Organiser: Richard Joiner, University of Bath, United Kingdom
                Paul Kirschner, Open Universiteit Nederland, Netherlands

The aim of this symposium is to examine the design of computer supported collaborative learning from two perspectives, either a socio-emotional or socio-cognitive perspective. For some time now research regarding computer supported collaborative learning has focused on the sociocognitive processes in collaborative learning. However more recently there has been a greater emphasis on the socio-emotional processes. These processes are known to be important in the success of social interaction for supporting learning, but have often been overlooked in the past. The symposium will present a number of papers have examined the role of sociability in asynchronous communication. These papers have found that the greater the sociability, the more social interaction and consequently the more likely collaboration will lead to learning. Other papers will present findings that have looked at the role of engagement in computer supported collaborative learning and how that influences social interaction. The expectation is that the greater the engagement the greater the social interaction and the greater the benefits of co-operation. The symposium will conclude with a discussion of the role of socio-emotional process in collaborative learning, discussing whether it has a mediating or a more direct role in students learning.

Collaboration as a motivated and co-ordinated action in computer-supported learning settings: Socioemotional constraints and consequences
Sanna Jarvela, University of Oulu, Finland
Paivi Hakkinen, University of Jyvaskyala, Finland

Recent research on collaborative learning has been increasingly interested in the notions shared, collaborative and motivated engagement as critical contributors for a successful collaborative learning. Research have produced new concepts related to collaborative learning, such as involvement, engagement, mutual understanding and alignment, which have implicitly been linked to motivation, but not empirically analysed nor conceptually defined. The aim of this paper is to better understand the socioemotional processes of computer supported collaborative learning. It is provided ideas how to conceptualize shared and social processes of collaboration in terms of their motivational meanings. In order to support the conceptualization it is also included findings from our ECOL (Ecology of collaboration in virtual spaces: collaboration as a motivated and co-ordinated activity) research project dealing with collaborative learning in different computer supported settings.

Savannah: affective and effective learning in mobile gaming?
Richard Joiner, University of Bath, United Kingdom
Keri Facer, NestaFuture Lab, United Kingdom
Danae Stanton Fraser, University of Bath, United Kingdom
Jo Reid, Hewlett Packard, United Kingdom
Richard Hull, Hewlett Packard, United Kingdom
David Kirk, University of Nottingham, United Kingdom

This paper reports a study which attempts to explore how using mobile technologies in direct physical interaction with space and with other players can be combined with principles of engagement and self-motivation to create a powerful and engaging learning experience. We developed a mobile gaming experience designed to encourage the development of Children's conceptual understanding of animal behaviour. Ten children (5 boys and 5 girls) aged between 11 and 12 played and explored the game. The findings from this study offer interesting insights into the extent to which mobile gaming might be employed as a tool for supporting learning. It also highlights a number of major challenges that this format raises for the organisation of learning within schools and the design of such resources.

Sociable cscl environments: warming up cold cscl environments
Karel Kreijns, Open Universiteit Nederland, Netherlands
Paul Kirschner, Open Universiteit Nederland, Netherlands

Most computer-supported collaborative learning (CSCL) environments are purely functional, that is, they contain only educational functionalities. This is not surpris-

ing because their design is entirely based on educational grounds. Unfortunately, these functional CSCL environments do not always fulfill their objectives, namely activating collaborative learning for social construction of knowledge, critical thinking, and deep understanding. What is missing is social interaction amongst the collaborating learners which is seen as a key in collaborative learning. This contribution reports a study which shows that collaborative learning not only has cognitive aspects but also socio-emotional aspects. The notion that CSCL environments are used by geographically dispersed learners who collaborate in small groups on learning tasks means that attention should be paid to processes such as group formation and group dynamics. It is precisely these geographically dispersed learners who feel the need to socialize because they do not know each other and it is very likely that they never will meet face-to-face (at least at distance education institutions like our Open Universiteit Nederland). Socializing is important because it is hypothesized that it creates a sound social space enabling the social interaction for collaboration. A sound social space is characterized by trust, belonging, and friendships. Purely functional CSCL environments are cold because they do not facilitate the socializing processes. What is needed are attractive sociable CSCL environments that incorporate social functionalities which transform the cold, functional CSCL environment into a warm, human oriented environment. A social affordances framework is presented for creating those sociable CSCL environments together with three instruments for measuring social space, sociability, and social presence. An experiment with a tool for achieving this and the instruments to measure it was carried out. Results are discussed.

Studies of affective and effective computer-supported collaborative learning
Kim Issroff, University College London, United Kingdom
Ann Jones, The Open University, United Kingdom

This paper begins by discussing a range of approaches to understanding and evaluating affective factors in CSCL in different teaching and learning contexts. These include different age groups in compulsory education and higher education; different modes of teaching such as face to face teaching, online learning and 'mixed' modes, and also different forms of collaboration including on-line collaboration and groups that are co-located. An intensive case study of one student's experience of an online course is then used to illustrate how affective and social factors impact on students' experiences of learning. The paper discusses a model that incorporates affective factors into evaluating the use of learning technology with a particular focus on motivational features. Finally the paper reflects on the differences be-

tween the different studies, with particular reference to their methods and to the ways in which these enable us to conceptualise and understand affective factors in computer-supported collaborative learning; the limitations of current methods and future possibilities.

K 19   26 August 2005   08:30 - 10:30   Room A019

SIG Invited Symposium
Instructional Design

INSTRUCTIONAL DESIGN AND EMPIRICAL RESEARCH: EXPERIMENTS AND/OR DESIGN EXPERIMENTS?

Chair: Jan Elen, Katholieke Universiteit Leuven, Belgium
Organiser: Peter Gerjets, Knowledge Media Research Center, Germany
                Jan Elen, Katholieke Universiteit Leuven, Belgium
Discussant: Sloane Finbarr, National Science Foundation, United States
                Mandl Heinz, University of Munich, Georgia

This symposium will focus on a major methodological issue in the instructional design field, namely the relative roles of 'experimental research' on the one hand and 'design experiments' on the other. Design research has grown in importance since it was first conceptualized in the early 90s, however, it seems by no means to be an uncontroversial replacement of more traditional experimental research in instructional design. Since the topic is currently intensively discussed, the papers in this symposium will explore in greater depth the state of the art with regard to the pros and cons of traditional experiments and design experiments in the educational field. Additionally, avenues for integrative research approaches that combine the advantages of both methodological camps will be highlighted. The five presenters in this symposium will defend positions in favour of design experiments (Christopher Hoadley, Martin Valcke), traditional experiments (Fred Paas) or in favour or particular ways of mixing or combining both methodologies (Frank Fischer, Joost Lowyck). The presentations will refer to empirical studies that exemplify the preferred type of research. Two discussants that are characterized by different methodological convictions on their own will elaborate on the papers, with Finbarr Sloane preferring more traditional experiments, and Heinz Mandl advocating an integrative research paradigm.

Design-based research and design experiments: towards usable knowledge in instructional design
Christopher Hoadley, Penn State University, United States

In this presentation, I argue for the relevance of design-based research methods, also called design experiments, as a way to understand learning environments. In this presentation, I begin by identifying characteristics of usable knowledge in education (Lagemann, 2002) and describe some of the particular knowledge needs of instructional design. Drawing on other design fields such as engineering or architecture, I suggest that instructional design not only needs deterministically predictive models but also a different kind of knowledge that is less predictive and more generative across contexts. Next, I compare some of the inferential strengths and weaknesses of different research methodologies at creating deterministic models and generative models, including naturalistic inquiry such as ethnomethodology and grounded methods; positivist inquiry including experiments and quasi-experiments; and design-based research methods such as design experiments. Finally, I illustrate some of the advantages of design-based research using prior work on computer-supported collaborative learning (CSCL) environments. Drawing on these research trajectories, I demonstrate how design-based research methods can lead to increased validity of research (Hoadley, 2004), can help generate explanations in addition to falsifying theories (Hoadley, in press), and can provide a better way to integrate the role of context into instructional design (Hoadley, 2002).

Design Experiments: Neither a Design nor an Experiment
Fred Paas, University of the Netherlands, Netherlands

Since the early nineties, the educational research community has welcomed use-inspired basic research, development research, or design experiments as a valuable alternative to traditional empirical research. A fundamental tenet of design experiments is intensive and long-lasting collaboration among practitioners, researchers, and technologists. In this presentation I will defend Levin's (2004) position that design experiments can be regarded neither as a design nor as an experiment. With regard to 'design', although these design experiments may be beautifully designed in an aesthetic sense of the word, they are not in the methodological sense. Design experiments do not have a set of preexperimental plans concerning the specific conditions, methods, and materials to be incorporated in the study. Instead, the design is flexibly revised by the researcher or teacher as the investigation unfolds. With regard to 'experiment', in design experiments there is no random selection of par-

ticipants and participants are not randomly assigned to two or more systematically manipulated and controlled conditions of a study, thereby seriously compromising the external and internal validity, respectively. Whereas the lack of random selection does not permit to generalize from a sample to a population, the lack of appropriate randomization and control does not permit a credible attribution of outcomes to the instructional procedures under investigation. It is argued that in scientifically credible educational research design experiments should only play an informative role in the preliminary stages of instructional development research. This claim is supported by prototypical examples of empirical research and design experiments.

Use-inspired basic research on the orchestration of cognition, instruction and technology in the classroom
Frank Fischer, Knowledge Media Research Center, Germany
Josef Schrader, University of Tuebingen, Germany
Christof Wecker, Knowledge Media Research Center, Germany
Peter Gerjets, Knowledge Media Research Center, Germany
Friedrich W. Hesse, Knowledge Media Research Center, Germany

In the discussion about the contribution of educational research to practice two explanations for the low impact of research on practice prevail: (1) lack of cumulative knowledge validated by strict methodological standards and (2) research that answers the wrong questions. With these diagnoses also the suggested cures vary: For the accumulation of validated knowledge strict adherence to traditional methodological standards for the justification of theories is recommended, whereas the discovery of answers to the right questions is expected from design-based methods. Building on Stokes' suggestion to drop the distinction between the goals of understanding and use as opposite poles of one dimension and replace it by a model with understanding and use as distinct dimensions, we developed an approach to optimize them simultaneously. It is applied in a research collaboration on the conditions of the acquisition of competence in technology-enhanced learning environments. Based on the insight that the perspectives of disciplines studying technology-enhanced learning have their respective strengths and weaknesses with respect to practical relevance, and therefore need to collaborate interdisciplinarily, it comprises the following elements: (1) the study of interactions between psychological and pedagogical factors in interdisciplinary interactional designs, (2) Anschlussf?higkeit, i. e. the integration of knowledge within disciplines, between disciplines, and between research and practice by the use of boundary concepts, frameworks and competence models, (3) methodological issues such as the combi-

nation of traditional hypothesis-testing and design-based methods for exploration between project phases and scaling-up, (4) collaboration with practitioners, and (5) generating instructional knowledge by the construction of models of professional competence for teaching with technology-enhanced environments in classrooms. By undertaking first steps towards the development of criteria for the usefulness of scientific knowledge and by directly addressing transfer by research on models of instructors' professional competence we aim at realizing use-inspired research in the field of technology-enhanced

Experiments and/or design experiments? An intermediate or moderate position
Joost Lowyck, Katholieke Universiteit Leuven, Belgium

Methodological discussions often polarize positions, reducing research complexity to a very limited set of options. Examples are: quantitative versus qualitative research; descriptive versus prescriptive research, fundamental research versus applied research, laboratory experiments versus design experiments. Independent upon the methodological line of thought, which seems to infer if-then reasoning rather than yes-no statements, the conceptual clarification of what is meant by the so-called polarized terms has often been neglected. In line with methodological reasoning, the characteristics of design experiments are described in order to shed light on the very particular features. In addition, the concept of 'design experiment' is contextualized since research objectives, available knowlegde-base, novelty of approach, specific target group and intended outcomes of any research define to a high degree methods and instruments used. Moreover, not only the methodology, but the peculiar research topic as well as logistic parameters define any choice of methods and techniques. The intermediate or moderate position will be illustrated by two intensive studies using design experiments in the context of validating design scenarios: one stems from research on writing processes (Vanmaele, 2001) and the other on designing team training (Van Berlo, in press).

It is evidenced that using design experiments, not only the scenarios are controlled as to their validity and effectivity, but at the same time highly interesting information is gained on the theoretical level. This means that design experiments not only are as a suitable methodology in research on instructional design, but on empirical validation of theoretical model als well

Dissecting a design-based research cycle: deriving strengths and weaknesses in view of future studies

Martin Valcke, Ghent University, Belgium
Tammy Schellens, Ghent University, Belgium

This symposium will focus on a major methodological issue in the instructional design field, namely the relative roles of 'experimental research' on the one hand and 'design experiments' on the other. Design research has grown in importance since it was first conceptualized in the early 90s, however, it seems by no means to be an uncontroversial replacement of more traditional experimental research in instructional design. Since the topic is currently intensively discussed, the papers in this symposium will explore in greater depth the state of the art with regard to the pros and cons of traditional experiments and design experiments in the educational field. Additionally, avenues for integrative research approaches that combine the advantages of both methodological camps will be highlighted. The five presenters in this symposium will defend positions in favour of design experiments (Christopher Hoadley, Martin Valcke), traditional experiments (Fred Paas) or in favour or particular ways of mixing or combining both methodologies (Frank Fischer, Joost Lowyck). The presentations will refer to empirical studies that exemplify the preferred type of research. Two discussants that are characterized by different methodological convictions on their own will elaborate on the papers, with Finbarr Sloane preferring more traditional experiments, and Heinz Mandl advocating an integrative research paradigm.

K 20   26 August 2005   08:30 - 10:30   Room E010

SIG Invited Symposium
Special Educational Needs

PROMOTING INCLUSIVE LEARNING SETTINGS

Chair: Margarida Cesar, University of Lisbon, Portugal
Organiser: Margarida Cesar, Universidade de Lisboa, Portugal
                Ernest van Lieshout, Vrije Universiteit Amsterdam, Netherlands
Discussant: John Kirby, Queen's University, Canada

According to Salamanca Statement (1994) the inclusive schooling is the best means
to provide a quality education. Inclusive schooling is conceived as a dynamic and
dialectic school, seeking to learn from the difficulties and problems. It is also a
reflexive school, aiming at solving problems, regarding them as a challenge. It is a
way of celebrating diversity instead of avoiding it. This approach was deeply relat-
ed to special educational needs when it began. It was a way of trying to include the
most different ones in schools and in society, avoiding exclusion and segregation.
But it went further and it is now a way of conceiving school and life, as it claims
that every person is special. So, instead of looking for what is missing what is (not
yet?) well developed, some authors began looking at what was already available
and how could other competencies be developed. However, moving from ideals
to reality is no easy or straight way. There is still a long distance between wanting
to change and knowing how to change, between ideals and daily practices. And
if some researchers have shown commitment to this approach, others have been
sceptical and pointed out limitations, giving examples that illustrated the failure
of inclusive practices. In this symposium we wish to share and discuss successful
examples of inclusion from four different countries. Russel Gersten and Joseph Di-
mino present innovative teaching techniques and curricular materials for students
with learning disabilities. Margarida Cesar stresses the role of collaborative work in
the promotion of more inclusive learning settings. Carol Aubrey analyses English
mainstream schools including SEN pupils using the Bowe and Ball's policy trajec-
tory model. Sangeeta Bagga-Gupta discusses the case of deaf students schools in
Sweden, the only segregated ones, and explores how diversity and democracy can
be operationalised in educational settings.

Eyes on the Prize: Offering Innovative Social Studies Curriculum for all Students
Russell Gersten, University of Oregon, United States
Joseph Dimino, University of Oregon, United States

Presenters will demonstrate innovative teaching techniques and alternative curricular materials proven to be successful when teaching students with learning disabilities, challenging material in history in inclusive settings. The topic is the American Civil Rights Movement. The approach to inclusion was evaluated using a rigorous research design, including randomized trials, as recommended the U. S. National Academy of Sciences. The sample included 78 students (7th and 8th grades). Thirty-eight were students with learning disabilities. The major finding was that middle school LD students can learn challenging historical content. They show this knowledge much more clearly in oral interviews than written exams. Teaching techniques such as having students work in pairs to answer a question, or on projects using various text structures, really helps students with LD learn the material. Significant effects were found on essays and on content analysis of the interviews using Ann Bwons system for content interviews. Effects were not significant on short answer test. Significant effects were also found for average ability students on the essay. Qualitative analysis demonstrated increased depth and knowledge of cause and effect. Students with disabilities demonstrated significant greater knowledge of the topic covered, and were able to demonstrate understanding of important linkages between events and the significance of key historical events than students with LD taught with more traditional methods of instruction.

From exclusion into inclusion: Collaborative work contributions to more inclusive learning settings
Margarida Cesar, Universidade de Lisboa, Portugal

Society deeply changed during the last decades and schools are facing new challenges, like to avoid exlusion and promote inclusion. This is no easy task. It deals with fears, frustrations, conflicts and doubts. It is easy to repeat the ideals, but difficult to put them into practice. However, some authors presented successful cases of inclusion and we think we can learn a lot from sharing successful learning experiences. It does not mean becoming less critical. It just means also looking at what went well as a way of learning how to go further. Collaborative work was the mediational tool we used in order to achieve more inclusive settings. Vygotsky stressed the importance of social interactions in complex functions' development and of working in the zone of proximal development in order to promote children's devel-

opment. Gathering a coherent didactic contract and adequated tasks to the notion of situated learning it is possible to construct a learning community, an inclusive learning setting. Our main goal is studying and promoting peer interactions to achieve more inclusive learning settings. Collaborative work is not merely promoted among pupils, but also among the research group. These data are from the action-research level. Teachers implemented peer interactions as a daily practice during the last eleven years (several classes, 5th to 12th grades). Data were collected through participant observation; audio and videotaping; questionnaires; projective techniques; interviews; reports; and sets of materials gathered by teachers. Special attention was given to certain cases in each class. The analysis of some paradigmatic cases show the potentialities of collaborative work to achieve inclusive settings. It also illuminates its role facilitating more positive attitudes towards academic learning and subjects, promoting pupils' socialisation, their socio-cognitive and affective development and their school achievement. A way to avoid exclusion, implementing a quality education and inclusion.

Removing Barriers to Achievement?
Carol Aubrey, University of Warwick, United Kingdom

The new English SEN strategy (Department of Education and Skills, 2004) proposed early intervention, personalised learning, developing teachers' skills and focusing on Children's progress, more SEN children to be educated in mainstream schools supported by special schools designated as centres of excellence, and closer partnerships between education, health, social services and the voluntary sector. This raises questions:
- How compatible is inclusion of more SEN pupils with the Government's agenda to raise educational standards;
- Do parents want really want their SEN child educated in a mainstream setting;
- How will special school staff expertise be best protected and utilised;
- What is the view of mainstream teachers and what impact will there be, if any, on teacher recruitment and retention;
- How can such a strategy be sustained within existing resources?
This paper reports a study that adopts Bowe and Ball's (1992) policy trajectory model that recognises three policy contexts: the context of influence, where policy is initiated and discourses constructed; the context of policy text production, usually articulated to appeal to reason and commonsense; and the context of practice, where policy is reinterpreted and then recreated. These three 'arenas of action', each with its own public and private struggles, provided the basis for a cross-sec-

tional analytical strategy. A number of data gathering methods were used to identify barriers and constraints to effective inclusion practice:
- Document analysis to interrogate current national and local SEN policy;
- Elite interviews with national and local policy makers;
- Observation, interviews and focus group meetings in one 'centre of excellence', including staff, parents and children. Qualitative data (text and images) were analysed for themes, issues and surprises. The challenge to a single school in effectively meeting the needs of all its pupils is reported and critically evaluated.

Diversity or Disability? Reflections on Deaf Education
Sangeeta Bagga-Gupta, Orebro University,, Sweden

Educational settings are interesting sites for understanding how diversity and democracy become operationalised. In addition to being arenas of diversity, schools in the post world war II period have the concomitant agenda of attending to a variety of needs that students are viewed as having. This paper explores issues of representation and identity against the backdrop of research that focuses specific human categories. Special schools for the deaf in Sweden are interesting in this respect since these institutional settings have remained segregated during the last two centuries despite radical shifts in the ideologies of communication that have shaped the organisation of learning and instruction in this school form both in Sweden and the rest of the world. They currently constitute the only segregated school form in Sweden and these special schools constitute arenas for a group who are understood as both handicapped as well as belonging to a linguistic minority group. Tensions related to maintaining a physically segregated school form on the basis of the auditory condition of deafness and conducting research on the human category defined on the basis of deafness can, it is argued, be resolved by focusing upon the diversity represented by human language use instead. Implications regarding (the lack of) pluralism in research perspectives are discussed and the need for integrating studies of marginalisation into mainstream academia are highlighted. Issues related to democratic ways of organising education that attend to the visual orientation of Deaf students but which at the same time do not focus the category of deafness are also discussed.

CIT Sessions

Supporting research and practice in relation to careers guidance and work-related learning
Sally-Anne Barnes, Warwick Institute for Employment Research, United Kingdom
Alan Brown, Warwick Institute for Employment Research, United Kingdom
Jenny Bimrose, Warwick Institute for Employment Research, United Kingdom

An interdisciplinary team of researchers, practitioners and professional associations in the UK have worked together to create a comprehensive website for those interested in career guidance research. This has been funded by the Department for Education and Skills in England. Target groups include: practitioners, policy makers, researchers, guidance students and trainees, tutors and trainers. The website is to support the development of a community of interest and has the potential to enhance practice. Its overall purpose is 'to bring together research and practice in guidance to increase effectiveness'. A key feature of this website development is the construction of a shared knowledge base, by working with contextualised professional problems. This has been achieved by the formation of groups with relevant expertise. These groups represented a centre of expertise for particular topics and had several tasks (for example, the identification of gaps, key areas or problems and the provision of a mediated commentary on key documents and research findings on-line). Approximately 55 members of the guidance community contributed to the development of a shared knowledge base that has emerged from the contextualised problems faced in practice. An important feature of the website is that it provides the opportunity to raise issues, engage in development work and contribute to on-line discussions. This type of collaboration is necessary for active knowledge creation. In this way, it is hoped that we can progress our understanding of guidance issues - as existing available knowledge is combined with new insights to create new forms of contextualised knowledge. The development of a complementary website has focused upon supporting research in work-related learning and is an example of a collaborative initiative supported by the Presidents of EARLI and EERA. As such this initiative is likely to be of interest to those from the learning and professional development SIG.

An early mathematical computer assisted instruction software
Jose Navarro Guzman, University of Cadiz, Spain
Manuel Aguilar-Villagran, University of Cadiz, Spain
Gonzalo Ruiz, University of Cadiz, Spain
Concepcion Alcalde, University of Cadiz, Spain
Esperanza Marchena, University of Cadiz, Spain

The purpose of this research is to present a Computer Assisted Instruction (CAI) software to facilitate teaching early mathematical to Spanish population. The main goal of this software is to develop early mathematical skills in academic contexts. A large number of reports linked to early mathematical competence in pre-school children were published in the nineties. Results show huge differences on mathematical competences in school beginners. Playing with numbers is an interactive software designed to teach early math to children aged 4 to 7. This software teaches eight aspects of mathematical competence: Concepts of Comparison of quantitative and qualitative characteristics of objects; Classification of objects in class or subclass; Correspondence one to one relation; Seriation of objects in class or subclass; Using counting words, forward and backward; Structures counting, synchronous counting, shortened counting from the dice structure; Resultative counting, structured and unstructured quantities as well as counting hidden quantities; and General knowledge of numbers, being able to use knowledge of the number system in simple problem condition. Some of these mathematical components are based on The Utrecht Early Mathematical Competence Test (EMTC) developed by Van Luit, Van de Rijt, and Pennings (1994), and the experimental version of the Basic Mathematical Competences Assessment Test (TEDI-MATH) designed for Spanish children. Playing with numbers is designed in eight sections. Each section presents different multimedia games that progressively teach math skills. Each game has several difficulty levels and as many trials as needed to achieve the math concept. In order to validate Playing with numbers, a total of 128 children aged between 4 and 5 participated in this study. They attended kinder garden school, and were socially adapted. Experimental group received two, 25 minutes, computer sessions a week, for 5 months, in order to train the early mathematical concepts included in the computer program.

English online: Authentic contexts for learning english
Sarah Schrire, Centre for Educational Technology, Israel
Debbie Lahav, Centre for Educational Technology, Israel

The session will introduce participants to English Online, an innovative program for high school EFL (English as a Foreign Language) learning. The program presents learners with a comprehensive learning environment for acquiring linguistic competence in the English language. The learning environment emphasizes Internet-based project work that is supported by a series of modular booklets. Each module centers on a topical theme, such as music, sport, ecology, space, fashion, humor, news, film and others. Each topic is explored from many angles and is presented via texts, activities and performance-based tasks in the booklet and via extended work on the related online site. As students participate in each webquest and gather the information they need in order to develop their own web site on the topic, they are exposed to authentic English on the Internet and use the language to organize the information they have gathered on their web site. The English Online home site also provides platforms for communication and interaction among the group of learners, such as forums and polls, trivia games and activities for language practice. The program is based on a constructivist pedagogy that encourages each learner to build his or her own knowledge and multiple entry points are provided for each learner to engage with the material. The open-ended nature of the materials comprising the Internet component is balanced by the graded presentation of texts, activities, vocabulary and grammar found in the booklets. The booklet materials thus serve to scaffold the learning process while encouraging learners to build their knowledge of the English language through motivating tasks and independent research.

Thematic Poster Session
Culture and Education
Discussant: Miranda Christou, University of Cyprus

L1   The consolidation of a civic identity within a religious particularistic setting
Zehavit Gross, Bar-Ilan University, Israel

The aim of this paper is to investigate how the consolidation of Civic Identity can be enhanced in a particularistic socialization setting. This study was carried out among graduates of state religious education in Israel utilizing qualitative and qualitative methodologies. The main conclusion is that the separation between the nationalistic and civic components within the ego identity structure of the individual weakens democratic consciousness whereas the integration and adaptation of them within the socialization process strengthen and enhance democratic awareness and engagement.

L2   Training Teachers for Multicultural Education
Tsafrira Shur, Gordon College of Education, Israel
Rhonda Sofer, Gordon College of Education, Israel

The purpose of this paper is to discuss the development and impact of multicultural educational programs at Gordon College of Education, a teaching college in Haifa, Israel. Qualitative and quantitative methods have been used to assess and evaluate the programs. By combining these two methods, productive program development and changes have been implemented. This paper presents and analyzes the impact of the various programs which MERC organizes on its participants. Israel is a multicultural society which consists of different religious, ethnic and cultural groups. Haifa exemplifies the multicultural character of Israeli society by being a city in which Jews, Moslems, Christians, Druzes, and other religious groups live together. In 1997 Gordon College of Education established the Multicultural Educational Resource Center (MERC). Its goals are aimed at training teachers and developing programs which promote pluralistic values based on mutual respect and understanding, and enhance attitudes of tolerance and co-existence among different cultural, ethnic, religious and secular groups in Israel. All programs are evaluated using either quantitative or qualitative methods in order to assess the impact which

the programs are having on its participants. We hope that the model of multicultural educational programs developed and assessed by the staff of Gordon College of Education and presented in this paper can be applied to other Colleges or Departments of Education which face the challenges of preparing educators to work in today's multicultural world.

L3   Schools for Immigrants – Characteristics and Influences:Jewish Schools in Argentina and in Poland at the Beginning of the 20th Century
Adina Bar-El, Achva Academic College, Israel

The lecture will focus on various types of private schools established by immigrant minorities in their adopted country.In a review of the history of education in various countries two kinds of schools can be found. The first is a complementary school; in other words, the immigrant child attends a public school, and in the afternoon or on vacation he attends a complementary school of his own ethnic group. The second is a private comprehensive school for the minority (both new immigrants and veteran residents), in which the special studies of the minority are integrated into the mainstream curriculum. The factors shaping these schools vary – they can be economic, political, socio-cultural and historic. On the one hand this depends on the government, with its laws – particularly laws in education, its relation to minorities, the reigning political party at the time, and the existing education system. On the other hand there is the influence of the minority itself, which may not be homogeneous, and may have a variety of political and social streams. In this lecture we will examine the variables influencing these schools' character, using a historic example – the schools established by Jewish immigrants who arrived in Argentina. The comparison to Jewish schools in Poland is plausible because many Jews immigrated from Eastern Europe in general, and from Poland in particular, to Argentina. This research indicates that the main determining factors in Jewish education in Poland were internal community factors. In Argentina, on the other hand, the determining factors were mainly external, both political and geographic-demographic. The research tool used was qualitative content analysis.
The corpora researched were:
1. Schools' periodicals, especially compositions and letters written by children which appeared in this press.
2. Reviews by educators, writers and social activists who wrote during the researched period.

L4   EU/ASIA learning bridges: reflective action research for disseminating best practices in multicultural projects

Alessandra Talamo, University of Rome La Sapienza, Italy
Henk Sligte, University van Amsterdam, Netherlands

Since the late eighties of the past century international school networks evolved in which computer supported collaborative learning projects are the main activities. These networks can be characterized as dynamic social systems, but often educators and learners within their school contexts, are loosely coupled and highly diverse with regard to local culture, and possibilities and constraints for innovation of education. Factors that determine freedom and constraints for innovation can be described as encompassing Pedagogical, Organizational, Economic, Technological and Cultural (POETC) dimensions. In the presentation at EARLI authors will report on findings from a networking project between Europe and Asia. The connected research aims at identify the cultural bases of the definition of best practices in the implementation of ICT at school. Questions are: How can best practices be really shared? What are the topics of intercultural exchanges when defining best practices at an international layer? What kind of constraints in terms of organizational contexts affect the definition of best practices? The EU/ASIA Learning bridges can be characterized as reflective action research: it inquires into unknown futures by bringing actors in circular processes of creating consensual knowledge. To understand how best practices are developed and shared in the EU/ASIA multicultural context, face to face meetings in which teachers of European and Asian countries discuss on implementation of ICT at school are recorded. Ethnographic data (Duranti, 1997) are also collected to describe different conditions in which teachers of different cultures act. Discourse analysis is introduced to analyse the discussions to reveal the ways in which teachers, researchers and educators discuss the POETC dimensions of best practices. During the presentation excerpts will be shown on how local representations of what a Best practice is considered to be in different cultures are declared, developed and put into practice by educators in dependence with POETC.

L5   Teacher trainees' prejudices against gypsies

Janos Geczi, university of Pecs, Hungary

Based upon a review made in Pecs University – among students who will get teacher's diploma, we examined the students' prejudices. The aim was: recognition the

prejudices of the future teachers in order to know what kind of changes, we need in the curriculum. The method was: visual presentation of the relations by figures with so-called Galois-graphs. In this presentation we will focus on the questions about the gypsy minority. By this way we got a sample containing 559 persons and 12 questions, containing few personal data and opinions of gypsies. For the purpose of an analysis using Galois-graphs, in our work we recoded each answer to a dichotomous scale, as negative, or positive answer. In the database one can find the 12 student professions. We applied Galois-graphs for the purpose of visualization of the trends among the positive answers of the different professions. The result shown by the graphs: - these students don't want to teach in the future - they have good result of maturity - maximal number of positive answers given by the students of the professions: Geography, French and Sport - if the minority of the pupils in the class are gypsy it is not a problem - it would be a smaller problem if the majority of the pupils in the class are gypsy than if half of them.

L6   Searching for new ways to assess adolescent moral competence
Oleg Podolskij, Psychological Institute of Russian Academy of Educ, Russia (Moscow)

Several contemporary studies of adolescent moral development showed (Podolskij, Karabanova, 2003) that it is much more difficult to identify a moral content of the practical social situation than its other contents for adolescents. To explore adolescent moral development and moral competence as an important indicator of moral development it is important for the researcher to have at his disposal the instrument to make proper moral collision content explicit for an adolescent subject and stimulate the subject to make a proper decision. On the basis of an analysis of the psychoeducational (Eisenberg, 2002; Haidt, 2001; Lind, 2004; Pizarro, 2001, etc.) and instructional technology (Elliott, 1984; Meisel, 1998; Romiszowski, 1988; Smith, 2003; Wetzel, 1994, etc.) literature, we supposed that a specially designed diagnostic movie could be used as a way of representing a proper moral collision to enable the following: 1) to develop essential motivation and inclusion of viewers in the core of the presented task, 2) to perform a realistic (in vivo) content of the problem situation, and to present the context of this situation as a whole, showing interests and aims of the participants of the situation in question, 3) to make explicit the emotional content of the situation in question: especially feelings and attitudes of the situation participants. A short diagnostic movie has been produced aimed to present adolescents a moral collision more adequately than a traditional verbal manner of presentation did. In 2002-2004 the new method to assess adolescent moral

competence has been tested in secondary schools of Moscow, Russia (subjects aged 13 – 16). It has been found that a new method of moral competence evaluation we used allowed to objectivate the content of a moral collision much more effectively than a textual manner did and consequently revealed more adequately a level of adolescents' moral competence.

L7   Content analysis of free-response narratives to personal meanings of death among chinese children and adolescents
Shih Fen Chen, National Sun Yat-sen Univ, Taiwan
Shu Ching Yang, National Sun Yat-sen Univ, Taiwan

The study explores development of the concept of death among 204 Chinese children and adolescents, and analyzes the relationships between death concept development and background variables. A coding manual for content analysis of death constructs adapted from Neimeyer et al. (1983) was used to classify each written construct in the paragraphs written by participants regarding their views of death. The five categories most frequently identified by subjects were Internal Causality, Negative Emotion State, External Causality, Nonexistence, and Negative Body State. Death-related experiences did not significantly influence concepts regarding death, while significant differences emerged as a function of grade, gender, religion, and family death discussion for several death constructs. Compared to earlier American samples, Chinese children and adolescents identified less with choice and purposeful death constructs, and were less likely to view death in terms of personal choice and morals, or in terms of psychological or natural meaning. Whether the differences were due to cultural, methodological or age factors deserves further study. Finally, this study concludes with some recommendations for the future study of death constructs.

L8   Perceptions of a coeducational learning environment: A longitudinal study of single sex school reform
Shirley Yates, Flinders University, Australia

School reformations from single sex to coeducation have increased considerably in many countries over the three decades, despite a lack of substantive evidence as to the relative merits of single and mixed sex education in general, and the efficacy of this reform trend in particular. Most studies of single sex and coeducational learning environments have been conducted at the secondary level and few have considered the effects of the introduction of coeducation into single sex schools

on students over time. Perceptions of a coeducational learning environment were examined in students over five years, together with their educational plans, career aspirations and achievement following the reform of a single sex boys' school. This longitudinal study involved students across the elementary, middle and secondary levels and employed appropriate statistical techniques that allowed for particular situational and environmental variables that may be operating across cohort groupings and grade levels over the five years of the study. Results, based on all students in Grades 3 to 12 in the school who participated at Time 1 (N = 484), Time 2 (N = 597), Time 3 (N = 509), Time 4 (N = 523) and Time 5 (N = 555), shed light on the long term impact on students of the increasing world wide trend towards single sex school reform. Suggestions for further studies are also explored.

Learning and cognitive science

L9   Procedural Practice in Complex Domains, Classroom and Laboratory Perspectives
Miriam Rosenberg-Lee, Carnegie Mellon University, United States
Marsha Lovett, Carnegie Mellon University, United States

Does practice make perfect? The effects of procedural practice on the acquisition of conceptual knowledge were investigated in two contexts. In an observational study of a university Linear Algebra course, the effects of mastering a procedural skill, row-reducing a matrix, were investigated as a function of course performance. Linear Algebra has a heavy emphasis on this procedure at the beginning of the course because numerous concepts in the domain require its application. However, this emphasis may backfire as students fail to grasp that the domain extends beyond this skill. To determine if the standard curriculum helps or hinders the acquisition of the conceptual material an observational study was undertaken. A relationship was found between the row-reduction abilities of middle level students and their abilities to make gains later in the course. These results suggest that mastering a procedural skill may facilitate conceptual learning by freeing up cognitive resources later in the semester for more demanding material. This hypothesis was investigated in a behavioural paradigm using an algebra analog. Participants were given strings of symbols and rules for manipulating them. Unbeknownst to the students, application of the rules amounted to solving for 'x'. Participants practiced solving these problems and were tested before, during and after practice to determine whether they were learning any of the conceptual material that underpinned the task. Purely procedural practice led to gains in their understanding of the conceptual material.

However, continued practice after reaction times had reached asymptote did not produce greater conceptual learning. Yet, participants who took the conceptual test before and during practice had greater gains after practice than those who took the test only after practice. These results suggest that procedural practice coupled with exposure to the existence (although no instruction) of conceptual material can lead to spontaneous learning of that material.

L10   Labeling and pointing from imagined viewpoints
Marios Avraamides, University of Cyprus, Cyprus
Louiza M. Ioannidou, University of Cyprus, Cyprus

A typical task used in experiments of spatial cognition requires participants to imagine themselves adopt perspectives in a previously depicted or described scene and locate from memory a number of target objects using manual responses (e.g., pointing, facing a target). The present study challenges the suitability of using such manual responding for evaluating spatial reasoning abilities. In a series of experiments participants completed a computer-based task in which they located objects from various imagined perspectives in a presented spatial scene. In one condition, participants were asked to respond manually. In another condition they located the targets using verbal labels. Overall, results revealed an advantage for verbal responding, suggesting that language is a more flexible medium than manual responding, presumably because it does not rely as strongly as manual responding on the human body. This difference is exemplified when responses are made from imagined perspectives that are misaligned with participants' actual facing direction. The implications of these results for the field of spatial cognition in general and for practical applications entailing spatial reasoning from imagined perspectives (e.g., route direction software, tele-surgery applications etc) are discussed.

L11 The method of selective mobilization of attention as a trigger for metacognitive control in science and math teaching

Jozef Feigenberg, Jerusalem Interdisciplinary seminar, Israel
Valentina Lea Lavrik, Jerusalem College and Lifshitz Academic College, Israel
Meir Vladymir Shunyakov, Lufshitz Academic College, Israel

One pedagogical technique aimed at emotional activation of students and increasing their metacognitive control and motivation is the selective mobilization of attention' method, which based on the knowledge of typical misconceptions in the content of the teaching material and utilizes the theory of probabilistic prognosis. This technique is effective in cases when the lesson deals with something about which the students have preliminary knowledge (even at the level of daily life), although for some of them this knowledge may be erroneous. At the very beginning of the lesson the students are asked a question related to the material to be taught. The question is formulated in accordance with the principle of multiple-choice, with characteristic misconceptions included among possible answers. After the student made his choice, he is immediately provided with the correct answer. The discrepancy between the student's opinion (in the case that he is wrong) and the correct answer causes the latter to have an emotional reaction and increases his attention precisely at the time, when the teacher begins his discussion of the matter, that was misunderstood by the student. That is why we shall label this technique the Selective Mobilization of attention' Method - SMM. Four groups of science students of some Jerusalem colleges have been taught using the new SMM. The effectiveness of the new method for the triggering initializing metacognitive processes, such as monitoring, evaluation, and correction of personal concepts of a student in was tested on the basis of video recordings, quizzes, and feedback questionnaires.

L12 Does Cooperative Learning improve metacognitive skills?

Chiara Trubini, University of Parma - Department of Psychology, Italy
Beatrice Aimi, University of Parma - Department of Psychology, Italy
Marina Pinelli, University of Parma - Department of Psychology, Italy
Silvia Perini, University of Parma - Department of Psychology, Italy

Aim of this study is to verify if cooperative learning, compared with a traditional way of teaching, supports the development of an internal attributional style, problem solving strategies, attitude towards school and teaching, self efficacy, academic results and metacognitive skills, as the literature shows. Besides, this research investigates if cooperative learning improves social relations between students and

modifies the sociometric structure of the classroom. Finally, we examine if all these metacognitive components are related to each other and also to social factors. In the traditional way of teaching frontal explanation and individual work prevail, while cooperative learning organizes positive interdependency and interactions, encourages the individual responsibility and promotes social skills. The study involves 34 north Italian students of 15 and 16 years old, matched and divided in 2 equal groups according to Survey Study Habitus and Attitudes' results (Brown and Holtzman, 1967), gender and age. The results will be analysed by MANOVA and Pearson test. We suppose that cooperative structure improves cognitive and social components and that all these factors are related to each other.

L13 Fourth-graders' self-regulation reading processes in relation to their reading achievements
Vlastimil Svec, Tomas Bata University, Department of Education, Czech Republic
Karla Hrbackova, Thomas Bata University, Czech Republic

The present analysis trying to gain a better understanding of the degree to which young children engage in self-regulatory activities in the context of reading. Participants included 250 children (4th graders) from 9 to 10 years old of ten elementary schools from the Czech Republic. The pupils Self-Regulated Learning Questionnaire (PSRLQ) used in this study was revised based on the Motivated Strategies for Learning Questionnaire (MSLQ, Pintrich & De Groot, 1990), Metacomprehension strategy index (Schmitt, M.C., 1990) and Zimmerman's self-regulated learning theory (1990). The questionnaire is composed of 44 items. Personal beliefs and motivation factors: self-efficacy (3 items), task value (3 items), extrinsic and intrinsic goal orientation (6 items), attrition (2 items). Metacognitive and self-regulated strategies factors: planning (4 items), monitorin (7 items), self-evaluating (5 items). Learning strategies (cognitive and resource management)factors: 10 reading strategies (11 items), time (1 items), environment (1 items), help- seeking (1 items). Data for academic performances will collect through last 2004 quarter, including reading comprehension test and teacher observation and pupils will devide into two groups: high and low school performers. For all twelve SRL construct, a oneway MANOVA will conduct across all items in each construct, with academic performance level (high and low) as the grouping factor. This analysis indicate which from these following categories show statistically significant differences in the PSRLQ constructs between high and low scholl performers. The results of this pilot study will presented at the 2005 (August) 11th European Conference for Reseach on Learning and Instruction in Cyprus.

L14   The Acquisition of Quantitative Reasoning: An Israeli National Project
Yaacov J. Katz, Ministry of Education and Bar-Ilan University, Israel
Ofer Rimon, Ministry of Education, Israel

Standardized international examinations are now highly regarded as a means of assessing the effectiveness of learning and instruction in many countries. In light of the poor achievement of Israeli students in international examinations over the past two decades and most especially in TIMMS 1999, a strategic decision was taken by the Pedagogic Secretariat of the Ministry of Education Culture & Sport to develop a national program designed to promote the acquisition of quantitative reasoning in order to solve the problems facing Israeli students in international examinations. In order to clarify the necessary steps to be taken, a number of short research studies were conducted after which a comprehensive program was designed to develop quantitative reasoning of students within the mathematics curriculum. This quantitative reasoning program was accompanied by a controlled experiment designed to closely evaluate the effectiveness of this step. The results of the experiment indicate a significant improvement in students' achievement in three areas: understanding of basic mathematics studied in the elementary school; quantitative reasoning; and achievement in algebra and geometry studied in the junior high school. We now await the publication of the results of TIMMS 2003 in order to assess the improvement of Israeli students' achievement in this examination as a result of their participation in the program to promote quantitative reasoning.

Motivational, social and affective processes
Discussant: Marios Avraamides, University of Cyprus

L15   Peers teaching self-management: The impact on attitudes regarding condom use and sexual activity
Charalambos Cleanthous, Eastern Washington University, United States
Shannon Duncan, Central Valley School District, United States
Russell Kolts, rkolts@ewu.edu, United States
Julian Gire, Eastern Washington University, United States

The current HIV/AIDS pandemic calls for interventions that are primarily preventative in nature. A 9-week long self-management program was designed to help prevent and/or reduce high risk sexual behaviors. The program borrows from both cognitive and operant psychology. The content is peer taught, thus minimizing the

concerns with those perceived as authority figures. The peers must first success-fully complete the course themselves and demonstrate mastery of the material. The peers are then trained in structured delivery format, role-play various scenarios, and practice teaching with supervisor feedback, prior to being permitted to teach the course. In addition weekly supervised conferences with the peers provide a forum to answer questions discuss content, and practice delivery methods. The content in-cludes the fundamentals of self-management, decision-making, information about STDs and HIV/AIDS, the impact of drugs and alcohol on behavior, communication and assertiveness, and birth control procedures including condom use. The latter focuses on condoms as both a birth control measure and as a preventative measure against certain STDs and HIV. Attitudinal and behavioral measures are used to determine the outcome effects. The participants in the present study were under-graduate university students. A control group consisting of undergraduate students with similar demographics was used to assess the impact of the program. The re-sults indicate that the program brought about significant between group and within group changes in attitudes toward condoms and their use. In addition, there were within group differences in sexual activity. Thus, the program is showing promise in the attempts to prevent the spread of STDs and HIV. The future use of such a program holds promise in teaching younger children how to self-manage their own behaviors. Borrowing from the developmental psychology literature, it would be ideal if the implementation of such a program took place prior to the initiation of sexual intercourse.

L16   From other to self - learning as interactional change
Fritjof Sahlstrom, Uppsala University, Education, Sweden
Cathrin Martin, Uppsala University, Education, Sweden

The aim of this study is to empirically develop the understanding of learning. The point of departure is that learning is interactionally and situationally constituted and made visible as changes in participation. The contribution of this study lies in the empirical demonstration of how learning is constructed in systematic changes in participation in interaction. Participation in interaction is studied within a con-versation analysis (CA) perspective. Data consists of longitudinal video recordings made in authentic physiotherapy-patient encounters. The analytic focus is on how physiotherapists and patients understand things together in activity and how they manage understanding through the practice of repair. Repair is an understanding-display device, a type of check procedure in interaction which is critical to the establishment of intersubjective understanding between people. Analytic attention

has been turned to the interactional resources that the participants themselves turn their attention to in the organisation of repairs such as the interplay between talk, gaze, gesture, other bodily actions as well as artefacts. Participation develops over time as a gradual stepwise change in the organisation of repair over time. These changes can be conceived of as four distinct phases with a change from physiotherapist to patient regarding control and responsibility for detecting and solving problems in local understanding. In sum, a successive change for the patient from other- to self-initiated repair, and from other- to self-repair. The co-constructive structuring of repairs can be conceived of as scaffolding in the 'zone of proximal development' through negotiations, clarifications and confirmations. The systematic empirical analysis of organisation of repairs over time have also made it possible to demonstrate non-learning. The findings provide insight into the local and sequential constitution of how we learn and how the relevance of the situational context is oriented to by the participants.

L17   Educational Quality for the Poor: A Learning Environments Perspective in Ethiopian Primary Schools
Jos de Kock, University of Amsterdam, Netherlands
Marike de Kloe, stichting Woord en Daad, Netherlands

The purpose of this study is to attain more insight in the arrangement of learning environments by teachers in primary schools for poor youngsters from underprivileged families in Ethiopia. Nongovernmental organisations (NGO's) in Ethiopia play an important role in providing education for these poor youngsters. In this research project semi-structured interviews are held with teachers from schools that are supported by one of these Ethiopian NGO's. This organization wants its teachers to arrange 'student-centered' learning environments. The core principles of this approach are striving for attitudinal, metacognitive and social learning skills and high student responsibility for his/her own learning. The research questions in the study are formulated as follows:
(a) Which choices do teachers make when arranging learning environments in general and which of these choices are or are not, in their opinion, related to a student-centered approach in particular?
(b) Which important factors, both inside and outside the schools, do affect teachers' arrangement of learning environments, in a context of education for poor people from underprivileged families?
The interviews in this study are focused on the practical knowledge teachers have on arranging learning environments in their school practice. The results of this

study could be used by NGO's to make tools for teachers that help them to design learning environments that fit the principles of student-centered learning environments. Furthermore, the study discusses the relevancy of the learning environments perspective for the strive for educational quality in Ethiopia. Because the theoretical framework used for this interview study was developed within the context of Dutch schools, an additional outcome of the study is a discussion of the relevancy of these theoretical concepts within the culture of teachers in Ethiopian schools, in particular those schools for poor youngsters from underprivileged families.

L18   School visits to a science center: patterns of teacher-museum staff relationships
Revital Tal, Technion, Israel
Laura Steiner, Technion, Israel

The aim of the study that was held at the educational center of a large science museum in Israel, was to understand the ways schools incorporate museum visits within the curriculum. We focused on the relationships between teachers and museum staff, aiming at identifying and characterizing school-museum collaboration patterns. The research questions were: 1) what are the characteristics of teachers' relationships with the museum staff? 2) how the teachers perceive the class visit to the museum? and 3) what are the patterns of the class visit to the museum? The study contributes to our understanding the teacher's role in the museum excursion, and suggests guidelines for establishing collaboration that contributes to a successful learning in museum settings. We identified three types of relationships between teachers and the museum staff: technical, technical-professional, and professional-pedagogical. Most of the elementary school teachers reported about technical relationships, whereas the other types were more common among secondary school teachers. Most of the museum guides proffered the technical pattern. We identified as well two patterns of managing the educational field trip to the museum. In the elementary school, the visit is seen as part of school tradition or routine, and therefore, does not require special planning and involvement of the teachers, and does not require pre- and post-visit learning activities. The other pattern, the class-based learning and the museum visit as a continuum, is more typical to secondary schools. The coordinator on the school side is a science teacher, who is much more involved in planning, preparing and wrapping up the field trip. Finally, organizing and implementing a class visit to a museum require that the teacher would challenge technical, as well as educational difficulties. Therefore, professional-pedagogical relationships between teachers and museum staff, could contribute to the

overall success of the visit.

L19   Uncertainty in distributed collaborative learning groups: The socio-emotional dimension of grounding
Kati Makitalo, Institute for Educational Research, Finland
Johanna Poysa, Institute for Educational Research, Finland
Paivi Hakkinen, Institute for Educational Research, Finland

When the members of distributed learning groups first meet in an online learning environment they have to gain an adequate level of common ground in terms of mutual understanding, knowledge, beliefs and assumptions in order to reach deeper level communication and collaboration. Online learning environments do not guarantee that learners will interact with each other. People participating in online learning courses often do not know each other and are unsure how to act in these learning environments. If learners feel uncertainty, it might prevent learners from communicating with each other. This study explores online interaction applying elements of the communication theory of uncertainty reduction and the linguistic theory of grounding. By combining these different theories the aim is to explore the interactive process called grounding from a wider perspective than merely at the linguistic level. The socio-emotional dimension of grounding is especially relevant when the participants feel some degree of uncertainty in a new situation involving interaction with strangers. Our aim is to find out how the participants experience uncertainty and investigate also the participants' reciprocal efforts to reduce uncertainty in sharing their thoughts, feelings and emotions with each other in a small group. The set of data was gathered during an online course and it involves questionnaires, discussions, personal text notes and a project log written by three teacher students of the group. In the qualitative approach we used the content analysis. The results of the study reveal that there was some degree of uncertainty involved and the participants used different strategies, for example, seeking similarities, self-disclosure and the use of paralanguage for decreasing uncertainty between the participants. The findings reveal also that by sharing feelings and emotions it empowered the learning partners to support each other which is essential in collaborative learning.

L20   Quality of family relationships and school achievement: Relationships with self-esteem academic self-concept and goal orientations in 12th grade students
Francisco Peixoto, Higher Institute of Applied Psychology, Portugal
Florinda Saleiro, Higher Institute of Applied Psychology, Portugal

Goal orientations, self-esteem, self-concept and quality of family relationships are constructs with a growing interest in educational psychology. This growing interest is mainly due to the fact that all those variables are related, in one way or another, to student's performance at school. This study has two main purposes: first we will analyse the relationships between quality of family relationships, self-esteem, academic self-concept, goals orientation and school achievement. Second, we will to analyse the role of goal orientations, self-esteem and academic self-concept in the mediation of the relationship between the quality of family relationships and school achievement. Participants were 185 students attending 12th grade, from six secondary schools in the south of Portugal, with their ages ranging from 17 to 22 years. To collect data we used a self-concept scale (Peixoto & Almeida, 1999), a scale of motivational orientations (Skaalvik, 1997) and a scale to assess the quality of family relationships (Peixoto, 1999). MANOVAs analyses show that the quality of family relationships, self-esteem and academic self-concept has main effects on goals orientations. Despite the fact that school failure does not differentiate students in motivational orientations, this variable interacts with self-esteem. A path analysis using AMOS 5.0 shows that the quality of family relationships influences marks mainly through academic self-concept.

L21 *Dialogue, voice and identity; critical issues for networked learning*
Vivien Hodgson, Lancaster University, United Kingdom
Debra Ferreday, Lancaster University, United Kingdom

In this paper we will focus on the increased recognition that ICT supported networked learning provides new opportunities for learning through dialogue and interaction. In particular, we will consider how Bakhtin's work on dialogue and Fairclough's work with critical discourse analysis offer us useful insights for understanding issues such as voice, presence and identity construction, amongst other things, within online discussions.

Student Learning in Higher Education
Discussant: Mien Segers, University of Leiden, The Netherlands

L22 *The relationship between students' approaches to learning and the assessment of learning outcomes*
David Gijbels, University of Antwerp, Belgium
Gerard Van de Watering, University of Maastricht, Netherlands
Filip Dochy, University of Leuven, Belgium

Piet Van Den Bossche, University Of Maastricht, Netherlands

The purpose of the present study is to gain more insight into the relationship between students' approaches to learning and students' quantitative learning outcomes, as a function of the different components of problem-solving that are measured within the assessment. Data were obtained from two sources: the revised two factor study process questionnaire (R-SPQ-2F) and students' scores in their final multiple-choice exam. Using a model of cognitive components of problem-solving translated into specifications for assessment, the multiple-choice questions were divided into three categories. Three aspects of the knowledge structure that can be targeted by assessment of problem-solving were used as the distinguishing categories. These were: understanding of concepts; understanding of the principles that link concepts; and linking of concepts and principles to conditions and procedures for application. The 133 second year law school students in our sample had slightly higher scores for the deep approach than for the surface approach to learning. Plotting students' approaches to learning indicated that many students had low scores for both deep and surface approaches to learning. Correlational analysis showed no relationship between students' approaches to learning and the components of problem-solving being measured within the multiple choice assessment. Several explanations are discussed in the paper.

L23   *Power Discourse and Gender in Doctoral Examination*
Terence Lovat, The University of Newcastle, Australia
Melissa Monfries, The University of Newcastle, Australia

The conceptual convergence of the Habermasian paradigm for ways of knowing and social cognitive approaches to power relations was used to analyse PhD examination reports. Previous analyses revealed that even when PhDs were given the highest evaluations, they were frequently accompanied by negative remarks. It is argued that examiners' epistemological beliefs obstruct the emancipation of knowledge and are representative of a conservative academic culture which protects its extant structures. Research in social psychology has demonstrated that people in positions of power are motivated to maintain their high power base. The combination of these philosophical and psychological tenets guided the analysis of the discourse used in examination reports of PhDs. The study examined 23 reports and showed that while there was evidence of the three hierarchies of power (examiner as expert, examiner as partner and examiner as learner/listener) in the discourse, it was dominated by negative comments and largely indicative of the examiner per-

ceiving his role as that of expert. This was interpreted in light of the literature suggesting those in power are reluctant to relinquish their high power base. Ongoing work is narrowing this thesis to include an exploration of gendered roles in relation to examiner positioning in relation to the candidate and in the text used to convey assessment.

L24   *Study strategies and approaches to learning*
Hans Peter Christensen, Technical University of Denmark, Denmark

In this study students' study strategies have been compared to their approaches to learning. The time students spend on different study activities has been investigated at the Technical University of Denmark, and as a pilot project a few students also filled in a reduced version of Bigg's Study Process Questionnaire to identify their approach to learning. It was hypothesised that the students' learning approach would depend more on the quality of the study work than on the quantity; that an active and reflective study strategy was required to obtain deep conceptual understanding. The result showed a weak correlation between the student's main learning approach as defined by the ratio of the deep approach score to the surface approach score and the student's study intensity as identified by the ratio of non-scheduled independent activities to scheduled teacher-controlled activities. There was however a much stronger linear correlation (significant at the 0.01 level) between the deep-surface ratio and the total study load. The same result was observed when measuring other students' study strategy and learning approach for a single course. The empirical basis is still too limited to draw conclusive conclusions, but it raises some intriguing questions. Is time more important than the kind of learning activities for obtaining conceptual understanding – is all that matters from a teaching point of view to ensure that the students spend long hours studying?

L25   *Undergraduate mature students' experiences of their teaching-learning environments*
Jenny Hounsell, University of Edinburgh, United Kingdom

This poster reports the findings of a research study of students' perceptions of their teaching-learning environments. During the last four decades, there has been a substantial increase both in the number of students studying at undergraduate level in the UK and in the diversity of those students. Against a background in which the great majority of entrants to higher education courses in the UK traditionally have come straight from school and were aged under 21, there has been a large and

increasing number of older students entering higher education courses. An under-standing of what factors are perceived to help or hinder these 'mature' students in achieving high-quality learning is therefore important in enhancing environments that support students of all ages. The research was carried out for a dissertation but also as part of a four-year ESRC-funded project, 'Enhancing Teaching-Learning Environments in Undergraduate Courses', of which the author is a team member. Two inventories, the 'Learning and Studying Questionnaire' and the 'Experiences of Teaching and Learning Questionnaire' were completed by over 4500 students in 15 UK higher education departments and in five subject areas, including more than 500 mature students. The inventories built on previous research into student learn-ing, including work on approaches to learning and studying, orientations to study-ing, and teaching-learning environments. This study uses a variety of quantitative methods to analyse this large database of younger and mature students' responses to items concerning different aspects of teaching-learning environments. The re-sponses of students are analysed by age-group, subject area and year of study. The findings explore the relationships between student 'maturity' and their approaches to learning, together with their perceptions of teaching and assessment methods, course organisation and structure, guidance and feedback to students, staff support-iveness, working with other students, and course content and relevance.

26   What is university students' experience of learning in relation to instruc-tion?
Lynn Mcalpine, Mcgill University, Canada
Cynthia Weston, Mcgill University, Canada
Julie Timmermans, Mcgill University, Canada
Gail Fairbank-roch, Mcgill University, Canada

Our goal in this session is to describe the results of an initial analysis of student ex-perience of learning during instruction. This study is drawn from a 10-year program of research into teacher reflection. We have recently begun exploring student learn-ing in relation to teacher reflection since there is an assumed but undocumented relation between the two. Many factors other than teacher reflection may affect student outcomes in a course (e.g., students' knowledge base); so we began by fo-cussing on students' experience of learning rather than outcomes. We premised our design on the idea that university students are active seekers of knowledge, with mediating processes influence this activity. Students may fail to perceive or misin-terpret the stimulus; they may be overly challenged cognitively, or lack motivation to respond. How students respond to instruction is critical in learning. Yet, the ways

in which they respond may not be congruent with teacher intentions since sequences for learning are not the same as those for teaching. Professors and student dyads independently watched a video of a one-hour class within 36 hours of participation and were stimulated to recall their thinking at that time. Using an original method of data display and consensual coding of the transcripts, we sought evidence of links between teacher reflection and student learning. We were thus able to a) define student experience of learning as well as b) the specific classroom actions that students perceive as supportive of their learning. These will be elaborated in the session. This research extends the range of ways we can examine student learning. As well, it has direct educational value in that the findings can be integrated into academic development activities so that staff would have empirical evidence for making specific instructional decisions.

L27   *Approaches to learning: The influence of learning environments and competence to be acquired*
Gunnar Handal, University of Oslo, Norway
Kirsten Lycke, University of Oslo, Norway

Within an international project (EU project HPSE-CT2001-00068) we studied approaches to learning among students in professional programmes. We interviewed Students and Novice professionals in two programmes/professional fields (Psychology and Political science). Research questions: • Which are the characteristic approaches to learning among Students (Freshmen and Seniors) and Novice professionals in Psychology and Political science? • Which – if any – differences in their approaches to learning can be identified o between Students and Novice professionals and o between Students/Novice professionals in the two programmes/professional fields? Informants were interviewed as Freshmen and Senior students and as Novice professionals about their learning and the competence they acquire in their studies and during their first year of work. Learning environments are found to influence student approaches to learning in higher education (Vermetten 1999). Despite a certain individual consistency over time in their learning styles, students also adjust their approaches to learning to their study environments. Characteristic differences in these environments are referred to as different forms of teaching and consequently to structural aspects. Our findings support that there is continuity in approaches to learning from Freshmen to Seniors. There are even strong similarities between students in the two programmes. However, characteristic differences in approaches to learning are found between Novice professionals and students. This may be explained by differences in learning environments at university and at work.

Looking also at the types of competence the Novices acquire at work, compared to what they learn at the university, we discuss the possibility that the approaches to learning are just as much related to the competence to be acquired as to the learning environment seen as a structural context. The paper will primarily present data from Norway but also make references to findings in other European countries within the project.

L28   Students' experiences in undergraduate economics at a Chinese mainland university: A conceptualisation of effective teaching-learning environment from Chinese mainland students' perspectives
Rui Xu, The University of Edinburgh, United Kingdom

This paper is based on data collected and analysed for a doctoral study, which is constructively related to the Enhancing Teaching-Learning Environments in Undergraduate Courses (ETL) Project funded by the UK Economics and Social Research Council's Teaching-Learning Research Programme (TLRP). By concentrating on undergraduate Economics in a Chinese mainland context, the study explores the similarities and differences between Chinese and British students' perceptions of the teaching-learning environment, therefore arrives at a cultural- and disciplinary- specific conceptual framework that might help to further explore different approaches to enhancing present knowledge of Chinese mainland students' learning experience. In total, 669 questionnaires have been administered with a return rate of 77.8%, and 38 interviews conducted with 65 students and 6 teachers. As this is a study not only for affirmation but also for variation, the strategy adopted in data analysis was to bear in mind the main constructs/categories in the existing western theories during analysis, while be alert to subtle differences in the way that the same categories were constructed by the Chinese students. The result from this study generally supports the cross-cultural validity of such a multidimensional model of teaching-learning environment. As expected, however, Chinese students seems to have different criteria when judging what means 'effective'. Elaborating on those differences helps to draw a clear picture of Chinese mainland students' way of perceiving their teaching-learning environment. Although this study was conducted in a single setting, the analytical framework obtained at the end of the study could be used to explore and understanding the learning of students in other Chinese universities because of the careful choice of the University and the major.

Teacher education
Discussant: Els Boshuizen, Open University, The Netherlands

L29   Repertoires of Science Teaching - A Multi-Criterial Approach
Inger Marie Dalehefte, IPN, Germany
Tina Seidel, IPN, Germany
Manfred Prenzel, IPN, Germany

The study presented analyses distinct repertoires of science teaching. Thereby three case samples of innovative instruction in science education are selected and compared to a randomised sample of videotaped lessons in physics instruction. The interpretation of the videos is based on a theoretical approach that differentiates between three important factors of effective instruction: 1) time on task and student orientation in the choice of classroom activities, 2) learner-oriented teaching by providing scaffolds for cognitive and motivational student activation, and 3) lesson structure and content coherence. The representative sample includes 50 videotaped teaching-units on secondary level I (9th grade) in German science classes. Further single videotaped examples of three innovative teaching approaches could be included in the study. For the video analyses, different observational low-, medium- as well as high-inference coding instruments developed and applied in the project Teaching and Learning Processes in Physics Instruction – A Videotape Classroom Study were used. For the representative sample the results of the analyses of teaching repertoires point to one typical pattern. It is characterized by low student orientation in activities, by a low degree of learner orientation in teaching, but by a high structuredness in teaching and a coherent content structure. Overall, repertoires with an extremely positive combination are rare, various combinations of high-quality with low quality aspects or extremely negative combination were rather observed. The explorative investigation of the three innovate teaching approaches show that student activities as well as learner-orientation and structuredness vary between the cases, depending on the theoretical background and aims of the single programmes. The procedure of integrating multiple indicators for instructional quality gives an important view on overall teaching patterns.

L30   The Next Step: Developing a Community of Learners in Preservice Education
Teresa Lewin, Kaye College of Education, Israel
Tamar Eylon, Kaye College of Education, Israel
Hadassah Aillenberg, Kaye College of Education, Israel

Developing a community of learners is important to any educational environment. This study focuses on a group of fifteen preservice students, four mentors (kindergarten and early grade teachers) and five college tutors, who have been working together as a community of learners researching the connection between sociodramatic play and literacy skills. This intensive project has been in progress for the past two years in the Department of Early Childhood Program Education at the Kaye Academic College of Education (Beer Sheva, Israel). Our rationale for the inclusion of a community of learners in Preservice Education community development is based on democratic ideals of learning processes and products. A community of learners is a group of people who work together in the process of learning and understanding, towards a common purpose and through a common mission (Roth, 1998). The aim of the study is to describe and analyze the characteristics of our community of learners; our role as teachers in the whole community of learners and the implications of building a community of learners in Preservice Education. The analysis of students, college tutors and mentor teacher's discourse revealed that the community encourages the potential of all learners; promotes peer interaction with students looking to each other for intellectual stimulation and development of strategic and metacognitive thinking; promotes dialogue and interaction; engages collaborative learning; redefines the teachers role as coach or facilitator. The end result is a community of learners whose individual voices can be heard throughout a collective process.

L31   Cooperating Teachers' Conceptions on Assisting Student Teachers' Learning in School-Based Teacher Education
Annelies Kreis Mueller, College of Teacher Education Thurgau, Switzerland
Fritz C. Staub, University of Zuerich, Switzerland

Cooperating teachers play a pivotal role in school-based education of student teachers. Being an experienced teacher is not sufficient (Borko & Mayfield, 1995). There is, however, no consensus on what kind of cooperating teachers' beliefs and actions are most effective for student teacher learning. Models of reflective practice (e.g., Putnam & Borko, 2000) view the role of a cooperative teacher in being a competent and critical companion. Content-Focused Coaching (West & Staub, 2003) suggests a more collaborative role for cooperating teachers also during the planning and enacting of lessons. Our study is an initial step in a running intervention study on the professional training of cooperating teachers (primary school level, grade 1-6) working with a state college. Cooperating teachers' prior conceptions

on assisting student teachers have been researched on the basis of interviews (N=9) and an extensive questionnaire with open and closed items (N=71). The questionnaire addressed how cooperating teachers assist student teachers' learning, the kind of issues and topics most often raised, the motives and the challenges related to their role. Data analysis shows that cooperating teachers see themselves to provide student teachers with opportunities for reflected teaching experience. Interviews indicate as an area of concern, whether, and if so, under what circumstances, they should intervene when students are teaching. Cooperating teachers' role as teacher educator and their responsibility for their class sometimes run into conflict. Open items in the questionnaire reveal that cooperating teachers only rarely address content specific knowledge as an area for reflection and even less frequently refer to educational or learning theory. The emphasis on the role of reflection for supporting student teachers' learning is in line with the college's recent guidelines. Results document a need for further development.

L32   Preservice teachers' use of self-regulatory processes to learn how to teach and motivate pupils within their praticum
Sylvie Frechette, Universite du Quebec a Trois-Rivieres, Canada
Frederic Legault, Universite du Quebec a Montreal, Canada
Monique Brodeur, Universite du Quebec a Montreal, Canada

The study investigated the use by trainees of self-regulatory processes to regulate the way they learn how to teach children and activate motivation. Data were collected from 115 secondary preservice teachers and 101 cooperative teachers by using two likert-style protocols. Findings showed significant correlations between cooperative teachers rating and preservice teachers' self-reports, and also between cooperating teachers rating and preservice teachers academic performance.

L33   Resolution of word problems and interaction in the classroom. A comparison between expert and preservice teachers.
Javier Rosales, University of Salamanca, Spain
Jose Orrantia, University of Salamanca, Spain
Santiago Vicente, University of Salamanca, Spain
Jose Maria Chamoso, University of Salamanca, Spain

In this paper we want to show the difference between three expert teachers and three preservice teachers, analyzing the activity of students and teachers when resolving arithmetic word problems in the classroom. The system allows study two different

aspects: on the one hand, what is made public during the interaction taking into account the models of word problem solving; on the other hand, the level of autonomy with which teachers and students work in each interaction. In this study participated 6 teachers of Primary Education (Spain). Three of these 6 teachers had more than 10 years of educational experience and the other three were preservice teachers. The six teachers were recorded while they solved with his students the same word problem, a typical inconsistent compare word problem, with reference set unknown. The interactions was transcribed and analyzed. The results suggest that the behaviour of both groups of teachers differs in how they directed the student's attention toward the essential elements implied in the resolution of word problem. Only the expert teachers guaranteed to their students a precise representation of the problem previous to the resolution phase. On the other hand, preservice teachers created this representation when the students showed difficulties solving this task. With regard to who takes charge from public contents, expert teachers allowed students a greater participation, whereas the students had a smaller presence in the interaction maintained by preservice teachers. We think that this work is important because it allows us to know what occur in the everyday teacher's interaction when they solve a word problem with their pupils. If we know this, we will be able to propose proposals of change or enrichment that are not very remote of which already it is being made and that can be integrated in the daily activities.

L34   The diary use: Measure of strategies and connection with efficiency of a group of teachers in training period
Juan Luis Castejon Costa, University of Alicante, Spain
Raquel Gilar, University of Alicante, Spain
Narcis Sauleda, University of Alicante, Spain
Maria A. Martinez, University of Alicante, Spain

The aim of the research is analyzing what learning strategies teachers in training period use in a real learning situation and how this use affects the learning results. The diary is the main tool taken when evaluating learning strategies of the group of teachers. Likewise, the results obtained from the evaluations taking diaries and those taking inventories will be compared and the way in which these two types of measuring strategies contribute to the explanation of the learning process as well as intelligence contributes to that learning process are analyzed. It can be stated that the deliberate use of the strategies and the variety selected by each individual has a positive effect on the learning acquisition. In the evaluation of strategies, the qualitative method of analysis of verbal protocols written down on the diaries prove to be

more useful than the use of traditional inventories. Besides, it offers the advantage of evaluating the strategies in the natural situation concerning the content they are employed on.

L35   *Conceptual maps in teacher education research: a task and scoring method*

Mercier Julien, Universite du Quebec a Montreal, Canada
Deaudelin Colette, Universite de Sherbrooke, Canada

Widespread in science, the use of concept maps in ill-structured domains such as education is problematic because of the nature of the domain and the learning context. This poster presents a concept-mapping task and a grading method for the assessment of learning for research in the context of teaching practicum and examines issues of validity and reliability. After a theoretical discussion of validity, a reliability study is reported. Subjects were 60 student teachers in practicum. Their task was to create a map without any concepts provided. The topic was specified as the pedagogical integration of ICT. Constraints related to the task were the time provided and the hierarchical nature of the map. Two raters were used. The raters were trained in grading the maps, using a set of maps (n = 15) drawn from the sample but not used in the analysis. First, the criteria were discussed. Then, three maps were graded simultaneously and the results discussed. Finally, an iterative process of independent grading and sharing took place with four series of three maps. The four series were necessary to reach an inter-rater agreement of 100% for three maps, that is, to obtain the same score for each of the criteria simultaneously. Afterwards, the 45 maps used in the analysis were graded by both raters. The reliability indicator is based on generalizability theory. The obtained g-coefficient of .91 is relatively higher than all the methods tested by McClure, Sonak, & Suen (1999). The proposed method can therefore be considered a sound alternative for grading concept maps.

L36   *Becoming a teacher: What Changes Must be Made?*

Nirit Reichel, Ohalo college, Israel
Ditza Maskit, Gordon college, Israel

The purpose of this research is to reveal the image of the teacher's training system in Israel as perceived by student teachers, while focusing on those changes which, should take place during the training process. 350 students, studying in different tracks in four different teaching colleges, participated in this study. They were at

different stages of their professional training. The research question focused on locating and mapping topics in the teachers training system which require change. The research tool was an open questionnaire: On the basis of your practical experience and your studies in the teachers' training college, please list which changes should, take place in the teachers' training system?. The data received analyzed according to the inductive analysis system which allows explanations to be produced from findings and the application of various encoding methods. Certain key words and central concepts derived from the data and conceptual categories were determined. Frequency of each conceptual category was counted and translated into percentages. The data was analyzed separately by two analysts on a basis of full-agreement between the researchers (Inter-Rater Agreement). Research findings demonstrate that student teachers indicated various topics that should, undergo change. These topics cover main fields including the organizational, general training system, didactic, content and inter-personal fields. Differences were found according to the various stages the students were in their studies. The research findings widen our knowledge of the inside world of the trainee teachers. The 'yes and no's' of the changes suggested by the students reflect, beyond the words themselves, the contribution of the training to the students and the extent of their ability to criticize and evaluate the training system. The classification and application of the necessary changes in the training system, present a challenge to the thinking and actions of those dealing with teachers training.

Computer - supported learning environments
Discussant: Loucas Louca, University of Cyprus

L37   Novice Programmers Difficulties as a Basis to Designing Programming Environments
Deek Fadi, New Jersey Institute of Technology, United States
Christopher Bladek, New Jersey Institute of Technology, United States
Joseph Khalife, LAU school of arts and sciences, Lebanon

This paper presents an integrative review that will identify, in detail, novice challenges such as those attributed to pedagogy, psychology, programming languages and paradigms, and external influences. An in-depth look at the syntactical, semantical, and pragmatic issues of programming languages will reveal the problem areas and why they are inherently hard to overcome for novices. Each challenge that is identified will contain the reason why novices struggle in their understanding of the issue. The objective is to postulate a set of characteristics that can be taken into

consideration by researchers and developers when designing learning tools and resources to aid the novice programmer.

L38   Evaluating Collaboration: A Rating Scheme for Assessing the Quality of Computer Supported Collaborative Problem-Solving
Anne Meier, Department of Psychology, University of Freiburg, Germany
Nikol Rummel, Department of Psychology, University of Freiburg, Germany
Hans Spada, Department of Psychology, University of Freiburg, Germany
Sabine Hauser, Department of Psychology, University of Freiburg, Germany

In CSCL research, the collaborative process – e.g. the way co-learners exchange information, discuss different perspectives, take on diverse roles, coordinate their efforts in solving a joint task, or make use of technological tools – is of central importance. The quality of the collaborative process determines to a great extent the results of working and learning in groups. Moreover, it follows that instructional measures to promote CSCL are more likely to be successful if they are developed based on insights about what features of the collaborative process are relevant for successful learning and problem-solving. But analyzing and assessing collaborative process is not easy. Methods of coding and counting instances of particular interaction patterns or types of utterances have been criticized for revealing little regarding the quality of the collaborative process. In turn, collaborative process analysis of purely qualitative nature can only be applied to small samples and does not provide quantitative results. We have made the attempt to embrace the benefits of both qualitative and quantitative methods in developing a new assessment method for analyzing collaborative process. Nine dimensions of successful collaboration were identified applying a qualitative methodology. Based on these dimensions, a rating scheme was devised which allows to assess collaborative process quantitatively. In this paper, we describe how the nine dimensions were extracted from video-recordings of collaborating dyads and how the rating scheme was compiled. We further explain how the rating scheme was applied to and tested on another sample. Based on positive findings from this application, we argue that the new method can be recommended for different areas of CSCL research.

L39   The effect of type of access to digital information on data searching and localization of information
Raquel Mayordomo, University of Barcelona, Spain
Merce Garcia-Mila, University of Barcelona, Spain

This study examines the effect of the type of access to information on searching processes, and localization of information. One hundred and fifty junior high school students participated in the study. They were asked to search in a digitalized version of a science textbook for a specific datum: the mass of the electron. The variable type of access was manipulated. There were five conditions for this variable (Glossary, Index, Table of contents, Plain text and a Choice among the above). The underlying assumption of this work is that different types of access should facilitate different types of searching processes. Participants were distributed among the five conditions. Information-searching individual behaviours were analyzed by recording computer trace data. The dependent variable was operationalized as success in the localization of the specific datum. Our results show a condition effect on the rates of success on the task performance. The two conditions that yielded a higher performance were the index condition (access to the searching process through and index page) and plain text (no access system). The condition that yielded the poorest performance was the Choice among access systems) These results are analyzed in combination with a qualitative analysis of searching patterns defined by the sequence of visited pages and interpreted according to Rouet, Vidal-Abarca, Erboul, & Millogo (2001) findings that claim that a structure overview (table of contents) may increase the initial (presearch) study, facilitating the information localization. Along this line, we suggest that a more segmented overview enables the readers to quickly find information, although the amount of text material read is reduced, because less text search is required (Dee-Lucas, 1996). The implications for learning and educational purposes derived from this are also discussed.

L40   *Patterns of interaction in computer supported collaborative learning environments*

Claes Malmberg, Malmoe University, Sweden
Annette Johnsson, Malmoe University, Sweden
Gunilla Svingby, Malmoe University, Sweden

The main aim of this study is to shed light on the quality and nature of computer – mediated communication in a higher education context. The focus is on what patterns of social interaction emerge in groups of students working collaboratively with problembased issues. The empirical work was carried out amongst teacher students in Mathematics and Science during their first year. The research data was gathered in 'natural' settings, as part of an ordinary computer - mediated course. The data includes contributions to the group dialogues, products produced by the groups and individuals, background data and self-assessment. The Social Network

Analysis (SNA) was used to describe the interaction-process as the amount of contributions to the group as a whole and by individual participants. The concepts Core and Periphery, Initiative and Response were applied. Students initiating the dialogues as well as participants who got many or few responses were recognized. Most groups had an asymmetric communication between group members and developed a typical core – periphery structure. A few students in each group receive significantly more contributions than they make. Consequently, their contributions generate more responses than those of other group members do. The asymmetric communication is correlated with three aspects of the dialogue; timing, dialogic function and ethnicity. The time aspect of a participant's contribution in a discussion was shown to be crucial. Early submission of contributions is correlated with high number of responses.

L41 Developing CSCL activities in elementary grades: Results of a three-year design experiment project

Ilias Karasavvidis, University of Thessaly, Greece

CSCL has attracted considerable attention over the past decade. CSCL environments can support a range of learning practices which are incompatible with traditional practices while on the other hand traditional teaching practices cannot be transferred (i.e. translated) into CSCL practices.Therefore, effective CSCL requires the development of new forms of teaching and learning practices such as new tasks, activities, and instructional scenarios. The development of such CSCL practices constitutes the focus of the present study which reports the successive approaches to the development of a CSCL activity. The activity selected involved the collaborative production of an electronic newspaper by students from two remote elementary schools. A design experiment approach was adopted as a research method where the author acted both as teacher and researcher. The experiment was conduced with elementary students in the city of Rethimno, Crete, lasted three years and included three instructional sequences of 30 class sessions (45' each). In the first sequence, a first version of the task was developed. In the second sequence, 89 6th graders collaboratively produced an electronic newspaper. The problems which surfaced from this implementation were used to modify the activity. The modified activity was used in the third sequence with 136 6th graders who collaboratively produced an electronic newspaper. The present paper focuses mainly on the second sequence of the design experiment. Five main types of problems were identified from this sequence and are discussed in detail. The rationale as well as the measures taken to remedy those problems and refine the activity in the third sequence are also ad-

dressed. The effectiveness of the measures regarding the refinement of the activity is also evaluated. The paper is concluded with a discussion of the findings and their implications for the design of CSCL activities.

L42   *Can Computer-Mediated Communication provide an effective environment for language learning?*
Sophie Ioannou-Georgiou, Cyprus Pedagogical Institute, Cyprus

Computer-mediated communication (CMC) is argued to be an effective learning environment for language learning because it is considered ideal for 'optimal' interaction (Long, 1981; 1983). Nevertheless, there is not yet adequate research into the use of CMC in language classrooms or into the learner nteractions it generates. Existing research results are contradictory. Warschauer (1996), for example, found students use more complex language in CMC but this was contradicted by Chun (1994), Kern (1995) and Sotillo (2000). As regards the crux of the interaction hypothesis, the existence of negotiation of meaning, the only strong proof for its existence is offered by Pelletieri (2000). This study aims to shed more light on this area. The questions raised are: a) What is the nature of synchronous text-based CMC interactions? b) Do synchronous text-based interactions foster negotiation of meaning? The study employs a quasi-experimental, longitudinal design. CMC interactions were implemented in a junior high-school's class language program, once a week, for one term, while a comparable class, at the same school, carried out comparable interactions face-to-face. The face-to-face interactions were used as baseline data for the analysis of the CMC interactions. All the interactions were analysed qualitatively and quantitatively. Quantitative analysis focused on negotiation of meaning, student participation, production rates, L1 use, length of utterances and variety of discourse functions. Qualitative analysis focused on analysing instances which assist in understanding the interactions in context. The results are mixed. Instances of negotiation of meaning were few but CMC interactions had a variety of discourse functions, well-balanced participation rates and rare L1 instances. In contrast, face-to-face interactions were often dominated by strong students and had abundant instances of L1 use. Despite the expected limitations that such a study has, there are implications for research and pedagogy as regards the effectiveness of CMC as a learning environment.

L43   *Argumentative interactions in different cscl-environments*
Lisette Munneke, Utrecht University, Netherlands
Jerry Andriessen, Utrecht University, Netherlands

Gellof kanselaar, Utrecht University, Netherlands

In the Twins project we study the quality of argumentative interactions during collaborative learning in different CSCL-environments. The aim of the research is investigating the effects of synchronous and asynchronous systems and different collaborative tasks on argumentative interactions between students. Two experiments were done in which students aged 16 - 17 years had to write an argumentative text about genetic modification. In both experiments the collaborative task consisted of two phases, a discussion phase and a collaborative writing phase. Two tasks were designed which differed in the discussion phase. The two experiments differed in the use of synchronous or asynchronous communication during the discussion phase of the task. The argumentative interaction in both tasks and experiments was analysed on the way students explored the space of debate. A codescheme was developed based on the work of Kuhn (1991, 2003), to measure the depth and breadth of discussion. Also was looked at the way students discussed with each other. It appeared that there were no differences in argumentative interactions between different tasks during discussion phase when students are communicating synchronously. Overall students enumerate a lot of arguments but discuss them only superficial. They are focused on the products they have to deliver and not really involved in the subject of discussion. If an asynchronous situation will give the same results is still unknown, because at this moment the analysis of the second experiment is still running. Results for the second experiment and the comparison between experiment one and two are forthcoming and presented at the EARLI.

L44   Developing computer-support learning environments in vocational education: A socio-cultural approach to the study of pilot projects
Jean-Francois Perret, University of Lugano, Switzerland
Michele Grossen, University of Lausanne, Switzerland

In this paper, we present a research which was aimed at evaluating the use of platforms for e-learning in twenty vocational schools in Switzerland. The research has been carried out over a two-year period (2002-2004) in which each of these schools developed a pilot project that gave them the opportunity of experimenting various forms of computer-support learning environments in order to meet their different training needs. Drawing upon a socio-cultural approach, our research questions focus upon the meaning that the various actors give to their pilot projects; the way in which they make sense and appropriate new tools of communication; the influence of these tools on educational practices; the organisational and technological

conditions that enable the realisation of a school project; the various resources used (or not) by the project teams. In order to answer these questions, the method puts emphasis upon a qualitative approach: interviews with the leaders of the projects and all the teachers involved in the projects; participation in the meetings of the project teams; observation of training situations; analysis of the documents and e-mails which were exchanged through the platforms; questionnaires addressed to the students and teachers involved in the school projects. The results presented in this paper will concern two different aspects. First, we shall describe the educational practices that have been developed in the new learning environments that the schools have experimented. Second, we shall analyse a series of dimensions which account for some positive outcomes in the school projects.

Educational technology
Discussant: Helmut Niegemann, University of Erfurt, Germany

L45   Hypertext: A Case-study on hypertext for foreign language text comprehension
Carmen Tomas, University of Nottingham, United Kingdom
Shaaron Ainsworth, University of Nottingham, United Kingdom
Do Coyle, University of Nottingham, United Kingdom

The present case study focuses on hypertext and the features that are most relevant to enhance text comprehension in a foreign language. Two roles of hypertext are examined: firstly, the provision of ancillary information in the form of glossary; secondly, different ways of segmenting texts into hypertexts. The aim is to describe and deepen our understanding of the affordances of these structural features and the potential benefits for reading comprehension in a foreign language. Firstly, in relation to the provision of vocabulary aids, the focus of the study is on types, the content of aids and issues of display. Secondly, different segmentation formats of the information of a traditional text will be compared. Process and outcome measures will be taken including student ability to infer meaning of unknown words, the reading speed and overall engagement with the text will be observed. A range of text types will be used and different methods of segmenting information explored. Finally, the present case study seeks to be a contribution both in practical and theoretical terms. This study might be of interest to practitioners in suggesting ways of dealing with authentic (unsimplified) texts for foreign language reading using hypertext as a tool to support this process. Secondly, the theoretical contribution is in advancing our understanding of the use of vocabulary aids (content and types) and

the uses of segmentation for reading comprehension.

L46   Differential Use of Technology in K-12 and Higher Education Mathematics and Science Classes

Ann Ooms, University of Minnesota, United States
Frances Lawrenz, University of Minnesota, United States

Over the years, the use of technology in science and mathematics classes has been increasing but there are differences in the amount of use and perceived helpfulness in K-12 and higher education settings. Teachers use technology less frequently than faculty, with the exception of the use of technology as a tool for assessment. There is a fairly large variance in the score. Ratings of frequency of use range between seldom and occasionally for teachers, while those rating are closer to occasionally for faculty. K-12 and higher education students are reasonably equal in their ratings of use, except for the use of technology as a tool for communication, which is higher for higher education environments, and for use of technology as a tool for assessment, which is higher for K-12 settings. Interestingly, ratings of amounts of use, especially for K-12 students, are not necessarily lower than the ratings of use provided by teachers and faculty. Students' rate of amount of use varies from only seldom to occasionally. Usefulness ratings range from somewhat to very useful. Higher education students see technology as much less useful as K-12 students. Lowest perceived usefulness is for the use of technology as a tool for assessment for higher education, but the lowest rating of usefulness for K-12 students is use of technology as a tool for communication. Despite these differences, it is clear that instructional technologies are not always used to their potential. Our results show that adapting teaching strategies to the new technologies in ways that trigger student learning and understanding remain challenging.

L47   Conditions facilitating the implementation of ict integration in the malaysian secondary school curriculum

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Wan Zah bt Wan Ali, University Putra Malaysia, Malaysia
Hajar Mohd Nor, Curriculum Development Centre, Malaysia
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This study reports on the implementation of ICT integration in the curriculum, specifically in the classroom environment. The main purpose of this study is to look at conditions that facilitated the implementation of ICT integration in a curriculum.

A qualitative methodology was employed. Three technology-rich Malaysian secondary schools, the Sekolah Bestari, of different technology levels were carried out to identify the conditions. Twenty-one informants were interviewed. The study has identified two sets of conditions that facilitated the implementation of ICT integration in the Malaysian secondary school curriculum. They were the essential conditions and the supporting conditions. The essential conditions identified were availability of ICT resources and acquisition of ICT knowledge. These conditions were able to see the implementation of ICT integration in the curriculum. If one of these conditions was not present then implementation of ICT integration would not take place. The next set of conditions was the supporting conditions. The supporting conditions comprised of the accessibility of ICT resources, existence of support, desire to change, school practices, influence of external forces and teacher's commitment to the innovation determined continuous implementation of ICT integration in the schools. It was found that the presence of these conditions in schools enabled them to continue with the implementation of ICT integration. However, the lack or absence of these conditions resulted in the slow down or discontinuation of the integration of ICT in the curriculum. The findings also revealed that teachers in the study employed four levels of approaches in integrating ICT in the curriculum. These teachers integrated ICT as verbal resources at level one, as printed resources at level two, as hands-on experience at level three and a combination of all the approaches at level four. It seemed that the levels of approach were influenced by the presence and absence of the conditions.

L48 *Preparing Teachers to Teach with Technology: Case studies from Thailand and Philippines*

Charalambos Vrasidas, CARDET - Intercollege, Cyprus
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Thanomporn Laohajaratsang, Chiang Mai University, Thailand
Praweenya Suwannatthachote, Chulalongkorn University, Thailand

The goal of this paper is to discuss the theoretical framework and preliminary evaluation findings behind a professional development program that focuses on integrating ICT in teaching and learning in primary and secondary education. The program consists of teacher training modules, support documents, outcomes based assessment, an online portal, and ongoing support. Preliminary findings indicate that there is a general satisfaction among all stakeholders regarding the success of the project. Issues that need to be addressed include access to technology, class size, teacher incentives and compensation, education policies, the structure of curriculum, and

assessment practices.

L49   Information and communication technology use in Croatian schools: Focus on teachers and school principals
Branislava Baranovnic, Institute for social research in Zagreb, Croatia
Ivana Batarelo, Institute for social research in Zagreb, Croatia
Iris Marusic, Institute for social research in Zagreb, Croatia

Educational use of information and communication technology (ICT) is an important aspect of keeping the curriculum relevant and preparing students for a knowledge-based society. In this paper we discuss ICT use in Croatian schools and its implications for curriculum reform and teacher education programs. The research, results of which we present in this paper was conducted in 2003 on a sample of 2134 subject teachers, 1134 classroom teachers and 120 school principals from 121 primary school in Croatia. The research findings indicate that there is a significant relation between age of survey participants' (i.e., school principals, subject teachers, and classroom teachers) and their technology literacy skills (i.e., personal computer use, Internet use and email use). Data indicate that most teachers rarely use information and communication technology as a tool in the teaching process. Personal computer, Internet, educational software and LCD projector are among the educational technology tools that are least used in the teaching process. There is a relation between a subject area and use of a specific educational technology tool. Furthermore, the study findings suggest a relation between teachers' technology literacy (indicated by level of personal compute use; Internet use; and email communication) and use of a specific educational technology tools. For more than a decade, technology literacy training is an integral part of teacher education programs in Croatia. On the other hand, teacher education students are not receiving training on methods, barriers and benefits of use of ICT in the classrooms. Rare educational use of ICT, demonstrates a need for more effective education on use of ICT in classrooms, both for teacher education students and the in-service teachers.

L50   Ready to Teach Faculty for Educational Technology? Teaching Counselling for technology enhanced teaching in higher education
Jasmina Hasanbegovic, University of St. Gallen, Switzerland
Sabine Seufert, University of St. Gallen, Switzerland
Dieter Euler, University of St. Gallen, Switzerland

Current professional development approaches at universities disregard faculty's

professional learning characteristics and fail to prepare academic staff adequately for technology enhanced teaching. Research on faculty engagement agrees upon the consensus that technology driven educational innovations are doomed to fail if teachers' needs, interests, beliefs are not considered. Faculty support is often unrelated to familiar teaching routines and do not fit in with faculty's own perceptions of their domain and discipline. Especially, new paradigms and practices of learning and instruction like student-centred and collaborative learning indicate new patterns of teaching and learning which are based on the development of faculty readiness for purposeful change. But research and practice neglect faculty as learning professionals at their learning-centered workplace in offering standardised qualification programs for technology enhanced teaching. The intended educational innovations can be brought in harmony with the teachers' ideas if we know how to (further) develop teachers' knowledge, skills and attitudes for technology enhanced teaching and if we can support a faculty centred approach which indicates the academic workplace as a learning environment for improvement and innovation in teaching. A major conclusion from studies on faculty engagement is that an understanding of individual and organisational characteristics influencing teaching competence is useful to rebuild and improve professional development and to make technology driven educational innovations more successful. Taking into account the new demands for faculty developers, this paper analyses different professional development approaches dependent on faculty's requirements. The purpose of this study is to understand the development or change of teachers' professional growth for technology enhanced teaching in relation to offered counselling by faculty developers. Therefore, expert interviews were conducted with experienced faculty developers at several universities. First results indicate the importance of different professional development approaches at the diverse individual professional growth stages and specific approaches for different disciplines.

L51   Limits in the appropriation of IT by Quebec teachers at the level of educational intervention: assessment of a national survey
Vincent Grenon, University of Sherbrooke, Canada
Francois Larose, University of Sherbrooke, Canada
Johanne Bedard, University of Montreal, Canada
Stephane B. Palm, University ofSherbrooke, Canada

This paper reports results of a national survey conducted with a stratified sample representative of 8000 full-time teachers in 66 Quebec school districts. Twofold purpose of the study: 1) to draw up a general profile of the real practices of teachers

in the pedagogical utilization of IT; 2) to assist the Ministry of Education develop national policies to foster IT integration. In collaboration with the department of didactical resources of the Ministry, we developed a questionnaire based on previous work conducted at the Center for Research on Educational Intervention (CRIE) and by adapting instruments validated in the scientific literature. A first version was submitted to a committee of experts for validity of content. The final questionnaire was distributed to the 8000 respondents along with two follow-ups to obtain more responses: one by email addressed to school principals of teachers in the sample and a second one by post. As a result, 1180 questionnaires were returned. The questionnaire covered general information regarding preservice and continuing education, teaching level, teaching experience, and level of computer literacy (Bawden, 2001). Subjects were asked to state their views on the computer literacy profile and methodological competencies of pupils and on their attitudes toward IT. Results will allow the Ministry to better support primary teachers develop higher order cognitive skills in pupils. Data gathered will allow us to draw up a differentiated profile between primary and secondary teachers concerning pedagogical use of IT, notably to control the search for information on the Internet. Results will also allow Quebec universities to adjust the content of preservice and continuing teacher education programs pertaining to pedagogical use of IT and the development of higher cognitive skills in pupils. Study conclusions should impact on the structures available to support teachers implement IT.

L52   Promoting equity through ict: first results of the gypsy educational computing project

Andrea Karpati, Eotvos University, Hungary
Ena Molnar, Szeged University, Hungary

An OECD project entitled ICT and the Quality of Learning (1999-2001) proved that the majority of high level ICT users are well-equipped, innovative schools with high SES students. Researchers were encouraged to develop methods for those on the other side of the digital gap and prove that ICT is an effective means for developing skills of low SES students. In the Hungarian project of the OECD effort reported here, Promoting Equity Through ICT in Education, (2002-2005), our aim is to introduce ICT-based teaching and learning methods in 10 primary schools in poverty stricken villages of Northern Hungary, with 60% or more Gypsy student population, in six disciplines. We develop cognitive, communicative-expressive and learning-to-learn skills and thus prepare students for secondary education and make students and teachers aware of the Gypsy cultural heritage. Five areas of skills

and abilities are assessed: general thinking abilities (Test for Inductive Thinking), operational abilities (Test for Combinative Abilities), reading achievement (Text Comprehension Test), self-regulation learning strategies and learning motivation (Learning Abilities Test), affective dimensions of personality (Personality Characteristics Test). Testing involved 120 minutes in total and was evenly distributed between two school days. Results were computed for all students, classes and the whole experimental group. Comparative data were presented from previous samples representative for Hungary and the given age group and sub-samples including students from Hungarian schools with similarly low SES only. Results of the pre-test were in all areas below the national average. The post tests executed at the end of the first school year showed that results in all areas increased substantially. The paper will give an overview of the achievements and discuss treatment methods that resulted in an increase of performance that brought the majority of the sample close to and the top 10% slightly above the national average.

Knowledge acquisition
Discussant: Csikos Csaba, University of Szeged, Hungary

L53   The concept of language in some educational theories
Thorsten Johansson, Department of Philosophy, Sweden
Elsie Anderberg, Department of Education, Sweden
Lennart Svensson, Department of Education, Sweden
Christer Alvegard, Learning Lund, Sweden

In the research project The interplay between language and thought in understanding problems from a student perspective have we been considering the question of what role language has in learning. We have therefore asked what kind of concept of language is used in educational theories of learning. If we compare two dominating schools of learning, the cognitive school and the socio-cultural tradition, we can see that they claim to have different views of what a language is. In the cognitivist tradition language is regarded as a kind of structure that we somehow manage to acquire. When we do that we cope with it in accordance to a mental structure that is identical to the language structure. Language use is then regarded as a kind of a computational activity. In comparison to cognitivist ideas of language we have the socio-cultural tradition. They claim that language is to be regarded as a social phenomenon that is learned in a social process by participating in a social activity. Language is then not seen as a mental structure in the mind, but as something that

is determined by its social use. It seems then that they have two different incomparable ideas of what a language is. We do however think that a closer examination of the two concepts of language show that they both share some important basic presuppositions. And we also think that these shared presuppositions give rise to several problems in their views of language as well as on learning.

L54   Elementary School Children's Text Comprehension Ability: Developmental and Differential Aspects in Mental Representation
Sabine Fabriz, University of Frankfurt, Germany
Gerhard Buettner, University of Frankfurt, Germany
Antje Henningsen, University of Frankfurt, Germany

Based on vanDijk's and Kintsch's text comprehension theory, we examined three hypotheses about interindividual differences in text comprehension processes. (1) We hypothesized that performance in a text comprehension test is associated with different abilities to build mental text representations. (2) It was supposed that younger and older children build text representations differently. (3) We hypothesized that text representation depends on the modality of text reception (reading vs. listening). Participants were 50 first and 99 fourth graders. After testing their comprehension skills using a standardized test, the children were presented six short stories under a listening and a reading condition. Each story was followed by a sentence recognition test consisting of original sentences and three types of distractor sentences: paraphrased, meaning changed and situation changed. Acceptances to the different types of sentences were registered and analyzed using multivariate analyses of variance. We found that comprehension skill had an impact on mental text representation only in younger children. Poor comprehenders in first grade had difficulties to build the text representation levels assumed by vanDijk's and Kintsch's theory. Also a developmental change in text processing was found. Fourth graders exceeded first graders in gist related, but not in verbatim text representations, indicating a developmental change towards a reliance on mainly gist information. Contrary to our expectation, the fourth graders' standardized test scores in listening and reading comprehension did not differ. Nevertheless, consistent with their test scores, the listening and the reading group showed similar mental representations. From an instructional perspective this evidence seems encouraging concerning the ability of elementary school children to master deeper comprehension of written text material.

*L55   Towards empirical base for multiliteracies in the curriculum - Text - Picture
Relations in Genres for Children in Israel*

Shoshi Waksman, Tel Aviv University and Levinsky College of Educat, Israel

The aim of this study is to construct an empirical base for an updated literacy curriculum, by mapping possible phenomena concerning the issue of Text – Picture relations in various semiotic layouts. The need for such a panoramic tool is based upon the Multiliteracies Theory that suggests including in the current definitions of literacy, as well as in research and pedagogy, ways of designing meaning in today's media. One of the direct implications of this theory is the inclusion of modalities not normally emphasized within literacy research such as picture, voice, gesture etc. The Multilitercies Theory is supported by a massive body of research within the framework of psycholinguistics and critical theory that emphasizes the possible influences of pictures on memory and comprehension in the process of reading. The construction of this tool was based upon knowledge structures of highly experienced professionals who create artifacts for young children by combining text and picture as main representational resources. In order to achieve this aim, in- depth interviews were carried out with 22 highly experienced professionals who are involved in the process of artifacts production in 6 genres that young children are exposed to. In the interviews, the professionals were asked to describe their work and all the possible considerations regarding the issue of text picture combination during production processes. The interviews were analyzed using qualitative and quantitative methodologies. According to the analysis, the overall taxonomy consisted of three spheres: production processes, functional purposes and combinatory structures. The taxonomy provides nine empirical and theoretical options for production. The taxonomy identifies a wide range of potential and empirical options for describing text-picture relations based on a variety of different genre in six different domains. This conceptual tool is offered as an important basis for literacy curriculum planning.

L56   Reading and writing in primary school: a longitudinal study

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Giuliana Pinto, University of Florence, Italy
Lucia Bigozzi, University of Florence, Italy

Reading and writing are interdependent processes related with the changes that occur during cognitive development, changes related with information coding and elaboration and mental representation. Literature show how these processes have

specific developmental patterns and common phases. Models which studied the relationships between reading and writing show how the child can improve the knowledge in one field thanks to results in the other one (Frith, 1985; Goswami & Bryant, 1990; Shanahan, 1997). The present study investigates the relationship between these two processes during the first two years of formal alphabetisation. 46 children participated at this longitudinal study. Data were collected in two different times: at the end of first grade and at the end of second grade in primary school in predominantly middle-class Italian towns. Subjects were given the reading test MT (Cornoldi et al., 1998) for first and second grade and two writing tasks (invented story writing). For each subject have been considered the parameters: rapidity and correctness in reading and fluidity and correctness in writing. Correlation analyses have been conducted through the cross-lagged panel design. A developmental model of reading and writing emerges from data analyses which evidences both specificities and interactions between the two considered abilities. Relations between reading and writing appear more evident in longitudinal perspective. In fact there is an important predictive link between correctness in writing in first grade and rapidity in reading in second grade. The results of present study substantiate the methodological importance of studying relationships between reading and writing in the continuum of learning processes. These results consent to discuss the causal links among reading and writing referring both to a set of common competences both to a positive feedback process where the mastering of a competence in one ability allow a qualitative improvement in the other for knowledge extension.

L57   Students and environmental motivational factors that influence reading achievement in 3rd grade
Cirila Peklaj, University of Ljubljana, Slovenia
Sonja Pecjak, University of Ljubljana, Slovenia
Katja Kosir, University of Ljubljana, Slovenia
Melita Puklek-Levpuscek, University of Ljubljana, Slovenia

Reading motivation is an important factor that influence students' reading achievement. It is the result of interaction between factors in student and in their environment. The purpose of the study was to find out the differences between good, average and poor readers in several students dimensions and in their class environment dimensions and to investigate which dimensions discriminate these three groups of students the most. 1062 third grade students (543 boys and 515 girls) and their teachers (60) participated in the study. Students reading motivation was assessed with Reading Motivation Questionnaire for Young Students (Peklaj, Bucik, 2003)

and the estimations of time spent students in reading and the frequency of reading were also collected. Environmental variables were collected with a questionnaire constructed for teachers. One-way ANOVA was used to find out the differences between poor, average and good readers. Significant differences were found in the following students dimensions: sex, time spent in reading, frequency of reading, interest and lack of self-efficacy in reading, and in following environmental dimensions: teacher as a reading model, frequency of reading activity in the class, frontal work, and cooperation with parents in promoting literacy. The discriminant analysis revealed one significant discriminant fuction that comprises only student motivational variables (lack of self-efficacy in reading (0.82), interest for reading (-0.39), time spent in reading (0.30) and sex (0.30) which discriminate between poor, average and good readers. The implications for educational practice are discussed.

L58   Reading strategies use in a German L2 reading task: how does group work foster reading comprehension?
Marianne Jacquin, University of Geneva, Switzerland

Research based on classroom observations and the analysis of textbooks show a quite utilitarian conception of reading acquisition, especially in L2 contexts: texts are above all used as a means to introducing new grammatical structures or new vocabulary and not as an autonomous learning object. The aim of our contribution is to analyse group interactions during German L2 reading tasks in order to reach a better understanding of L2 reading acquisition in a specific classroom context, i.e. group work (Cohen, 1994). We observed if and how students make use of formerly taught reading strategies while solving a specific reading task (co-construction of meaning.Therefore,we implemented a teaching sequence based on models of L2 reading instruction (Westhoff, 1987; 1991; 1997; Swaffar, Arens & Byrnes, 1991) in four secondary school classes (14-15 years old students). The sequence is composed by four lessons on reading strategies instruction followed by a reading task solved in a cooperative learning structure. In this contribution we focus on the last part of the sequence. Audio and video-recorded data has been transcribed and analysed to answer the following research question: What kind of strategies do students use while solving a reading task? We have developed a three level analysis: 1) a synopsis of the main subjects discussed in the groups; 2) an a-chronological approach based on the following categories: a)the way students start solving the reading task; b) the use of specific strategies or coordination of different strategies; c) the context in which privileged individual or group strategies appear;

3) a micro-genetic analysis of the group work. First results seem to show that pre-reading activities can be efficient, if students verify their hypothesis on the text basis. During the reading comprehension task, students tend to use isolated strategies and, most frequently, focus on words or sentences.

L59   English pupils' attitudes towards learning french
Chris Kyriacou, University of York, United Kingdom

There has been much debate in England concerning whether the generally low level of pupil motivation towards studying French stems primarily from pupils' poor attitudes towards France and the French Language per se (e.g. its relevance, usefulness, intrinsic interest, importance, etc.) or whether it is primarily a negative reaction to how French is being taught and their experience of learning French (e.g. it is difficult, boring, embarrassing, etc.). This paper reports case-study findings from three schools in the North of England. The first school served a disadvantaged area in a small town; the second school served an affluent rural community; the third school was an independent (private) school based in a city. Longitudinal data from over 400 pupils using both questionnaires and interviews explored: (i) how pupils' perceptions of French compared with other subjects; (ii) what they liked or disliked about how French was taught; (iii) what factors influenced their motivation towards learning French; and (iv) what could be done to make French lessons more enjoyable. The case-study data provided sensitivity to the school context. The theoretical framework on motivation for this study was influenced by Boekaerts' mastery and coping model, Gardner's socio-educational model, and Dornyei's process model. The importance of doing well in French was found to be lower than for most other subjects for low attaining pupils from disadvantaged communities, whilst for high attaining pupils in affluent communities, French was highly rated in importance. The main reasons cited for a lack of motivation towards French were more to do with how it was taught rather than pupils' image of France and French per se. Pupils felt that motivation would be improved if lessons involved more active learning. Implications of these findings for the theoretical framework and classroom practice are presented.

L60   Expert validation of an instructional strategy to teach reading comprehension in english to mexican university students at risk
Raquel Garcia Jurado, UNAM, Mexico
Sandra Castaneda-Figueiras, UNAM, Mexico

It was of interest to validate identified components of expert performance during the reading of texts in English as a foreign language, to construct an instructional strategy, aiming to teach reading comprehension in English to Mexican university students at risk. To identify the required components during reading, a cognitive task analysis (CTA), based on declarative, procedural and strategic knowledge employed by an expert reader was carried out. The analysis identified seven essential components and four complexity gradients. The instructional strategy was developed taking into account these components and vectors, so as to teach reading comprehension to those failing reading comprehension examinations. A validation scale that took the mentioned components into consideration was built; both, the scale and the instructional strategy were presented to ten experts on the teaching of reading comprehension and designing of reading comprehension materials in English as foreign language, in order to be validated. With data, coefficients of concordance were run. Results showed, for most components, agreement on the use of the component $W = 1$, df $= 11$, p $= 0.00$. Regarding efficacy and relevance, components ranked as follows, language code: $W = .293$, df $= 23$, p $= 0.07$; sentence structure: $W = 605$, df $= 23$, p $= 0.00$; paragraph organization: $W = 570$, df $= 23$, p $= 0.00$; cognitive strategies: $W = 431$, df $= 23$, p $= 0.01$; text type: $W = 513$; df $= 23$, p $= 0.00$; reading style: $W = 793$, df $= 23$, p $= 0.00$; Context complexity: $W = 607$, df $= 21$, p $= 0.00$. Expert validation makes it possible to trust that this new instructional design for teaching reading comprehension will render substantial results, as it models and scaffolds expert performance, leading the learner to an autonomous performance when ready.

L61   The oxymoron of bilingualism: Can language proficiency interfere with language learning?
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Katherine Fiori, University of Michigan, United States
Joanne Smith-Darden, University of Michigan, United States
Kai S. Cortina, University of Michigan, United States

This study aims to explore the nature of bilingual foreign language learners and examine their learning profile, i.e., their learning strategies and achievement, and how it may differ from their monolingual counterparts. Studies such as Wharton (2000) have suggested that bilinguals' increased use of or preference for social strategies might have resulted from their previous experience, and success, with a second language. Another key question in the research in foreign language learning is whether the advantages in metalinguistic awareness that bilinguals exhibit

in childhood extend to achievement of acquisition of foreign languages when they are adults (Klein, 1995). Whereas Thomas (1988) found an advantage for bilingual students, Magiste (1984) showed that those students who had passive knowledge of their first language performed better than both the monolingual students and the active bilingual students. Based on a theoretical cut-off point, we defined bilingual students as those who had spoken or understood one or more languages in addition to English for 10 or more years. There were 129 monolingual students and 37 bilingual students. The students were enrolled in introductory and intermediate undergraduate German language courses. Students completed either an online or written version of the questionnaire, twice during the semester. At Wave 1, monolinguals used significantly more learning strategies that were cognitive, compensatory, and metacognitive. At Wave 1, bilingual achievement was marginally significantly higher. Our results indicate that bilinguals may in fact not be at an advantage in terms of achievement and may not show preference for social strategies based on their previous language experience. These findings, respectively, may have resulted from interference from the bilingual students' second language and the differences between their more natural acquisition and the current instructional setting. Our study takes an original perspective in comparing monolingual and bilingual language learning profiles.

Lifelong learning and professional development
Discussant: Peter Rosseel, Catholic University of Leuven, Belgium

L62   E-learning for Glass Workers in Lifelong Learning and Professional Development
Martin Stigmar, Dep. of Education, Sweden
Rune Kornefors, School of Mathematics and System Engineering, Sweden

This paper is a presentation of experience made in a pilot project called the Virtual Glass Academy (VGA)- A pedagogical model for e-learning with multimedia support, within the EC program of Leonardo da Vinci II. The object of the project is to develop a tool to raise the educational level within the European glass industry to strengthen the potential of development and competitiveness. The goal is to develop and test a pedagogical model for short, problem-oriented, interactive, net-based courses with multimedia support. The target group consists of glass workers in lifelong learning and students in vocational training. This summary is based on the evaluative results reported from the partners in the project, England (Dudley College), Romania (National Glass Institute), and Sweden (Kosta glassworks). The

summary focuses the following questions:

1. Positive and negative things in general and suggestions for improving the module,
2. how long time did the course take,
3. what do you find positive or negative about collaborating in pairs,
4. what was the degree of difficulty,
5. did the course takers enjoy the module,
6. what do you think you have learned about glass defects occurring during forming,
7. teacher comments.

To begin with some shared findings are pointed out and are being compared to what was asked for in the field analysis in the beginning of the project. Finally some general conclusions are discussed.

L63   Will the introduction of a language of learning improve communication about learning and self-direction initiatives of learners?
Manon C.P. Ruijters, Twynstra Gudde, Netherlands
P. Robert-Jan Simons, Utrecht University: IVLOS, Netherlands
Hugo C. Van Helderen, Tilburg University, Netherlands

In order to make logical connections and choices and to support people in making their own choices, we need a language of learning. A language to characterize forms, results and ways of learning and to have an understandable conversation about learning between manager, HRD-professional and employee. Learning preferences and learning capabilities are elements of such a language. In order to analyse learning preferences, we have developed a system, containing five metaphors of learning: Apperception, Participation, Acquisition, Practisin and Discovery. The learning capabilities provide information about the way learning takes place 'inside their head'. In our opinion, learning can be described with the help of three variables: construction, interaction and reflection. An instrument was devised to measure the combinations of metaphors people prefer and the dominance of the three learning capabilities. The aim of this research was to get insight in the effects of the instrument as a language tool. The research question is: 'what are the effects of the learning-profile on the learning language in use and on directing one's own professional learning'. The most important result is that both learning language use and directing one's own professional learning increase significantly in the experimental group, but not in the comparison group. Learning language use is getting more detailed in that more words of learning are being used and that there is a shift

from general words of learning to words of learning from the learning-profile and more specific words in describing learning. There is also more variety and concrete founding in learning language use. Directing ones own learning expresses itself by referring to one's own learning, when not directly asked about it. The most important result in this respect is the shift in awareness about the part that one's own way of learning plays in planning development.

L64   The Mentor Teacher as an Adult Learner
Zivia Rahimi, Ministry of Education, Israel

The role of mentor teacher is a well known role in the practicum of the teaching training processes. But only in the last years specific training processes toward this role replace the intuitive functions of mentorship. This paper deals with the training of mentors as adult learners in the colleges of teacher education in Israel during the past decade. This framework is based on the following theoretical fields: the theory of organization, professionalization processes of teaching profession and andragogy- principles of adult learners. The main issues considered relate to: the examination of andragogical principles of mentor theachers learning, the creation of training models of mentor teachers, the existence of interrelationships between contents and frameworks of the involved groups and the links between andragogical principles and organizational culture. The functional experience of the mentors becomes a learning resource for themselves and for their coleague mentors. They create a community of adult learners which deals with practical knowledge in practice and on practice.

L65   Intuition as a component of professional expertise
Christian Harteis, University of Regensburg, Germany

Research on professional expertise theoretically indicates intuition as a crucial component of professional expertise (Eraut, 2000). This study focuses on the teaching profession by comparing teaching experts in the field of adult education with students on adult education regarding their intuitive decisions during teaching activities. Theoretical Framework: Intuition means the regulation of actions beyond rule-based criteria. It is the domain-specific capability to come to an appropriate decision without balancing various alternatives (Myers, 2002). Intuition reverts to knowledge-resources persons are no longer or still not aware of. Thus intuition can hardly be verbalized (Klein, 2003). Thus, from the perspective of research the assessment of intuition is made by simulating intuitive decisions. Research Ques-

tion: Because intuition refers to distilled experience (Crossan & Sorrent, 1997), the capability to decide intuitively should develop with raising expertise. This suggests a design in the tradition of research on expertise by contrasting experts and novices, in order to gain empirical data about the theoretical framework. The research questions are:• Do experts and novices differ in the extent of deciding intuitively during teaching? • Is intuition a domain-specific phenomenon or is there a correlation between teaching and daily life? Design: A sample of n1=120 experts (professionals in the field of adult education) and n2= 150 novices (students in the field of adult education) was investigated by a standardized questionnaire derived from the Rational-Experiential Inventory (Epstein, Pacini, Denes-Raj & Heier, 1996). This instrument contains the subscales faith in intuition and need for cognition referring to the teaching domain and daily life in 28 items. Results: • Experts do more than novices tend to strive for control the classrooms. • Novices do more than experts decide intuitively in teaching situations. • Novices spend more efforts for rationally analyzing classroom situations. All these differences found are significant.

L66   Sociocultural research on expertise: Egocentric networks of experts
Monika Rehrl, University of Regensburg, Germany
Hans Gruber, University of Regensburg, Germany

This paper aims to combine sociocultural aspects of experts' network participation in relation to personal attributes by using methods of egocentric networks. Research on expertise traditionally focuses on cognitive skills to explain experts' mastery in their profession. It attempts to identify the particular attributes which lead to expert performance. However sociocultural concepts of expertise emphasise the dimension of social embeddedness of experts in different kinds of communities. Only recently the pursuit of a convergence between individual and socio-cultural aspects increased substantially. Expertise in professional contexts increasingly is considered as a dynamic interdependence of individual agency and cultural production and reproduction of social structures and tools. The study presented combines the individual and sociocultural perspective of expertise. It accomplishes methods of egocentric networks with attributive data of 15 experts in the domain of medicine. Personal network data are collected in terms of relevant relationships for seeking advice, getting support, receiving new information or implementing change. These relations refer to structural measures of the social capital versus constraint of experts' networks. Additionally, impact and functionality of the different connections are investigated in respect of situational factors that structure the performance requirements in the workplaces of experts. Besides the relational network data, at-

tributive properties of the workers about their former network experiences as well as their epistemic beliefs, interests and values are related to their social network integration and activity in their communities of practice. The results show that the egocentric network approach in combination with individual conditions is a useful tool for predicting expertise development in professional contexts and, thus, for a better understanding of the conditions of professional performance.

L67   Nurturing expertise by personal networks

Tuire Palonen, University of Turku, Finland

Monika Rehrl, University of Regensburg, Germany

Hans Gruber, University of Regensburg, Germany

Erno Lehtinen, University of Turku, Finland

The aim of our paper is to ask how working life expertise can be studied and explained by methods of egocentric networks and analytical tools close to it. As learning is seen as an interactive process of participating in various cultural practices and shared learning activities, the development of expertise is dependent on in which expert cultures the worker is taking part (Lave & Wenger, 1991; Wenger, 1998). Rather than functioning within the frames of traditional institutions, many experts are relying on their own personal social networks. The concepts of intentional (Nardi, Whittaker & Schwarz, 2000, 2002) or egocentric (Mc Carty, 2002) network are used in literature in order to describe this kind of creation, maintenance, cultivation and activation of personal social networks. The theories of personal networks complement the socio-cultural view of expertise with the notion of active mind (Hakkarainen, Palonen, Paavola & Lehtinen, 2004). Methods. The data has been gathered as a list of the names in which respondents mark with whom they are having a relationship in advice or information seeking, collaboration and social support. Data is collected in a public organization (N=89). In second phase, the most often advice asked experts are selected from the whole network data in order to compare the variety of their personal networks. The data refer to some attributive property of the workers and some structural measures of their egocentric networks (the size, density and diameter). Result and discussion. Personal network structures reflect various expert profiles and different network strategies. These structural analyses might explain respondents' behaviour in a way, which is difficult to catch by other means. Egocentric network measures can as well be useful tool when predicting expertise development of an individual worker.

L68   An approach to the nature of professional knowledge

Maria Luisa Perez Cabani, University of Girona, Spain

Ester Sangerman Rossell, University of Girona, Spain

In spite of the importance to train futures professionals, still there is not a widely shared conception of what the professional knowledge is, how it is used and how it is constructed. For this reason, and starting from the contributions of different authors and from different perspectives, our interest has been focussed on advancing towards to understand the nature of knowledge which lets the professional of a Psychopedagogycal Advising Team take decisions in an appropriate and coherent way on the different surroundings of his or her professional practice. We have made a qualitative study of a single case from the biographical-narrative perspective and we have analyzed the professional way of a member of a Psychopedagogycal Advising Team, his/her professional practice and the knowledge that manages on specific surroundings. The results of this investigation show that the knowledge that this professional manages in order to offer answers to the complex and contextualitzated situations of her practice, includes a theoretical or scientific knowledge and a practical or personal knowledge. The first, once integrated and reconstructed into the professional practice, allows the professional to reflect on its practice and to analyze it from another perspective. The permanent academical training would help with the integration and the attribution of sense of the scientific knowledge in the practical context strengthening new ways to think and to act to the professional. The practical knowledge, resulting from the learning in the context of work through the partners, the challenges and the reflected experiences, allow the professional to fit into concrete situations. During her performance the adviser develops a reflective practice, result of which we can consider the use strategic of knowledge.

L69   The world of words we dwell. A research on linguistic interactions between children and educator in the nursery-school
Luigina Mortari, Department of Education - University of Verona, Italy

According to socioconstructivism the way of thinking is jointly constituted; on the basis of this presupposition it is important for educational research to investigate the linguistic exchanges occurring in the educational contexts.
Since the first linguistic environments with which we interact early in life are crucial in shaping our way of thinking, the subject of this research is linguistic exchanges in the nursery-school. The research was carried out in a phenomenological frame and according to a qualitative methodology. The object of the inquiry is the verbal interactions occurring in two nursery-schools between the educators and the chil-

dren. The paper presents: (a) the coding system which is inductively constructed and (b) the conversational moves which are privileged by the educators and what kind of interactions they produce in the group of children.

L70   Learning to memorize during preschool: a distancing training program
Florence Labrell, IUFM Orleans-Tours, France
Martine Godefroy, Ecole Henri Wallon St Pierre des Corps, France
Muriel Clement, Ecole maternelle henri Wallon St Pierre des Corps, France

The aim of this study was to elaborate a distancing training program to stimulate the semantic memory during preschool, based on previous researches (Labrell & Ubersfeld, 2004). Our model, which showed that the most cognitively demanding level of talk was particularly efficient to influence young Children's memory performances, was based on Sigel's theory of distancing (Sigel, 1993, 2002). Our experimental method included two groups (training and control group) of 10 children each which were 4 years and 6 months of age as a mean at the beginning of the study. The protocol scheduled for each group a pre-test and a post-test about a memory task about objects' names with pictures. Between the two tests, children from the training group received special distancing interventions with three sets of pictures during ten language episodes in the classroom, thanks to the teacher's verbal interventions. All the training program, which is still on progress, will last nine months but we will have our complete results next Spring.

L71   Metaphoric knowledge - a path from teachers to students
Rosa Maria Amaral, University of Porto, Portugal
Leonor Lencastre, University of Porto, Portugal

Metaphoric knowledge is central to literary-poetic texts comprehension-interpretation and empirical research seems to claim that the traditional view of figurative language understanding is no longer the most comprehensive path to approach this cognitive and linguistic competence. And which perspective do Portuguese Language teachers favour in their teaching practice? The aims of this exploratory study are: to explore teachers' conception about metaphor, to examine the implemented activities and to find if there are differences on metaphor conception and classroom strategies between two groups – one with teachers who have already finished the specific teacher-training program and have more than one year of teaching practice and the other with inexperienced teachers who are initiating the teaching training

and practice. The results of a questionnaire involving 77 teachers from 14 Portuguese schools show that, though subjects consider language as not predominately literal, metaphoric ubiquity is not viewed by 52% as a constitutive characteristic; the comparative approach is privileged by 81% of the subjects; 42% of the subjects do not consider metaphor as an underlying structure of human thought and experience; 41% have never reflected upon the metaphorical process as a high-order cognitive mental strategy involving inferential and problem solving activities; the instructional model implemented favours comprehension activities devaluating conceptual metaphors underlying novel metaphors. Inexperienced teachers seem to consider that metaphor is pervasive in daily language and conceptual metaphors used by students in daily discourse function as primes for literary metaphors. Teachers perception about the acquisition level of difficulty in mastering metaphor programmatic content contrasts with the results from semi-structured interviews previously held where teachers evaluated it as a very difficult competence specially when novel/creative metaphoric entailments are involved.

L72   Children's learning in outdoor environments
Jane Brodin, Stockholm Institute of Education, Sweden

The aim of this paper is to share some reflections concerning children's learning and social interaction in outdoor environments. Play is a natural form of movement. An outdoor play area provides opportunities for children to explore the environment at their own individual levels of development. A creative play experience enables children to test their skills, try new ideas, and seek challenges that cannot be duplicated in other environments. Tody the basic need to play outdoors is largely overlooked in society and the opportunities to learn from outdoor environments are underestimated. This presentation will focus on children's play and learning in different outdoor preschool settings. The study has been conducted with observations and interviews with children between four and five years of age. Children's perspectives are stressed. The results show that children play in areas that are not where adults expect children to play or what adults feel children could or should be able to do. Children prefer to play at hidden places where adults have no insight. Most of the children had a preference to play in the nature. They climbed in trees, they jumped on stones and scampered in water but they did not use constructive play materials. The results also show the importance of supporting childrens social competence in order to stimulate social interaction with other children and adults.

L73   The effectiveness of Instructional Design cycles A case study
Cees Terlouw, University of Twente, Netherlands

A case study with a first year university course on Application Information Technology (AIT) was applied in order to analyze the effectiveness of the improvement actions of the instructional designer in four successive instructional design cycle years. The intention was to apply web-supported project education as the core instructional method. Therefore the central problem was: Which telematic tools can be applied best for web-supported project education? The theoretical framework is twofold: (a) The FUNDES-model, especially the instructional design tool instructional functions that is used in the design phase of the model to choose instructional methods including telematic tools; and (b) Social Constructivism, especially the socio-cultural view (Vygotsky) is central in our theoretical framework for project education. Two research questions should be answered:
1. Do the telematic tools planned for project education in the course AIT realize better the intended instructional functions in four successive instructional design cycles years?
2. What are the consequences of the results of the instructional design of web-supported project education for the FUNDES-model?
The same electronic student questionnaire (49 questions) with 5 point Likert scales was used after the course in every of the four design cycles in order to evaluate the realization of the instructional functions and the goal attainment, and with that the improvement actions of the instructional designer. Medians, percentages and chi square tests were used to analyze the data. The conclusions are that only in the first two years improvement actions with web-supported tools significantly better realized the instructional functions in specific phases of project education, and also the evaluation norm set was reached differently for these phases. The FUNDES-model could be improved.

L74   Instructional Animation versus Static Pictures: A Meta-Analysis
Tim Hoeffler, nwu-Essen, Duisburg-Essen University, Germany
Detlev Leutner, nwu-Essen, Duisburg-Essen University, Germany

The question of whether animations do facilitate learning is still a matter of discussion. As there have been great hopes for the promising opportunities of dynamic visualizations in the past, research nowadays is content with identifying specific circumstances under which animations are superior to static pictures. The present meta-analysis of 26 studies yielding 76 pair-wise comparisons of static and dy-

namic visualizations of instructional content statistically evaluates whether there is an overall advantage of one type of visualization. Secondly it aims at identifying the factors responsible for successful learning with animations or static pictures. The analysis focuses on studies which compared static with animated displays containing no (or just minimal) interactivity and therefore provided an approximately fair contest of the two conditions. The results reveal an average weighted effect size of Cohen's d=0.46 indicating a medium advantage of animations. Furthermore, several factors seem to be associated with greater learning efficacy of animations: (1) Animations should have an interpretational rather than a decorational function (denotation adapted from Carney & Levin, 2002); i.e., the topic to be learned should explicitly be depicted in the animation. (2) Naturalistic video clips are not superior to computer-based animations. (3) Counter intuition, animations appear to be more effective when declarative rather than problem-solving knowledge is requested. On the other hand, static illustrations should include text to compensate for their disadvantages compared to animations – whereas signaling cues like arrows and highlighting in static pictures do not seem to make any difference in learning.

L75 *Teachers' and students' congruence in perception of teaching activities and school subjects*

Ivana Batarelo, Institute for Social Research in Zagreb, Croatia
Iris Marusic, Institute for Social Research in Zagreb, Croatia
Branislava Baranovic, Institute for Social Research in Zagreb, Croatia

Educational research suggests that the choice of the teaching strategy does influence students' perception of the teaching, learning of overall school curriculum. Hence, it is of crucial importance to assure that the chosen teaching method does not conflict with characteristics, needs and perceptions of the students (George & Alexander, 2003). Therefore, in this paper we compare teachers' and students' perception of teaching activities and school subjects. The data was collected as a part of a large-scale national survey of 2134 subject teachers and 2674 students from 121 elementary school in Croatia. Spearman's rho correlation coefficient was used to determine the congruence between teachers' and students' assessment of the frequency of teaching activities and perception of certain dimensions of school subjects. The statistical analysis showed statistically non-significant correlation between students' and teachers' perception of the frequency of certain teaching activities. Teacher-student congruence in perceptions of school subjects was determined according to the following dimensions: interestingness, difficulty, usefulness in current life and importance for the future life. The only statistically significant correla-

tion was found for the perception of difficulty. These results demonstrate that there is a high congruence between teachers and students in their estimation of how difficult a subject is relative to the other subjects, while such congruence does not exist for the other three dimensions. This is probably due to the fact that both students and teachers share the same indicator of subject difficulty - subject grades, while the other three dimensions are more fluid and thus more subject to the different judgments of teachers' and students'. This study indicates that there are substantial differences between teachers and students in their perception of teaching activities and school subjects. Given the importance of students' perceptions, it is crucial for teachers to recognize the needs and opinions of their students.

L76   Pedagogical leadership in tutoring long-term small-groups

Sanni Siitari, University of Helsinki, Finland
Laura Hirsto, University of Helsinki, Finland

The aim of this study is to investigate pedagogical leadership in the context of tutoring long-term small-groups. Traditionally pedagogical leadership has been mostly investigated in organizational contexts, but decentralization has brought leadership issues to a lower level. Changes in society require new kind of skills and leadership style with different attitudes to people, to knowledge and learning and to the role of the leader. Pedagogical leadership promotes capacity-building by developing social, academic, intellectual and professional capital (Sergiovanni, 1998). Good leaders are seen pragmatic and able to negotiate and compromise, work alongside their colleagues, look ahead, anticipate change and prepare people for it (Day & al., 2000: MacBeath, 1998). They actively promote a wide range of formal and informal learning for all their staff. The qualitative analyses are based on the empirical evidence consisting of interviews of the tutors of a long-term small-group-based teacher education program. According to preliminary results it seems that tutoring self-regulated, long-term small-groups requires many qualifications which are closely associated with successful leadership. Day (2003) has specified some tensions and dilemmas of leadership most of which are also found in these results: leadership vs. management, development vs. maintenance, internal vs. external change, autocracy vs. autonomy, personal time vs. professionals tasks and personal values vs. institutional imperatives. The scrutiny of tutoring in the context of long-term small groups provides new aspects for the concept of pedagogical leadership and vice versa.

26 August 2005   12:30 - 13:30   Conference Center   Room A

KEYNOTE ADDRESS

Chair: Beatrice Ligorio, University of Bari, Italy

Contradictions in e-learning communities II: Pedagogies for inclusiveness and diversity
Peter David Renshaw, Griffith University, Australia

Learning has been theorized recently by sociocultural theorists as an inherently dialogical and community-forming process. In his 2003 EARLI keynote (Contradictions in 'learning communities') Wolff-Michael Roth explored some of the contradictions of this approach, particularly when applied as a normative framework in formal educational contexts. In this talk at EARLI 2005 I endeavour to continue the conversation begun by Roth. I suggest that a sociocultural theory of learning directs the attention of educators away from technical concerns regarding individual knowledge acquisition, to social concerns of access, inclusiveness, conformity, diversity and status within the community. How is access to learning managed and distributed within a classroom community? How do processes of inclusion and exclusion operate to facilitate the learning of some individuals and limit the learning of others? How is conformity to classroom norms reconciled with respect for diversity? How do some learners become respected members of a learning community while others remain on the margins. In this talk I explore these key questions by drawing upon classroom studies that I have conducted with colleagues during the last decade. We have researched how a community of learners can be designed and maintained; how particular students adopt different social identities within a learning community across time; how students can learn to resist authority by invoking community norms of playfulness and inventiveness; how micro-moments of interaction between a teacher and a student involve complex professional decisions about how to reconcile an ethic of inclusiveness with respect for community ground rules. In reflecting on these studies, we have come to appreciate the contradictions and challenges of striving simultaneously for 'inclusiveness' and 'community'. We have also come to appreciate the significance of Bakhtin's theory of voice and dialogism as a method of analysis and as a resource for designing more inclusive and just learning communities.

26 August 2005   12:30 - 13:30 Conference Center Room B

KEYNOTE ADDRESS

Chair: Filip Dochy, Katholieke Universiteit Leuven, Belgium

Undergraduate courses as teaching-learning environments
Dai Hounsell, University of Edinbourgh, United Kingdom

The aim of this keynote presentation is to consider how undergraduate courses and programmes of study might be   viewed as 'teaching-learning environments', and what fresh understandings and insights can arise from conceptualising and investigating university-level pedagogical activities and experiences in this way. The presentation draws chiefly on the findings of the Enhancing Teaching-Learning Environments in Undergraduate Courses project, a large-scale, four-year study of first- and final-year courses in four subject areas in a cross-section of UK universities. In the presentation, the concern is with first-year teaching-learning environments as experienced 'on the ground' by the students, as well as in terms of what was intended and perceived by the teaching staff concerned. These experiences and perceptions, and the tensions and challenges associated with them, are approached through the lens of congruence, an adaptation of Biggs' concept of 'constructive alignment'. The focus is on the extent of congruence or 'goodness of fit' between key facets of undergraduate teaching-learning environments-as-experienced and the facilitation of high-quality learning processes and outcomes. A determining feature of the latter is seen in students' grasp of the characteristic ways of thinking and practising in a particular subject area or discipline. The presentation highlights two neglected dimensions of congruent teaching-learning environments in higher education. One is the need to take account of congruence not only with formal curriculum goals but also with students' diverse backgrounds and aspirations, and to engage constructively with these. The second relates to course organisation and management, and arises from the mirroring of large and diverse student intakes in similarly large and role-differentiated course teams, with potentially dysfunctional consequences for the shared understanding of students' needs and concerns, cross-team communication, and consistency of teaching-learning and assessment practices.

26 August 2005   12:30 - 13:30   Conference Center   Room C

KEYNOTE ADDRESS

Chair: Pietro Boscolo, University of Padua, Italy

Regulation of learning: Processes and contexts
Linda Allal, University of Geneva, Switzerland

In order to understand the regulation of learning, it is necessary to take into account internal cognitive, metacognitive and affective processes, as well as contextual factors? social, material, organizational? which influence these processes. Contextual factors, we will argue, do not directly regulate learning; rather they create settings within which internal processes of self-regulation are constructed and deployed. From the point of view of instruction, contextual factors are nonetheless essential. Instructional design consists in the selection, articulation and adaptation of contextual factors that are likely to foster self-regulation of learning.

After distinguishing different aspects of regulation that appear in the literature, the presentation will focus on three four categories of contextual factors and the role they can play in the regulation of learning: (1) social interactions among participants - teachers, students - in instructional activities, (2) affordances and constraints of teaching/learning situations, (3) tools created and used in instruction, (4) assessment procedures integrated in instruction. For each category, a number of conceptual distinctions will be proposed and findings from several empirical studies will be reviewed. In conclusion, the question will be raised as to how these four types of factors can be associated to create more powerful environments fostering regulation of learning.

Paper Presentation
Assessment methods

THEORETICAL ASPECTS

Chair: Filip Dochy, Katholieke Universiteit Leuven, Belgium

A Conceptual Model for Assessment.
Desiree Joosten-ten Brinke, Open University of the Netherlands, Netherlands
Jan Van Bruggen, Open University of the Netherlands, Netherlands
Henry Hermans, Open University of the Netherlands, Netherlands
Rob Koper, Open University of the Netherlands, Netherlands

In assessment the tendency is away from massive standardized testing to assessment that is more integrated in learning and instruction and that addresses complex skills. Current specifications for interoperability of assessments are still very much focused on traditional testing. The conceptual foundations of these existing specifications will allow only limited support to new types of assessments. In this paper we present a conceptual assessment model, cast in UML notation, that offers to support a large range of assessment types. Also the method we used in the development of the model is presented.

The Use of Generalizability (G) Theory in the Analysis of Wide Open-Ended Interviews in Assessment Research with Multiple Cultural Groups
Guillermo Solano-Flores, American Institutes for Research, United States
Min Li, University of Washington, Seattle, United States
Melissa Kwon, University of California, Santa Barbara, United States

Recent developments in test validation have focused on the cognitive demands of mathematics performance tasks (Magone, Cai, Silver, & Wang, 1994) and the cognitive activities elicited by hands-on and concept map tasks (Baxter, Elder, & Glaser, 1996; Hamilton, Nussbaum, & Snow, 1997; Baxter & Glaser, 1998; Ruiz-Primo, Schultz, Li, & Shavelson, 1999) but have failed to analyze cognitive activity within a cultural context. Indeed, serious concerns have been raised about the fact that current research on cognition and testing seems to be based on the false assumption that all principles in cognition are universal (Pellegrino, Chudowsky, & Glaser,

2001). This study is an attempt to integrate the reasoning utilized in a student's cognitive activity and the cultural context in which a student takes a test to result in a more dependable measure for assessing students across various cultural groups. We used generalizability (G) theory to analyze the properties of measures obtained with wide open-ended (WOE) instruments—instruments that pose no response length or format restrictions and allow for modifications in the wording of questions that reflect respondent characteristics. We scored students from different cultural groups' responses to WOE interview questions probing test meaningfulness—the extent to which individuals make sense of tests by relating the content of items to their personal experiences. G studies revealed that WOE interviews could be reliably analyzed. Also, the number of interview questions needed to obtain dependable measures of test meaningfulness varied across cultural groups. Our approach can be used to examine the technical quality of information obtained with interviews and verbal protocols and the extent to which the results can be generalized.

Exploring aprioristic and empirical difficulties in sources of content of large scale objective exam items
Sandra Castaneda-Figueiras, National Autonomus University of Mexico, Mexico
J. Isaac Ortega, National Autonomus University of Mexico, Mexico
Raquel Garcia Jurado, National Autonomus University of Mexico, Mexico

It was of interest to identify the incidence of aprioristic difficulties of four content sources on the global score of difficulty in objective nation-wide exam items and to establish differential effects of three levels of conceptual demand included in the analysed sources on empirical difficulty of their associate items. 10 trained judges estimated the aprioristic difficulties of the four content sources of 96 items selected at random. With these data a stepwise multiple regression analysis was run so as to conceptually understand the co occurrences between the assessed sources and the criterion variable global score of aprioristic difficulty. The regression model combined the four sources ($R2 = .995$). The bigger partial regression coefficient ($R = .838$) was obtained by the Cognitive Operation source, followed by R2 of change of 0.16 for the Field of Knowledge source, 0.09 for Item Format and 0.03 for Item Context. Once the incidences were established, a simple AVAR was run for each source using the empirical difficulties obtained in a random sample of 612 examinees. The results showed significant differences among the three levels of conceptual demand of two of the four studied sources Cognitive Operation, $F (2, 93 df) = 3.25$, $p = 0.04$ and Knowledge Field, $F (2, 94 df) = 4.51$, $p = 0.03$. Since measurement is an inferencial process, studies that validate content sources constitute a desirable

line of evidence generation in favour of intrinsic and extrinsic factors linked to the construct items aimed to be measured (v. gr. cognitive and conceptual difficulties about the subject matter), particularly when experimental control of nation wide exams is not possible to carry out as factors cannot be manipulated by the researcher and when very little information about a possible systematic error of measurement can be derived from the comunicentric index of empirical difficulty.

Concurrent Validity of Notebooks as Assessment Tools for Instruction and Accountability
Maria Araceli Ruiz-Primo, Stanford University, United States
Min Li, University of Washington, United States
Marsha   Ing, University of California, United States

The report, Knowing What Students Know, proposes an assessment system that is coherent, comprehensive, and continuous (Pellegrino, Chudowsky, & Glaser, 2001). Such an assessment system would require placing classroom assessments and accountability systems within the same conceptual framework. The report argues that, in order to provide a more comprehensive picture of the impact of teachers (and schools) on student learning, accountability systems should include measures of student work (Frederiksen & White, 2004). More precisely, assessment tasks and interpretation methods are needed not only to help improve student learning in a particular curriculum during daily instruction, but also to provide information about student performance that is useful for accountability purposes. This paper focuses on examining students' science notebooks as a classroom-based assessment tool to be considered for use in accountability systems. More specifically, the paper focuses on evaluating one aspect of the validity of notebooks as assessment tools, concurrent validity -- the extent to which notebook scores yield the same results as other measures focusing on the same learning goals. The study involves thirty-six notebooks sampled from six classrooms (six notebooks selected within each classroom). Students were administered three on-demand embedded assessments at three critical junctures of a buoyancy unit. The embedded assessments involved three types of prompts: Graphing, Predict-Observe-Explain (POE), and Open-Ended Question. All students were administered a 43-item multiple-choice test in a pre-posttest design. In addition to the multiple-choice test, the post-test included three other assessments, a POE prompt, a performance assessment, and a free-response question on why things sink and float. The paper will provide information about the internal consistency and inter-rater reliability across the different instruments used. The pattern of correlations between the set of measures will be explored and infor-

mation about the concurrent validity of notebook scores will be provided.

M 2   26 August 2005   14:30 - 15:50   Room A007

Paper Presentation
Culture and Education

IDEOLOGIES AND IDENTITIES

Chair: Nave Maslovaty, Bar Ilan University, Israel

A multimodal analysis of the presentation of Massacres in Israeli History text-books
Nurit Elhanan, Tel-aviv university and David Yellin College, Israel

This paper is a multimodal analysis of reports about the massacres of the Palestinian indiginous population committed by Israeli soldiers during the 1948 war, as they are represented in current Israeli schoolbooks. My general question is what do the schoolbooks offer both in terms of human values and ideology and in terms of literacy, namely discourse, genres and visual design. A discourse and a multimodal analyses of the texts and the visuals that accompany them, reveal the semiotic ways in which History is recontextualized to Education. For instance, a particular use of History genres as well as of visuals and layout leads the reader to the conclusion that even though the massacres were morally condemned, they were for the good of the Israeli nation and in accordance with Zionist ideologies. The analysis will reveal the rules of distribution and recontextualization of History to educational purposes, while examining the structures and functions of editorial texts, photographs and their captions, the use of colours and the meaning of layout. In terms of language, there is a different grammar of presentation regarding the Palestinians, which is apparrant in the reports about the massacres. Though the books make use of the genres of History, they manipulate them for the purpose of indoctrination and add to them features that are taken from political discourse(based on the analysis of Coffin 1997). Students learn from these reports that human suffering and human empathy are race or religion-dependent.

Ideological Dissonance in the Teaching Process
Lea Baratz, Achva College of Education, Israel

The study examined the implications of literary material for the teaching process, especially in situations where the teaching unit was incompatible with the teacher's worldview and that of prevailing public sentiments. In presenting the esthetic experience, the teacher is liable to find himself confronting a pedagogical method that doesn't correspond to his own ideological position. Obviously, each choice reflects the teacher's worldview. Ideology satisfies one of the needs of Man, the need for his self-awareness. Immanent ideology – immanent ideologies attribute to people certain values and intentions. It is not easy to distinguish between immanent ideology and practical thinking. In the process of learning, there is an awareness-producing action. Dissonance is a stage of awareness. The molding of the new arrangement of knowledge reaffirms or rejects the ideological dissonance that has been created, subject to the person's ability to cope with the content at hand. Cognitive dissonance is the term generally used in the professional literature. Cognitive dissonance, however, is dissonance created after an event has taken place. In cognitive dissonance, the event (the learning process, in this case) takes place despite the prior knowledge that it will cause a feeling of things being mismatched. On a theoretical level, teachers are ready to bring any text to class. The educational idea which seeks to teach from within the foreign, or seeks to educate in a worthy, pluralistic manner is a good one, but it still lacks the mental maturity needed to struggle with the text, and this creates ideological dissonance. In light of all this, one can see the tie between the socio-political climate and the teachers' points of view. On the operative level various teaching methods may be put to use in the classroom in order to create a process of teaching from within the foreign.

Children's Construction of National Identity and Museum Education in Cyprus
Chara Makriyianni, University of Cambridge, United Kingdom

The issue of learning and teaching history in countries with a contested past is usually largely debated. Museum Education has a unique contribution to the learning and teaching of history. The question of the impact of learning in two museums in Cyprus was assessed through a non-equivalent control group quasi-experimental design with the use of a well established social-psychological questionnaire (Barrett, 2004) and content analysis of a small narrative that the children were asked to produce before and after their museum visits. The findings point to the background of national identifications on which the museum visits are having their influence as

well as significant changes in aspects regarding the internalisation of their identities and stereotypes regarding in-groups and out-groups. The two museums examined (a struggle museum and an archaeological museum) had both similar and different impact on some aspects of their national identifications but opposing impact on their perceptions and stereotyping of out-groups. The implications of the results are discussed in terms of the significance of museum education for peace building and are framed within a larger debate about the role of history teaching in promoting critical thinking skills, citizenship and empathy. Some propositions for a museum educational programme that meets these requirements are also provided.

Changing conceptual understandings of Europe amongst 10-year-old greek-cypriot pupils: a study of the impact of a primary school curricular intervention
Stavroula Philippou, Primary School Teacher, Cyprus

One of the objectives of EU educational policy has been to promote a European dimension in education as a means of developing a sense of European citizenship and identity amongst pupils, two notions that have raised a number of debates and discussions. One argument has been that geographical knowledge of own and European countries enhances identification with national and European identities and indeed some definitions of national identity include aspects of knowledge of national geography. There is a scarcity of research, however, exploring Children's understandings of geographical concepts and of Europe; the few (psychological and educational) studies available indicate a number of difficulties faced by children in dealing with geographical concepts. These issues were addressed in a curriculum development, quasi-experimental, action research project aiming at introducing a European dimension in the History and Geography curriculum, which was implemented amongst 10-year-old pupils in Cyprus during the school year 2000-2001. The paper focuses on those findings which concern pupils' geographical understandings of Europe and on how these related to adherence to a European identity. Findings derive from both pre- and post-evaluation and the discussion is conducted through comparisons between and within the experimental and control groups, in order to identify the impact of the curricular intervention. Findings are structured into four sections; the first explores pupil representations of Europe and the EU and refers to their general understandings and knowledge of Europe. The second part investigates their landmark and configurational knowledge of Europe and the EU, the third and fourth focus on how pupils located Cyprus in relation to Europe and Europe in relation to the world respectively. The analysis indicates that both experimental and control groups improved in the areas investigated; however, the

quantity and nature of these changes were different. The discussion of these differences and changes concludes the paper.

M 3   26 August 2005   14:30 - 15:50   Room A108

Paper Presentation
Development of Expertise in Specific Domains

LEARNING IN SPECIALIZED DOMAINS

Chair: Stephan Dutke, University of Kaiserslautern, Germany

Learning about time through multiple environments and according multiple epistemological and pedagogical perspectives
Katerina Plakitsi, University of Ioannina, Greece
Vasilis Kokkotas, University of Athens, Greece

Contemporary science and culture both challenge the monothematic approach of epistemology and pedagogy of positivistic empiricism and functionalistic formalism. If we follow the approach of Polanyi about tacit knowledge, we will admit that articulated thought involves mechanisms of irrational unpredictable elaboration (Polanyi 2002). On the other hand learning is accomplished through the exchange of semiotic systems and communication in informal and figurative language (involves socialized humanity and its culture). As we have also tried to prove reason is not a closed system of rules but consists in the autonomous self-examination of reflexion (Plakitsi, Kokkotas 2003), whose substantiation does not consists in self-proved rules but, as Willke writes, in thematization (Willke 1996). (This in turn posits the interdisciplinary aspect of learning). In the case of time, as one of the fundamental categories of thought (Piaget 1969, Ogborn & Mariani 1995), we carried out a researching program for three years in Athens. In the first phase of our program, we recorded pupils' conceptions of time, following the Piagetian method of clinical interview. At the second phase of our program we expanded our study to the social constructivist field; and we tried to help pupils to scaffolding their ideas about time. We designed a research program to study a curriculum including teaching strategies adapted to children of 9-10 years. At the third phase we created open learning environments (Roth, 1995), and we used learning strategies, such as dialogues (Lemke, 1990), argumentation (Toulmin, 1958, Walton, 1996), academic controversies (Johnson & Johnson, 1995) etc. Pupils exchange their ideas, they

were telling stories about time, and they argued using many types of justifications. They challenged each other; but also they negotiate their ideas and make a synthesis that made meaning to them. The first outcomes of this project show off the necessity of integration through inter-disciplinarity.

Why law lecturers sometimes give UP: teaching difficulties experienced by UP law lecturers
Gail Volschenk, University of Pretoria, South Africa

Law lecturers in higher education have a multifaceted and complex role and an obligation to pursue excellence in several directions at the same time, of which amongst others, teaching. Their role as teacher implies equipping students to be able to function independently in future society. Yet, many law lecturers are not trained educators. Consequently lecturers of law face huge challenges and many need to acquire an array of competencies (Ramsden, in Johnstone, 1996; Fielden, 2001). Seen against this background, support regarding educational issues is a necessity. Experience working as Education Consultant, allocated to the Faculty of Law at the University of Pretoria, has shown that many lecturers experience difficulty with educational related aspects. In order to successfully guide law lecturers in as far as educational issues are concerned, it is important to understand how they perceive teaching and what specific teaching-related problems they experience. The following questions guided the research:
How do lecturers describe their teaching?What is the teaching difficulties lecturers experience? The research design is qualitative. Data was collected by means of in-depth, individual interviews, seeking out lecturers' teaching related problems. Participants were asked two questions: How would you describe your teaching? Tell me about a time when you experienced difficulty in your teaching? The data was coded and sorted and the analysis resulted in the identification of themes. This study has not only given lecturers the opportunity to reflect on their current teaching practice. Moreover the findings confirm that lecturers experience teaching-related difficulties. Key to the findings is the mismatch between lecturers' anticipated outcomes for students and what they actually achieve. Lecturers acknowledge their inability to assist students to achieve the set outcomes as their biggest shortfall as law educators. This study paves the way for relevant, significant educational support and development of law lecturers.

A model for attitudes towards statistics, reasoning abilities and course performance
Dirk Tempelaar, University Maastricht, Netherlands

The main contribution of this paper is the empirical testing of a structural equation model with the purpose of advancing our knowledge about the link between the outcome of a course in statistics on the one hand, and attitudes and beliefs as well as prior reasoning abilities on the other. To this purpose measurement models for reasoning abilities, using the Statistical Reasoning Assessment (SRA) instrument, see Garfield (2003), and for attitudes and beliefs, using the Survey of Attitudes Towards Statistics (SATS), see Schau, Stevens, Dauphinee and DeVecchio (1995), are developed that are used in a structural equation model in conjunction with constructs combining the results of various quizzes and tests. Main conclusions derived from the estimated model are that attitudes and reasoning abilities appear to be independent constructs, that both constructs have a moderate impact on course performances, and that the size of that impact and its specific nature varies with the type of course performance.

M 4   26 August 2005   14:30 - 15:50   Room A019

Paper Presentation
Mathematics Education

DIFFICULTIES AND MOTIVATION IN MATHEMATICS LEARNING

Chair: Karl-Heinz Pogner, Copenhagen Business School, Denmark

The impact of expectancy and value of mathematics on students' commitment
Roch Chouinard, University of Montreal, Canada
Thierry Karsenti, University of Montreal, Canada

The authors examined the predictive validity of a model of motivation for mathematics including expectancy (competence and control beliefs) and value (interest and orientation goals) as main variables. The relationships of these variables to the perception of support from social agents and commitment were examined according to age and gender of the participants. Several self-reported scales measuring the support received from parents and teachers, the participants' competence and control beliefs in mathematics, their interest, and their mastery, performance-approach

and performance-avoidance goals, as well as their commitment were administered to 634 Grade 7 to Grade 11 students (313 females, 321 males). Four groups were formed on the basis of gender and the median of age. Several multiple regression analyses were performed on each group. Results indicate that the model explains a significant portion of the variance of commitment in mathematics. Analyses also reveal that commitment is directly predicted for all groups by both mastery and performance-avoidance goals. Moreover, competence beliefs predicted commitment of younger females and older males while control beliefs also predicted older males' commitment. Expectancy beliefs both predicted mastery and performance-avoidance goals and thus exerted an indirect effect on commitment. As for the role of social agents, results showed that the perception of parental support mostly influenced variables associated with value of mathematics while teachers' support acted on expectancy beliefs and, to a lesser degree, on value. The present study thus confirms the heuristic value of the expectancy-value approach to motivation, it also shows that, at least in mathematics, value directly explains the variance on commitment while expectancy beliefs and the support of social agents act as mediators and contribute indirectly in model. Finally, this study stresses the importance of teachers' support on adolescents' academic expectancy and value.

Constructing significant qualities and divergences in students' math self-system structures
Marja-Liisa Malmivuori, University of Helsinki, Finland

The study to be presented relates to the idea of self-systems and self-system processes as the broader theoretical framework for describing the essential structures and dynamical aspects of personal learning processes and experiences. Self-systems point here to important habitual and structural personal metacognitive, cognitive and affective sets or systems and behavioural patterns constructed through past learning experiences. In this presentation we will construct connections between the kind of students? self-perceptions, affective responses and behavioural patterns that have turned out to represent significant factors in math learning and problem solving. Moreover, the research results of the variations in these self-system structures along with students? gender and math performance level will reveal the appearance and development of important individual differences in mathematics learning in Finnish school context. Attention is paid to the differences in the qualities and connections of students? self-confidence, their preferences or anxiety responses and their self-regulatory behavioural patterns. The empirical research results are based on the quantitative data gathered from 682 seventh-grade students

(age 13) in 17 different Finnish secondary schools. The measurement consisted of two structured questionnaires designed for the study and including students? responses to statements with continuous Likert-type scales. Math performance level was measured by a math test consisting of 26 math problems of different school math disciplines. The obtained research results support the theoretical model of the study. They indicated significant relations between students? self-perceptions, affective responses and self-regulatory behavioural patterns. Also connections were found between these constructs and students? math performance. The research results of the study also show that significant gender- as well as performance-related variations in students? math self-systems appear already at the beginning of Finnish secondary school. The connections of these differences to the school and classroom contexts will be discussed.

Forgetting during the calculation of multi-step addition and subtraction problems in children with math difficulties
Ernest van Lieshout, Vrije Universiteit Amsterdam, Netherlands
Evelien Dirks, Vrije Universiteit Amsterdam, Netherlands

According to Geary and Hoard (2001), children with math difficulties or dyscalculia are not especially hampered by problems due to misunderstanding of the required procedure, but have more trouble with keeping track of the calculation process. In the present study the calculation process itself was analyzed as a process in which keeping things in working memory plays a role. This was done by scoring calculation errors as either errors due to forgetting or as other errors. Ten pupils without math difficulties and 20 pupils with math difficulties (mean age 9.9) were selected from grade 3 and 4 of Dutch elementary schools. They had to solve 20 addition and subtraction problems with two two-digit numbers (e.g. 45 – 28 =). Forgetting was manipulated by a long or short problem presentation. The errors the children made during the solution process were categorized as (1) errors consisting of forgetting (part) of the problem or an intermediate solution and (2) errors that were presumably not caused by forgetting the problem or steps in the solution. A short problem presentation raised the number or errors due to forgetting significantly more in the MD than the control group. In conclusion, the children having math difficulties had more trouble when they had to solve a multi-step problem purely mentally than the children without mathematics difficulties. For the teaching of children with math problems it seems worthwhile to seek solutions for their forgetting problems rather than sticking to repeated instruction of solution strategies.

Students, teachers, experts reflect on errors and difficulties in the mathematics teaching/learning process. Self-evaluation in primary school
Silvana Mosca, Ministero Istruzione-Ufficio Scolastico Regionale, Italy

This contribution concerns a self-evaluation experience in a network of schools in Italy (Torino), Hungary (Budapest), Spain (Granada), Greece (Athens), involved in the VALMAT (Evaluation in Mathematics) project. The project aims at promoting the interaction of teachers, students and experts in order to stimulate the discussion on the analysis of learning obstacles and on how to foster improvement and motivation to do maths in school and outside of the classroom. The theoretical framework follows a psycho-pedagogic, constructive and meta-cognitive approach which considers error an opportunity for learning. The teachers fill in a questionnaire before the children take the diagnostic tests. They write their expectations of how the students will perform, what kind of difficulties they will encounter. At the end of the test the students receive five small coloured stickers. They are asked to put them by the five test items they feel most confident they have done correctly (jolly faces technique). The analysis of the answers given by teachers and students is rich in data, reflection, observations and discussions. There may be a positive correspondence or a negative correspondence between what the students think and what they are actually able to do. The student's evaluation, that depends on the perception they have of their own learning, is also related to the evaluation given by the teachers regarding the abilities of their pupils. The most interesting cases are those where there is no correspondence between what the students think and what they actually know, for instance, writing a half in the form of a decimal number, where the meta-cognition influence is stronger. The questions of the tests used in the VALMAT project aim at assessing both mathematical knowledge and cognitive strategies. Analyzing and evaluating the student's answers to the questions requiring argumentation has been very productive for the teachers.

Paper Presentation
Educational Effectiveness

TEACHER AND SCHOOL EFFECTIVENESS

Chair: Niki Tsaggaridou, University of Cyprus, Cyprus

Using the educational effectiveness knowledge base to examine teacher effectiveness in Physical Education
Leonidas Kyriakidis, Univesity of Cyprus, Cyprus
Niki Tsangaridou, University of Cyprus, Cyprus

This paper presents results of an evaluation study in Physical Education in which 23 schools, 49 classes and 1142 year 4 Cypriot pupils participated. The major aim of this study was to identify the extent to which a theoretical framework of educational effectiveness research based on Creemers' model can be developed. Results of the study concerning the instructional role of teachers in Physical Education are presented here. Specifically, we attempt to describe classroom teachers' behaviours in physical education classes, and to explore how these behaviours affect their practices and their effectiveness. Data collection strategies included observations, questionnaire to students and teachers and a performance criterion test, which was administered both at the beginning and at the end of school year 2002-2003. Multi-level modelling techniques were used to analyse the data. It was found that the influences on pupil achievement are multilevel and the net effect of teachers was higher than that of schools. Moreover, variables concerning with teacher behaviour in the classroom were associated with student progress in Physical Education. However, the majority of Cypriot primary teachers devoted high rates of instructional time to management, transition, and waiting time and therefore the amount of time students were actually engaged in motor activity was low. In addition, teachers devoted a great amount of subject matter motor engagement time in games and less time to skill practice. Furthermore, a lot of variation among the way teachers behaved was identified. Thus, cluster analysis was used and revealed five homogeneous groups of teachers according to their instructional behaviour. Cluster group membership was also found to be related with teacher effectiveness. Finally, implications of findings are drawn. It is also suggested that different type of support should be provided to each group in order to help them improve their instructional behaviour and

make them effective.

The Toronto District School Board and Elementary Report Card Data: A Pilot Analysis, 2001-3
Robert Brown, Toronto District School Board, Canada
Erhan Sinay, Toronto District School Board, Canada

The TDSB was formed in 1998 with the amalgamation of seven local school boards. In addition to issues of amalgamation, the TDSB is located in one of the most diverse populations in the world, with students speaking over 75 languages and representing over 200 countries of birth. Within this context, Toronto and Ontario educators have been dealing over the past few years with the introduction of standardized testing. This has provided a backdrop for local boards in Ontario to interpret and utilize different levels of data. Available research on teacher assessment at the elementary (grades 1-8) level was very limited. The TDSB started to collect elementary report card information centrally starting in 2001-2. This paper is one of the first analyses of this information. Part 1: Multi-method descriptive analysis of overall patterns. Part 1 is intended to serve as an introductory guide to more detailed research. Directions include pattern of subject achievement by grade; at-risk patterns of one subject across elementary/secondary panels; development of 'at risk' measures; year-to-year differences; the relationship between Report Card and similar provincial standardized tests. Part 2: Hierarchical Linear Model. The hierarchical linear model method will be utilized which enables researchers to utilize mean achievement and certain structural parameters that characterize the equity in the social distribution of achievement as multivariate outcomes for each school. Variation in these school-level outcomes is then explained as a function of school characteristics. Therefore this methodological discussion will focus on the student-level and school-level differences. We will use a two-level HLM microcomputer program to estimate the school effects for twelve subject/grade combinations: English, Math and Science for Grades 5, 6, 7, and 8.

Twelve years of value added feedback – what is the pattern of school improvement?
Sally Mary Thomas, University of Bristol, United Kingdom
Wen Jung Peng, University of Bristol, United Kingdom

This paper provides an overview of the findings from a unique twelve-year study into value added measures of secondary school performance in one English local

education authority (Lancashire LEA). The Lancashire value added project was set up in 1992 aims to provide an innovative system of secondary school evaluation and self-evaluation via the feedback of student performance, attitude and other data. The feedback information provided by the project is intended to inform the improvement processes of state funded schools within the Lancashire LEA region. The evaluation process is not intended for external accountability purposes, rather a tool for internal accountability and school improvement, in terms of assessing the performance of different subjects and groups of pupils as well as the whole school. Since the early beginnings, the project has expanded to incorporate a number of different types of value added evaluation feedback and the methodology employs 'state of the art' statistical techniques such as multilevel modelling. This paper utilises the unique Lancashire LEA 1993-2003 GCSE examination dataset matched to prior attainment and other pupil background variables to explore the long- term trends in schools valued added performance across eleven consecutive pupil cohorts. Different analyses controlling for a variety of pupil factors such as prior attainment and entitlement to free schools meals were carried out and the research methodology builds on previous research (see Thomas, 2001, Gray, Goldstein and Thomas, 2001, 2003). The results are discussed in relation to current UK government recommendations for a national value added system and improvements to the way information is provided to schools to assist teachers in evaluating school improvement.

Teaching factors that distinguish the most from the least effective schools in reading
Constantinos Papanastasiou, University of Cyprus, Cyprus

The universal importance of reading, as one of the components of literacy was highlighted when UNESCO (United Nations Educational, Scientific and Cultural Organization) declared 1990 as the International Year of Literacy. Therefore, one of the main purposes of education in all countries is to ensure that school students acquire the skills to read with understanding. Primary schools in general are responsible for the teaching of basic literacy skills. In all countries of the world, societies vary in terms of the degree of equality among their communities and among their schools. Given that schools vary, the question arises as to why some schools have high student achievement and some have low average student achievement. This study was based on data from the student questionnaire and tests of the PIRLS study, which was undertaken under the auspices of IEA. The sample included 3001 students whose average age was 9.7 at the time of testing. The statistical analysis used to distinguish the more effective and less effective schools was based on the residuals.

From this analysis four factors were found to be the reasons for school differences in reading achievement. The first factor which is the strongest one is related to the things happening after reading in class. The second most important factor is related to reading outside school. The third factor is related to time spent on homework, while the forth factor included things happening during teaching. Questions related to attitudes and school climate were not to significant in this analysis.

M 6   26 August 2005   14:30 - 15:50   Room A111

Paper Presentation
Metacognition

SELF CONCEPT

Chair: Alexander Renk, University of Freiburg, Germany

The power of g: How to predict task-specific expectancies from general academic self-concept
Oliver Dickhaeuser, University of Giessen, Germany
Marc-Andre Reinhard, University of Mannheim, Germany

Expectancies play an important role in shaping achievement-related behaviour. The impact of self-concept on expectancies of success has been assumed to be due to specific rather than general academic self-concept. Based on dual-process-theories of information processing, the present paper argues that given peripheral information-processing, expectancies will depend on general academic self-concept whereas given central information-processing expectancies will depend on task-specific self-concepts. Results from Study 1 (N = 104) showed that specific self-concept was predictive on expectancies only in individuals high in need for cognition (NFC; i.e. the tendency to engage in and enjoy effortful cognitive endeavours), whereas in individuals low in NFC, expectancies could be predicted from the general self-concept. After experimentally inducing high relevance of correct expectancy-ratings in Study 2 (N = 252), only the specific self-concept was predictive on expectancies independent of NFC, whereas after inducing low relevance, the results from Study 1 were replicated. In Study 3 (Study 3; N = 193), low or high cognitive load was induced. Given high cognitive load, only the general self-concept was predictive on expectancies independent of NFC, whereas in the low cognitive load condition, the results agreed with the findings from Study 1. The results are important for the

understanding of students' expectancies. They support the idea that inferring expectancies from the self-concept is a cognitive activity. Whether general or specific self-concepts are used to infer the expectancies seems to be a function of the type of information-processing used by an individual or in a specific situation.

Causal Relation Between Academic self-concept and academic achievement: effect of the contingency of academic self-concept

Cristina Antunes, Superior School of Nursing UTAD, Portugal
Anne Marie Fontaine, Faculty of Psychology and Education Sciences UP, Portugal

Although academic self-concept has been referred in the research as a motivational variable related with academic performance, the causal relationship between these variables is still under questioning. Research outcomes seem to indicate that the direction of the causality depends on the age of the students and on the type of measures used to assess academic performance. The measures used to evaluate academic self-concept, either specific or more generalized ones, may also have importance. Further more, some children may develop more stable academic self-concept while others may develop more unstable or contingent academic-self-concept and this can also influence the relation of causality. Little research has been done using structural equation models on longitudinal data to analyze the direction of causality, which is, according to several authors, a requisite to observe accurately the causal predominance between academic self-concept and academic performance. This research aimed to answer the following questions: (a) are there any age and sex differences in the causal predominance of general and specific (Math and Language) academic self-concept and academic achievement? (b) Does the independent/contingent academic self-concept introduce any difference in the causal relation between academic self-concept and academic achievement? To answer these questions, several models of causal relation with and without contingent/independent academic self-concept were performed and compared, following the parsimony and best fit indices criteria. Two cohorts of students (292 6th and 7th graders and 163 10th graders) were tested three times, with one year of interval in between. Academic self-concept was assessed using the Self-Description Questionnaire (SDQ) (Marsh, 1988), contingent and independent academic self—concept using a questionnaire designed for this study, and academic achievement was assessed using self-reported grades on several core subjects. LISREL structural equations' models were used to test the causal relations between these variables.

Promoting children's self-perceptions by working together
Vera Monteiro, Superior de Psicologia Aplicada, Portugal
Margarida Cesar, Universidade de Lisboa, Portugal

The primary purpose of this study was to determine the impact of a tutorial reading program with peers in the multiple self-concept domains and self-esteem of children. Participants were 160 children from elementary school, 80 4th graders and 80 2nd graders. From the older children, 40 were chosen to participate in a tutorial setting with the younger. In this way, 40 dyads were selected, while the other 80 children were the control group, who did not participate in peer tutoring. Instruments used to assess self concept were the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children by Harter and Pike (1983), for 2nd grade, and the Self-Perception Profile for Children also by Harter (1985), for 4th grade. Both instrument have been adapted for the Portuguese population. In the tutorial sessions we developed a Paired Reading Program. The children to be tutored (2nd grade) were paired with a helper from the 4th grade. The tutor/tutee pair was then instructed in this Paired Reading Program. Analyses assessing the Children's self-perceptions show the increment of the levels in all self-concept domains, and self-esteem for tutors and tutees. Tutors and tutees had more positive self- perceptions than did children who did not participate in the Paired Reading Program. The results will be discussed in terms of the relevance of tutorial situations for the development of multiple self-concept domains, and self-esteem and the use of these situations in school practices.

The effects of ability self-perception, perceived difficulty, performance expectations, and subjective value in various academic domains on academic performance and educational choice
Georgia Stephanou, University of Western Macedonia, Greece

This study, based on Wigfield and Eccles's expectancy-value model, aimed at investigating: (a) the constructs of value attached to mathematics, Ancient Greek, physics, and language, (b) the role of ability self-perception, perceived difficulty, performance expectations, and value placed on these specific academic domains in the generation of students' academic year performance and educational choice, and (c) the effects of ability self-perception and perceived difficulty on the formation of performance expectations, and on the impact of performance expectations on performance. The participants (N = 272 students, both gender, 10th grade), at the middle of a first school term, completed all the scales. Academic performance and

educational choice were estimated from the School Record. The results from x2 tests showed that the vast majority of the students placed high value on an academic domain because they perceived it as facilitator in their daily life or as useful for achieving their academic - vocational goals. The results from Manovas, followed by the results from Discriminant Function analysis, revealed that students' beliefs (in particular, ability self-perception and perceived difficulty) in mathematics were more powerful determinants of educational choice than students' beliefs in the other academic domains. The same kind of analyses also showed that ability self-perception, compared to other variables, was the most powerful factor in discriminating the successful from the unsuccessful group of students (particularly, in mathematics). A series of hierarchical regression analysis illustrated that perceived difficulty and, mainly, ability self-perception influenced the formation of performance expectations, and of the impact of performance expectations on performance. The findings also showed that task value and performance expectations was more closely tied to educational choice and academic performance, respectively. There were some differences in the observed relations among the academic domains. The findings are discussed for their implications to school practice and future research.

M 7   26 August 2005   14:30 - 15:50   Room A112

Paper Presentation

SELF EFFICACY

Chair: Zacharias Zacharia, University of Cyprus, Cyprus

How does principals' leadership style relate to teachers' sense of self-efficacy? The link to effective instruction environment
Ronit Bogler, The Open University of Israel, Israel
Tali Wolf, University of Haifa, Israel

In this study we examined the ways in which teachers' perceptions of their principals' leadership style affected their sense of self-efficacy (SE) in relation to two social systems within the school: teachers' interactions with students, and teachers' interaction with their colleagues and the school administration. We referred to the principals' transformational (charisma, personal consideration, and intellectual stimulation) and transactional (contingent reward and management by exception) leadership styles. A sample was composed of 98 teachers, most of whom were from

elementary schools in Israel. A teacher efficacy scale and the Multifactor Leadership Questionnaire (MLQ), measuring principals' transformational and transactional leadership style, were administered to the teachers in their schools by a researcher. Correlation and regression analyses were used to examine the relationships among the variables. Our primary concern was with individual teacher efficacy; hence individual teacher SE was used as the unit of analysis. Findings showed that teachers' perception of their principals as exhibiting personal consideration behavior predicted the teachers' beliefs of SE toward their students. Teachers who perceived their principals as charismatic individuals, exhibiting personal consideration, but surprisingly with no or little intellectual stimulation behavior, were more likely to report on feelings of SE toward their colleagues and the school. Additional background variables, such as school orientation (secular or religious) and teachers' level of education also predicted teachers' sense of SE. Findings are discussed in relation to their impact on effective instruction environment.

Self-efficacy beliefs towards mathematics and students' performance: A comparison study based on timss-r data for Cyprus, Singapore and South Africa
Modestina Modestou, University of Cyprus, Cyprus
Rodoula Sampson, University of Cyprus, Cyprus

In this article, we discuss the relation between self-efficacy beliefs, as a special kind of motivational beliefs, and performance in mathematics in three different countries of diverse achievement scores at TIMSS-R 1999 study. In particular, data are taken from Singapore, Cyprus and South Africa, amongst which multiple comparisons are made concerning the relation between self-efficacy beliefs and performance in mathematics. In addition, the effects of family educational background on the above mentioned relation are examined in all three countries. A general framework is presented according to which, students' performance in mathematics can be predicted by self-efficacy beliefs but to a different extend for each country. The power of self-efficacy beliefs as an indicator of students' performance has been found to differentiate in relation to the cultural and the educational environment of the student.

Efficacy Beliefs of Preservice Mathematics Teachers
Mine Isiksal, METU, Turkey
Erdinc Cakiroglu, METU, Turkey

This study investigates the relationship among the three constructs namely math-

ematics teaching efficacy beliefs, mathematics self-efficacy beliefs and academic performance of 145 preservice mathematics teachers in Turkey. Results revealed statistically significant relationship between mathematics self-efficacy beliefs and mathematics teaching efficacy beliefs. In addition, academic performance were also significantly correlated to mathematics self efficacy beliefs. However, results indicate no significant relation between mathematics teaching efficacy beliefs and performance. Although the present study is small, the results tentatively suggest the further investigation of the relationship between self-efficacy beliefs, performance and other variables including both cognitive and affective constructs. Studying how mathematics self-efficacy beliefs and teaching efficacy beliefs develop across the school years, what factors facilitate their development and how these affect the preservice teachers' performance and their further teaching experiences could yield valuable implications for the educational field.

Promoting self-esteem, self-efficacy, motivation, and aspirations in adolescent students: An intervention study

Amanda Hughes, Staffordshire University, United Kingdom
Peter Davies, Staffordshire University, United Kingdom
David Galbraith, Staffordshire University, United Kingdom
Mani das Gupta, Staffordshire University, United Kingdom
Geoffrey Pugh, Staffordshire University, United Kingdom
Mark Torrance, Staffordshire University, United Kingdom
David White, Staffordshire University, United Kingdom

Our paper describes quasi-experimental research examining the effects of self-esteem, self-efficacy, and motivation on students' educational and occupational aspirations. 1400 Year 10 pupils (aged 14.0 – 15.0 years) from urban high schools from one city in central England were either given three days of training focussing on goal setting, positive self talk, and other strategies for developing self-efficacy, or were assigned to a control condition. Pupils were given a battery of psychometric tests on three occasions; pre-intervention, immediately post-intervention, and four to six months post-intervention. Preliminary path analysis on pre-intervention data suggests that social deprivation (using a postcode-based measure) negatively predicts, and academic ability (based upon curriculum tests) positively predicts, intrinsic motivation, self-efficacy, and self-esteem in several domains. In turn, individual self-esteem and self-efficacy predict educational aspirations independently of academic achievement. These results indicate some basis for intervening to raise self-esteem and self-efficacy. At time of writing analysis is still in progress and

involves structural equation modelling taking into account the clustered nature of the data. Our paper at the conference will describe the effects of the intervention on aspirations and explore the extent to which this effect is mediated by changes in self-efficacy, self-esteem, and motivation.

M 8   26 August 2005   14:30 - 15:50   Room A009

Paper Presentation
Special Education

CHILDREN'S NEEDS

Chair: Timothy Papadopoulos, University of Cyprus, Cyprus

Basic psychological needs perspective on school environment
Helena Thuneberg, University of Helsinki, Finland

Elementary and upper school, general and special education classes in two cities. Age mean 12 years. Data collected spring 2003, partly repeated spring 2004. If the aim is for pupils to learn, they have to be in a learning state of mental readiness. The interpretation of social contexts influences the way pupils become interested and direct their own behaviour. In this on-going study motivation is seen as a continuum from extrinsic to intrinsic. The more it is intrinsic, the more behavior is self-determined. The school environment can either threaten or support self-determination depending on how well it fulfills the basic psychological needs: 1. Competence, 2. Relatedness and 3. Autonomy. The basic needs can be seen in relation to learning orientations and to the degree and quality pupils engage in tasks or cope in case of failure. The whole chain determines how well pupils develope personally, cognitively and socially. The research questions were: 1. How well are the basic psychological needs of pupils fulfilled at school? 2. How do pupils experience their own learning? 3. What types of motivation and self-regulation do pupils have? These questions were considered against the background variables: gender, general versus special education (segregated, integrated), age, academic achievement, big city or small city, Finland in comparison to other countries. The method was multiple-choice questionnaire BPNS, Basic Psychological Needs Scale at school (work) by Deci & Ryan (2000). The preliminary results show significant differences between general and special education. The overall results mean that in order to promote psychological well-being all tree basic needs – but especially the need

of competence - have to be taken into consideration and to targets when planning healthy (special)educational practices. The inclusion / segregation –discussion should much more move towards the quality aspects of environments instead of emphasizing organisatory structures.

Deaf education: dilemmas with the creation of effective learning environments – the case of a Portuguese primary school
Sofia Freire, University of Lisbon, Portugal
Margarida Cesar, University of Lisbon, Portugal

Inclusive schooling is generally acknowledged as the best means to a quality education. However, some find it one possible resolution of a dilemma related to diversity in schools (Clark, Dyson, Millward, & Robson, 1999a, 1999b). How can school offer its different students a similar education? This dilemma is most prominent in the deaf education, due to their communication and linguistic specificities. In Portugal, recent legislation tried to solve this dilemma. However, by definition, there are no possible solutions for it. Dilemmas can only be resolved, as for each overcome problem other will emerge (Clark et al., 1999a, 1999b). Besides, it is a resolution at the political level. But which constrains and which advantages does it face? Our aim was to understand what gains and losses does the implementation of the new deaf education legislation involves. The focus was the curricular and academic issues. So we studied a primary school for two years. We conducted structured and informal interviews to the different participants: regular school teachers (5), special teachers from the Deaf Student's Centre (3), PSL teacher (2) PSL traducer (1) and speech therapist (1). We also carried out participant observation of the different school contexts and activities and we colleted relevant information concerning the deaf students academic performance. We used an interpretative method (Miles, & Huberman, 1994) to analyse the data. The data show that it is still difficult to develop effective learning environments for deaf children due to the constrains of the system, structures, type of school organization and teachers' practices. On the other hand, social contacts between hearing and deaf child are frequent for most of the students on the classroom context, but do not extend to the break ground, where all the deaf students meet and, most of the time, play with which other.

Deaf pupils in a regular school
Alexandra Leal, Intermediate School of Cartaxo, Portugal
Carla Crisostomo, Intermediate School of Cartaxo, Portugal
Mauricia Oliveira, Department of Education of the College of Sciences, Portugal
Sandrina Freire, Portuguese School of Mozambique, Mozambique

A qualitative research entitled Deaf pupils in a regular school was outlined as an inductive and exploratory study in order to understand the deaf pupils teaching-learning process in regular schools that are meant for attending those pupils. The study focused mainly the process and not as much the outcomes. The researchers were attempting to gather data related to the following questions:
1.What kind of support has the Deaf pupils throughout their schooling?
2.What kind of interaction do Deaf pupils establish with their hearing and deaf peers and teachers?
3.What are the curricular approaches for deaf pupils?
4.What kind of teacher - training do their teachers have?
The data were collected by audio-recorded interviews of the teachers of deaf and of hearing pupils, of some members of the school board and of the teachers of the Deaf unit. Written records of classroom observation complemented the interviews. The data show that deaf pupils undergo a different curriculum from pupils with special educational needs. The deaf pupils are separated from the hearing pupils in several contexts: classrooms, playgrounds and extra-curricular activities. In fact, even mentioning inclusion or integration, teachers and school practices are closer to a segregation approach. Still, the researchers found that some of the teachers, although being teachers of the deaf pupils, did not feel well prepared to the tasks they are expected to perform and, consequently, they even feel uncomfortable to talk about deaf issues.

The effect of intervention for peer mediation on mediation style and learning-to-learn skills of children with learning disabilities
Adina Shamir, Bar-Ilan University, Israel
Tamar Lazerovitz, Bar-Ilan University, Israel

The purpose of the current study was to investigate the effect of Peer Mediation with Young Children (PMYC) program on mediation style and learning to learn skills of students with learning disabilities. Previous findings with regular class students revealed higher levels of mediation teaching style and higher cognitive modifiability among children who participated in the program than did control children, in each

of the five MLE criteria. The sample was composed of 162 pupils, 81 from Grade 5 (tutors with LD) and 81 from Grade 2 (tutees). The tutors were chosen from classes of children with LD and the tuteess were randomly chosen from regular classes. Each group pair of tutors and learners was randomly assigned to an experimental or control group. Both the experimental and control groups participated in a general preparation for the learning task and peer-interaction. The experimental fifth-grade tutors received additional training with the intervention for peer mediation. Following the intervention stage, the experimental and control children participated in three peer- tutoring sessions involving a computer drill and practice of Math problems. During the third session, the Children's interactions were videotaped and later assessed with the Observation of Mediation Instrument adapted to peer learning. The tutors were also given a dynamic assessment analogies test, that allows assessment of the ability improve learning how to learn skills. The pre-teaching phase of the DA test was delivered before the intervention while the post-teaching phase was delivered following the intervention. The findings showed that the experimental children showed higher mediation style and improved their learning to learn skills than did the control children. These findings are discussed from the perspectives of theory as well as practice.

M 9   26 August 2005   14:30 - 15:50   Room A109

Paper Presentation

ISSUES OF IDENTITY IN A MULTICULTURAL CONTEXT

Chair: Helen Haste, University of Bath, United Kingdom

Furthering of teaching minority languages in multilingual areas: What are the needs, problems and wishes? A comparison between nine multilingual areas in Italy, Slovenia, Hungary and Austria
Esther Blassnig, University of Klagenfurt, Austria
Philipp Mayring, University of Klagenfurt, Austria

The Comenius-project Furthering of minority languages in multilingual areas aims to explore lacks and to suggest improvements for teaching minority languages. The Academy of Pedagogy in Carinthia (Austria) coordinates this project; nine multilingual areas in Italy, Slovenia, Hungary and Austria are involved.
The present study aims to give an overview of the input-evaluation, which seizes

the situation of teaching minority languages. First, questionnaires for teachers, pupils and their parents of the 1., 2., 3., 4. class were developed. The items are related to minority language-competencies of children, prestige of minority languages, needs, wishes and problems in connection with teaching minority languages. These questionnaires were distributed to schools of nine multilingual areas. About 170 teacher-questionnaires, 1200 pupil-questionnaires and 1000 parents- questionnaires will be analysed and compared among the multilingual areas and the answers of teachers, pupils and parents. The first qualitative and quantitative results point out a huge deficiency of useful bilingual materials. Teachers underline the importance of developing materials according to different classes and different minority language-competencies. Trainings for teachers, how to handle pupils with different minority language-competencies are required. First results of pupils-questionnaires point out that they take pleasure in learning minority languages. Pupils and parents prefer lessons with the focus on active communication between teachers and pupils. Furthermore they become enthusiastic about the creative approach, like using games for learning new vocabularies or figuring situations of everyday life. The most important aim for parents is that their children become motivated in learning minority languages. Improving the minority language competencies is also relevant, but primarily teachers should impart that every language, every culture, every minority group are of value. The final results will be the basis for the development of didactical concepts, teaching methods and materials. Furthermore the implementation of more efficient training concepts for teacher is planned.

Cultural and linguistic characterizations of the good teacher: A comparison of Israeli Arab and Jewish preservice teachers' beliefs
Yael Katzir, Levinsky College of Education, Israel
Hanna Ezer, Levinsky College of Education, Israel
Tsila Shalom, Levinsky College of Education, Israel

This paper deals with cultural and linguistic characterizations of the good teacher by Arab and Jewish preservice teachers in a teacher education college in Israel. The characterization of the qualities of a good teacher is a central question determining the pedagogy of teacher education. Perceptions of the good teacher are part of the research on teachers' beliefs. Preservice teachers' beliefs about the good teacher are deeply rooted in the students' past experiences in school. Research on cultural variation in beliefs about the good teacher is scarce. Many Hebrew speaking teacher education colleges in Israel have come to include students of diverse cultural and linguistic backgrounds in the last decade, particularly a fast growing Arab

student body. This study aimed at comparing cultural and discourse patterns of Israeli Arab and Jewish student teachers' beliefs concerning the good teacher. The research population included 80 Arab and Jewish beginning preservice teachers in a teacher education college in Israel. The research tools included writing assignments in Hebrew regarding the good school teacher. Data were analyzed by content and discourse analyses. The findings show cultural and linguistic differences between Arab and Jewish preservice teachers' beliefs regarding the good teacher in the following categories:

1. Quality of interpersonal characteristics of the teacher.
2. Overall function of the teacher as a supporting vs. stimulating figure
3. Locus of control: in the teacher vs. student.
4. Students' feelings towards the teacher.
5. Hebrew sentence structure and use of verbs.

Important discourse differences were found between early-childhood vs. elementary school student teachers. The cross-cultural differences are represented also graphically. The study manifests the power of discourse analysis in eliciting culture bound perceptions and strengthens the claim that culturally sensitive teacher training programs should take into account preconceived beliefs about the good teacher that preservice teachers bring into training.

Academic Self-Concept, Track Position and School Colour
Sarah Blom, University of Amsterdam, Netherlands

In this paper we examine whether track position and school colour ('black', 'mixed' and 'white') interfere with the expected positive relationship between a student's performance level and his academic self concept. In addition we explore if student characteristics (ethnicity, socio-economic status and gender) will make a difference. Our theoretical framework rests on social comparison theory, in particular the research of Herbert Marsh, and on research of socio-cultural differences in academic self-concept. The population consists of 1402 10th grade immigrant and non-immigrant students in two general tracks of upper secondary education. Eight schools in Amsterdam are involved; two 'white', three 'mixed', and three 'black'. The two general tracks these schools offer are: vwo, preparing for university, and havo, preparing for higher professional education. The vwo-track is more demanding and has a higher social status. Students filled in self-reports (MSLQ), including a scale measuring academic self-concept. Two standardised performance tests, one for vocabulary and one for mathematical reasoning were included as well. Havo-track and 'black' schools have significantly lower school means on these tests and

thus provide a frame of reference for social comparison in which Marsh's 'Big-Fish-Little-Pond' effect may appear. Method: calculation of means and multilevel analyses, in order to find a best fitting model of what affects academic self concept. Results: So far, our explorations have yielded a weak, but significant relation between a student's score on the vocabulary test and academic self-concept. We found no relation between mathematical reasoning and academic self-concept. However, the relation between track position and academic self-concept, and between school colour and academic self-concept is strong and negative. At the conference we will present the results of further efforts to find a best fitting model. Student characteristics will be included.

Reflections about Democracy in an Online Forum- a Content Analysis of the Discourse between Arabs and Jews.
Roni Reingold, Achva-College of Education, Israel
Gad Alexander, Ben-Gurion University, Israel

This study analyses an online course on democracy and multiculturalism that was designed as part of a university teacher education program. The students were selected from two national groups in the Israeli society: Arabs and Jews. The course was converted from a face to face traditional academic format to the online one. The study analyzes the protocols of the four online forums that were opened for the course and brings findings from interviews made with some of the participants when the course was over. The course had two main objectives: Enhancing academic knowledge about concepts which are the basic for a life in a democratic society and changing stereotypical attitudes that the participants may have. The study contained several parts: First, a content analysis instrument was especially developed for this type of online discourse between diverse groups. The categories of the instrument were inspired by the theories and terminology of Banks and Wurzel. In addition, the instrument used categories that were found to be relevant to the analysis of face to face encounters between Arabs and Jews. In addition a quantitative analysis of the written protocols depicted several measures of formal participation such as the number of contributions, the length of the average response string, the origin of the comments, its timing, etc. The results from this study confirm in general the hypothesis that a knowledge community may develop in an online course in a way that may not be inferior to face to face encounters. For some students this environment may be more productive than the traditional course. The quantitative analysis showed an overall good response rate and a tendency of the students to take part in the discourse in all four forums. A closer analysis reveals pattern of participation

which are unique to each of the groups.

M 10   26 August 2005   14:30 - 15:50   Room E010

Paper Presentation
Teacher Education

TEACHER THINKING

Chair: Michal Zellermayer, Levinsky College of Education, Israel

Teachers facing academic failure: Intelligence social representations and educational practices
Maria Cristina Matteucci, University of Bologna, Italy

This paper describes two studies concerning the issue of educational practices used by teachers faced with academic failure, considering the role of causal attribution and of the social representations of intelligence. We argue that effort can be considered an implicit norm of conduct of the educational environment applied to the student's role (Matteucci & Gosling, 2004), and that social representations enter the process of causal explanation and of responsibility ascription. The first study investigated the influence of different types of causal attribution for student's failure (lack of effort vs. lack of ability) on educational practices chosen by 122 school teachers. The results show that, in case of lack of effort, teachers decide on more severe practices and on actions which pursue retributive goal. On the contrary, lack of ability attribution gave rise to encouraging actions pursuing utilitarian goal. Overall, these results support the role of causal attribution -and particularly of lack of effort- on disciplinary choices. The second study analyzed the impact of social representations of intelligence shared by 202 high school teachers on causal and responsibility inferences and on education practices. Preliminary analyses reveal the role of social representations on explanations and on educational practices. The results will be discussed with respect to theoretical aspects as well as practical implications.

Instructional strategies for conceptual change in teachers' thinking
Judith Abrahami-Einat, Israel, Israel

Changing sexist teaching practices that result from teachers' gender blindness necessitates familiarity with the particular social and cultural contexts within which

teaching is conducted. Moreover, training for more inclusive pedagogical practices, calls for the employment of such instructional strategies that neutralize the expected resistance to the conceptual change. This paper will describe one such innovative programme devised to introduce science teachers to issues of hidden sexism in education, and sex typed career choices of female students. The impact on participants' concepts will be demonstrated through analysis of the variety of data collected: art work, group activities, pre and post questionnaires, and personal written statements of teachers. Thirty two high school teachers attended a low priced five day residential in-service training course that combined an introduction to mechatronics and gender equity. The recruitment of the participants presupposed resistance to and marginalization of gender issues in science teaching, and accordingly mechatronics was intentionally set as the bait. The culturally diverse population (Jews, Moslem Arabs, Christian Arabs, and Druze teachers from different parts of Israel), including 16 religious teachers (Jewish and Moslem), validated the need for sensitive and creative instructional strategies. The instructional design incorporated both high and low tech, including experiential work in labs, computer assisted teaching, art work, mind teasers, discourse analysis, role play, visit to an industrial park, and evaluation of visual teaching aids, media and movies. Special attention was paid to diversity of settings and teaching methods, and the constant empowerment of teachers in the process of change.The design employed to increase awareness of social aspects of science teaching, and gender bias in particular, is compared to a project combining computer science and gender equity, conducted at Carnegie Mellon University (Fisher & Margolin, 2002, Unlocking the Clubhouse).

Are teachers' conceptions about assessment hindering their use of open problems? What do pupils tell us about it? Two cases and some consequences.
Ana Remesal, University of Barcelona, Spain

This proposal is based on a doctoral research on teachers' and students' conceptions about problem solving and about its use as classroom assessment task. A qualitative study was carried out with a socioconstructivist theoretical background. The different perspectives of teachers and students concerning the topic of study were compared in order to find similarities and differences. 50 mathematics teachers of primary and compulsory secondary school were interviewed and a selection of classroom materials elaborated by the teachers were analysed. 10 teachers out of the 50 were selected for a follow-up study in which one example of their usual classroom assessment practices was videotaped, and 6 of their pupils, with different achievement levels, were interviewed as well. Data were analysed following a qualita-

tive methodology of content analysis using a special qualitative software package (Nvivo-QSR). We present here two special cases out of these 10. One primary and one secondary teacher were chosen for a deeper analysis because of their particular conceptions about mathematical problems and about classroom assessment. Both teachers think of problem solving as a complex process, both teachers like open tasks. And yet, the way they conceive of assessment seems to prevent them from using open problems to assess the mathematical knowledge of their pupils. The interviews to the pupils were also analysed looking for likely relationships between the teachers' assessment practices and their pupils' conceptions about problems and about assessment. Results indicate a certain connection between both aspects in terms of pupils talking of problem solving as routine algorithms rather than as tasks of an open type.

What Do Teachers Know About Teaching? Finding Out Using Video Analysis
Nicole Kersting, UCLA, United States

It has been common practice to assess teachers in different contexts and for different purposes. The obvious reason for assessing teacher knowledge is the assumption that what teachers know about teaching affects their instructional practice, which in turn influences student learning. Thus, it is critical that assessments of teacher knowledge provide adequate, valid, and relevant information of what teachers know. This study presents a novel approach to measure teachers' knowledge, using the example of mathematics, and investigates its reliability and validity. Two main advantages of this new approach are that the assessment can be used both as formal and embedded assessment, and that it addresses the contextual nature of classroom teaching. Based on findings from the expert-novice literature, this new approach is based on the assumption that teachers' lesson analysis ability is reflective of their knowledge of teaching. Using video clips of mathematics classroom instruction as item prompts, which are made available over the internet, 74 teachers were asked to analyze each video clip with regard to the mathematical content and aspects of teaching and learning. Teachers' saved responses were subsequently scored. Reliability of scores was estimated above .8 using item-response theory and classical test theory. To investigate the validity, teachers were also completed a test of pedagogical content knowledge (PCK) and expert judgments of their teaching expertise were obtained. Correlations between scores from both assessment and the expert ratings yielded positive medium size correlations of about .5 and .3 respectively, providing supporting evidence for its external validity. These results provide the first empirical link that teachers' lesson-analysis ability is linked to their pedagogi-

cal content knowledge. They further suggest that this new instrument can be used as a reliable and valid instrument to document teacher learning. Future research needs to explore other content areas such as science and social studies.

M 11   26 August 2005   14:30 - 15:50   Room A010

Paper Presentation
Collaborative Learning

COOPERATION AND LEARNING PROCESSES

Chair: Jan Elen, Katholieke Universiteit Leuven, Belgium

Cooperation in friendship and acquaintance groups: The role of self-construal and self-efficacy for group work
Jose Hanham, University of New South Wales, Australia
John McCormick, University of New South Wales, Australia
Paul Chandler, University of New South Wales, Australia

Group work has been promoted as a teaching strategy that yields a multitude of positive academic and social outcomes in schools. However, much of the existing literature identifies a need for further investigation into the intricate relationships between cognitive and motivational aspects of student learning in groups. The aim of this study was to explore to what extent interdependent and independent self-construal and self-efficacy for group work played a role in determining students' attitudes toward cooperation in friendship and acquaintance groups in classrooms. A novel theoretical framework was developed based on research into group work in educational and broader organisational and cross-cultural contexts. This theoretical framework was tested by using a random sample of 583 students in nine secondary schools in Sydney, Australia. A series of confirmatory factor analyses and structural equation models were used to identify latent constructs and to test for relationships between constructs. Results of the analyses suggest that interdependent self-construal is more important in determining positive attitudes toward cooperation in friendship groups than in acquaintance groups. Self-efficacy for group work emerged as a key predictor of positive attitudes toward cooperation in acquaintance groups, and as a mediator between interdependent self-construal and positive attitudes toward cooperation in friendship groups. Interestingly, no direct relationship between interdependent self-construal and preference for working with friends was

identified. Students with strong preferences for working with friends were more likely to possess lower levels of self-efficacy and cooperativeness when working with acquaintances. This study suggests that teachers should use teaching methods designed to foster interdependence in students, because high interdependence is likely to enhance student cooperation and self-efficacy for working in both friendship and acquaintance groups.

Differential interactional patterns between successful and less successful dyads
Yoko Oura, Niigata University, Japan
Giyoo Hatano, University of the Air, Japan

In our daily life, we sometimes attempt to reconstruct a procedure from its product. Based on our previous paper examining the roles played by dyadic interaction in the reconstruction of a recipe from an unfamiliar but tasty dish, we investigated differential interactional patterns between successful and less successful dyads. Twelve pairs of female college students, given a slice of mousse of perch, were asked to discuss and reconstruct its recipe. The participants' utterances were tape-recorded and transcribed verbatim. Their reconstructed recipe was scored in terms of the 6 components of the standard recipe (the maximum score; 6). Two successful pairs were compared with two less successful pairs in terms of kinds of proposals (correct or incorrect) and responses (accept, discuss, and reject/ignore). Two successful pairs were found not only to produce many good ideas but also to examine each of them in comparison with alternatives. Even a less knowledgeable member contributed by serving as a monitor. Good ideas initially rejected or ignored were proposed repeatedly in the course of the development of ideas, so that all the 6 indispensable components could revive in the final recipe. Two less-successful pairs could not use good ideas they produced. It was because, when her partner showed some objection to or hesitation to accept her idea, a participant often chose to withdraw the idea rather than to insist on it. Frequent changes of the focus of discussion also led to failure to develop coherent conversation to examine each proposal. These results suggest that interactive processes would be fruitful only if each member of a dyad could use information offered by the other effectively to activate their joint comprehension activity.

Emotion, regulation and interest in web-based learning activities
Minna Vuorela, University of Turku, Educational Technology Unit, Finland
Lauri Nummenmaa, University of Turku, Department of Psychology, Finland

The purpose of this study was to determine how the emotions experienced while using a web-based learning environment (WBLE), emotion regulation strategies, interest to the course topic (subject interest) and interest to use a WBLE (web interest) are related to students' invisible and observable activity in the environment. Data (N=60) for the study was collected in the year 2004 from three different university courses. Participants' emotion regulation strategies (suppression and reappraisal) and interest were measured before the course. Participants responded repeatedly to an online questionnaire during the course. The online questionnaire (Self-Assessment Manikin) measured participants' experienced valence and arousal resulting from using the WBLE. Analysis of participants' observable activity was based on the amount and the content of the students' archived comments in the collaborative discussions. Analysis of their invisible activity was based on the log data of the environment. Using binary logistic regression modeling we found that the standard deviation of valence predicted the observable activity and the web interest predicted the invisible activity in the environment. The results show that interest and emotions have different effects on the activities in a WBLE. It appears that the emotional reactions are important when considering the students' actual collaborative activity. When considering the invisible activity, the web interest might be more important predictor than the emotional reactivity. This suggests that the students follow actively the events in a WBLE because they are interested in the web-based learning itself rather than the participating in the events and discussions. On the contrary the experienced emotions maintain the participation in the collaborative learning effort.

Group Cognition in Online Collaborative Math Problem Solving
Gerry Stahl, Drexel University, United States

This is a case study of online collaboration on an algebra problem. It adapts the methodology of conversation analysis to quasi-synchronous, text-based chat room technology. The analysis is conducted within the context of a design-based research effort, so a primary goal is to identify technological barriers caused by standard chat technology with an eye to designing a more appropriate and supportive online collaborative learning environment. Group cognition is a theoretical framework in which cognitive processes are identified as resulting from the dynamic interaction of multiple personal interpretive perspectives within contexts of group discourse and collaboration. The analysis is conducted within a theoretical framework that focuses attention on the small group unit of analysis as the site of problem-solving agency, rather than on cognitive processes of the individual participants. The

analysis results in the identification of interactive methods of doing mathematics as a group. This, in turn, reflects back on the theoretical framework and refines the notion of group cognition. The analysis aims to motivate the following theoretical, methodological and design-based claims: • The discourse displays elements of mathematical understanding, problem-solving strategies and logical rationality by the group that parallel those of individual students. • Interaction among the student participants can be conceptualized as an instance of group cognition. • Excerpts of online collaborative math problem solving can productively be analyzed at the small group unit of analysis. • The methodology of conversation analysis can effectively be adapted to interpret text-based online interaction. • Group cognition displays the potential to achieve more than the individual participants seem capable of accomplishing on their own, but also displays interactional problems that prevent the group from achieving its full problem-solving potential. • Conclusions can be drawn from such an analysis that are relevant to the design of improved computer-supported collaborative learning environments.

M 12   26 August 2005   14:30 - 15:50   Room E009

Paper Presentation
Social Aspects of Teaching

SOCIAL ASPECTS OF LEARNING

Chair: Philip Weinsier, Bowling Green State University, United States

The multiple sociocultural activities and contexts of the tutor/mentor
Judith MacCallum, Murdoch University, Australia

Research on mentoring generally focuses on the outcomes for mentees and the conditions that support the development of successful mentoring relationships. The activity of the mentor or tutor is thus considered in terms of supporting or assisting the mentee. Effective mentoring programs, however, provide networking and support opportunities for mentors as well as a range of benefits for mentors. This paper examines the multiple sociocultural activities and contexts in which tutor/mentors participate. It is based on evaluation studies of two peer tutoring and mentoring programs. In both programs the work of the university students included both tutoring (academic function) and mentoring (including social and emotional, direct assistance and role modelling functions). The study adopts a sociocultural view of

learning as a social process, in which learning occurs through ongoing activity with others. The present analysis draws on multiple data sources, including program documents and interviews with participants, but focuses on the 25 peer tutors. In both programs, four distinct sociocultural learning contexts were evident for the peer tutors. These were (i) the relationship with the program coordinator, (ii) the relationship with the class teacher, (iii) the relationship with the school students, and (iv) the relationship with other peer tutors. The sociocultural activities differed in terms of the levels of mutuality (i.e. mutual responsibility for and contribution for tasks) and equality (i.e. equal in status, skills and knowledge) (Damon & Phelps, 1988) among participants. In addition the character and importance of each of these contexts differed between programs and from tutor to tutor, and contributed in different ways to the outcomes for the tutors.

The Role, Training and Job Satisfaction of Teaching Assistants in English Primary Schools and their Effects on Teachers and Pupils in Years 4 to 6 during 2000 –3: Results from the Class Size and Pupil Adult Ratios (CSPAR) Key Stage 2 Project
Anthony Russell, Institute of Education, University of London, United Kingdom
Peter Blatchford, Institute of Education, University of London, United Kingdom
Paul Bassett, Institute of Education, University of London, United Kingdom
Penelope Brown, Institute of Education, University of London, United Kingdom
Clare Martin, Institute of Education, University of London, United Kingdom

There has been much international debate about the role and impact of teacher aides (TAs, as they are called in the UK). Despite the recent massive investment by the UK Government, there are still significant gaps in knowledge. The Class Size and Pupil-Adult Ratio (CSPAR) Key Stage 2 (KS2) study is the largest yet undertaken in the UK and investigated the deployment of TAs and their effect on interactions involving pupils and teachers in the same classrooms, and on pupil attainments. The study had a longitudinal, mixed method and multi-informant design, and involved 202 schools and 8728 pupils in Year 4. Methods of data collection included questionnaires completed by TAs, teachers and head teachers, assessments of pupil attainments, data on pupil background, case studies and a systematic observation study. TAs reported that they mainly work in the classroom, supporting pupils. They work particularly with pupils who have SEN or low attainment. Whilst the majority have high levels of job satisfaction, many refer to the dramatic changes in the role of the TA, which have not been matched with changes in status, pay, conditions of service and contracts.

This study found that the TA's role in KS2 is predominantly a direct one, in the sense of face-to-face interactions supporting certain pupils. There was no evidence that the presence of TAs, or any characteristic of TAs, had a measurable effect on pupil attainment. However, results were clear in showing that TAs had an indirect effect on teaching, e.g., it allowed more individualised teacher attention. We conclude that more attention needs to be paid to what we call the pedagogical role of TAs, particularly in the context of the enhanced roles for TAs being introduced as part of the UK Government's remodelling agenda.

The socialization of student teachers as blue collar employees
Anat Kainan, Kaye College of Education, Israel
Ron Hoz, Ben-Gurion University, Israel

The market economy led to the deskilling of teachers and devaluation of their professional and social status. The Work part of teaching lost its precedence to the Labor part and teaching was made semi-profession or blue collar occupation. We studied the work-related ideas that underlie the views of pedagogic tutors regarding their occupational status and action and the professional future role of their students. The findings were that the pedagogical tutors relate to their job in terms from the culture of work and through construction, food and agriculture metaphors. They call work their supervision and tutoring and relate to learning tasks as work and assigned work to their students, who hand in their works. Professional-occupational issues pertinent to teaching in school and colleagues and their component techniques and strategies are referred to as work. The metaphors which describe the teachers' college and the school system, aspects of the educational process and the work of the students come from the world of construction, agriculture, and food preparation or consumption. Their hopes are that three and ten years after certification their students endure as classroom teachers, and do not forecast any professional and social mobility by climbing up to school principalship or superintendenship. These findings indicate that the teachers' college adapted itself to the preparation of workers/laborers, became part of the sophisticated covert social mechanism that perpetuates and amplifies the pressure to further degrade the teachers' status and role, and serves to maintain the social class of teachers. As a social reproductive process the preservice education socializes the future teachers into the working class and as obedient blue collar employees.

Single-Sex Environment Doesn't Improve High School Girls' Motivation
Isabelle Plante, University of Montreal, Canada

Normand Roy, University of Montreal, Canada
Roch Chouinard, University de Montreal, Canada

The objective of the present study was to examine the overtime impact of school environment (single-sex or co-ed) on public high school girls' motivation and perceptions of social agents' support in two basic subject matters: Language Arts and Mathematics. Among the researchers interested by the impact school environment (single-sex or co-ed), some found that single-sex schooling especially favoured girls (Lee, 1986; Foon, 1988). Others criticized these results claiming that students from single-sex schools mainly came from private institutions, hence presenting several social characteristics differentiating them from their counterparts schooled in co-educational public institutions (Marsh, 1989). In order to evaluate the impact of school environment on high school girls, several self-reported scales were used to assess the expectancy of success (perceptions of competence and control), the value accorded to school matters (utility, mastery goals, performance approach goals and performance avoidance goals) and the perceptions of social agents' support (mother, father, and teacher). The scales were administered to 916 French-speaking girls' studying in eight public high schools of the Montreal area (Canada). The schools, either single-sex or co-educational, all presented a low socio-economical environment. Participants were followed twice yearly during a period of three school years. Multi-level analyses were performed to determine the role of school environment on high school girls. Results showed that school environment affect only few motivational variables (3/12) and some perceptions of social agents' support (2/6). In fact, girls from co-ed schools felt more control in Language arts and reported higher performances in Mathematics. In addition, students from co-ed environment perceived more support from their mother in both matters. However, these differences were already present at the onset of the study. Furthermore, results haven't showed any interaction effect, confirming that sex segregation didn't improve girl's motivation or perceptions of social agents' support.

M 13   26 August 2005   14:30 - 15:50   Room E113

Paper Presentation
Academic Learning

MEDICAL EDUCATION

Chair: Kirsti Lonka, KAROLINSKA INSTITUTET, Sweden

Effects of Step-wise Admission on Achievement in Medical Education
Christina Cliffordson, Department of Education, Gothenburg University, Sweden

The purpose of the study is to examine effects on study efficiency of specially designed admission procedures, Step-wise admission, used for selection to medical education. In Step-wise procedures, written tests and interviews are used to assess personality traits such as motivation, social competence, patience, empathy and devotion. The selection of variables is based on assumptions about the influence of personal characteristics on success both academically and in the profession. By using data from a large-scale longitudinal project (VALUTA), the students admitted via Step-wise admission are compared to those admitted through regular admission, grades from upper secondary school and scores from the Swedish Scholastic Aptitude Test (SweSAT). Efficiency in studies is measured by achieved credit points, interruptions in studies, drop-outs and obtained degrees. The results indicate that admissions based on the Step-wise procedures had the highest point production, in spite of lower grades, and lower SweSAT scores than the SweSAT group. Previous research has demonstrated that upper secondary grades and SweSAT scores provide good measures for predicting study success in higher education. However, in this study those admitted through grades obtain somewhat fewer points, and those admitted via SweSAT scores produce by far the lowest average number of credit points. Thus, it does seem quite interesting to investigate why the Step-wise procedure results in the selection of more successful students, and to look more closely into the relative importance of cognitive factors and other personal characteristics for achievement in medical education.

Teachers promoting expertise in medical education – Understanding the role of core curriculum
Klara Bolander, Karolinska Institutet, Sweden
Anna Josephson, Karolinska Institutet, Sweden
Kirsti Lonka, Karolinska Institutet, Sweden

Medical teachers play an important part in supporting students' development from novice to expert physicians. The purpose of the study was to explore the aims and objectives of teachers in a Swedish medical school and how these related to research on the development of expertise and communities of practice. Additionally we wanted to find out whether the aims matched the objectives of the Core Curriculum, and what role Core Curriculum played in the construction of the teachers' aims. Semi-structured interviews were conducted with teachers in Anatomy and

Surgery. Anatomy, taught in 1st year, is regarded as central to the learning and understanding of Surgery, which is taught in the 4th year of medical school. The aims and objectives of teachers matched the goals expressed in the Core Curriculum and could be divided into three orientations: content-oriented, competence- oriented, and attitude-oriented. However, description of the level of competency required by the Core Curriculum was insufficient to provide guidance to academic staff as how to support the development of expertise. The educational contribution of medical teachers could be enhanced by a greater depth of understanding of concepts of learning and the development of expertise. We propose that this would facilitate the use of educational strategies to achieve vertical integration of the aims and objectives in Core Curriculum.

A sociocultural perspective on transfer of self-regulated learning between problem-based classes and clinical learning contexts in medicine
Sarah Hyde, University of Sydney, Australia
Richard Walker, University of Sydney, Australia

This study investigated transfer of self-regulated learning (SRL) between the problem-based learning (PBL) context and the hospital ward in a graduate entry medical program. The study was longitudinal and followed 17 students from the beginning of their second year to the end of their third year in the four year program. Students spend one day per week in the hospital in year 2, and all of their time in the hospital in year 3. This transition from year 2 to year 3 therefore marks the end of pre-clinical study and the beginning of clinical learning (and move into a profession) in earnest. Data collection comprised observation and interviews. Results show that students use an array of SRL strategies in PBL tutorials in year 2 and fewer in year 3. Results also show that there was greater transfer of SRL in year 2 compared with year 3. Students' relation to each context is a primary influence upon the use of learning strategies. In year 2, the collaborative learning environment and climate established by the tutor in the PBL sessions encouraged SRL. The support provided by lectures aided student preparation for each session and helped to set goals. In year 3 however, students' perceptions of context changed due to altered curriculum structure and location and subsequently affected transfer. The PBL was seen to exist in isolation to other activities. Transfer in this study is measured by the changing relations between person and context (Beach, 1999). Students' understanding of the purpose of the learning activity and how it relates to their desired learning outcome of belonging to a community of practice influences whether SRL skills are used and transferred. This has widespread implications for higher education but also pro-

vides further understanding of the issue of transfer and how to promote it.

M 14   26 August 2005   14:30 - 15:50   Room B107

Paper Presentation

PROFESSIONAL DEVELOPMENT OF SCHOOL TEACHERS

Chair: Christopher Clark, University of Delaware, United States

Opportunities for teachers' professional development in three countries
Raimo Rajala, University of Lapland, Finland
Maria Flores, University of Minho, Portugal
Aki Tornberg, University of Lapland, Finland

The issue of teachers' professional development is becoming increasingly impor-
tant for the national teachers' inservice training systems. In this comparative study,
teachers' opportunity for learning at school is regarded as a key factor to be ca-
pable to develop professionally. Also, the type of teacher community is seen to be
related to opportunities to develop professionally.The leadership plays an impor-
tant role in realizing policy promoting development and growth of organization
members. And, finally,   the job content itself allows for workers development in
great many respects. The research questions are as follows: (1) What is the situ-
ation of teachers' professional development in Finland, Serbia and Portugal? (2)
How factors bearing on opportunities for learning at work, teachers' professional
orientations, school leadership and job contents are related to professional develop-
ment in the three countries? The data of the research will be collected via closed
ended questionnaires. The main research variables are professional development,
opportunities for learning at work, school leadership, teachers' professional orienta-
tion and job content. Teachers represent primary and secondary levels of teaching
in teh focal countries. At the moment, the final data collecting procedure is being
completed. The pilot study data is however available (N=89). Descriptive analyses
of the pilot data suggest that the opportunities for regular professional development
and motivation for it varied countrywise. Analyses into the relationships among the
key variables were carried out using multiple regressions. The analyses suggest that
both opportunities and motivation for regular professional development were pre-
dicted by good opportunies for learning at teaching work, high community orienta-
tion and effective leadership at school. In the final data, these tentative finding will

be revalidated. The results will be discussed with respect to the differences and the similaries between the three counties in teachers' professional development.

Mentoring in Supporting Novice Teachers' Professional Development
Hannu Jokinen, University of Jyvaskyla, Finland
Jouni Valijarvi, University of Jyvaskyla, Finland

The study is a part of the project Teachership-Lifelong Learning: Supporting Teachership in a Changing Work Environment funded by the LEARN –research programme of the Academy of Finland. The necessity of responding to an environment that is not more diverse and open but also more complex is perceived by teachers as involving new demands on themselves. A particularly problematic situation faces new teachers, who are learning how to teach. Finnish schools have no formal statutory system for inducting new teachers. The study is based on an examination of mentoring from the theoretical perspective of the teacher's continuous professional learning and on-the-job learning and the school community's professional development. The aim of this project is to study the role of the mentoring in induction phase supporting new teachers' professional development. The main problems are aimed at helping new teachers to develop professional growth, the new teacher's practical experiences and previously acquired theoretical knowledge of pedagogy. The data will be gathered using the methods of action research in two municipalities and the process will exploit documents, questionnaires, interviews and reflective journals. Mentoring meetings enabled the new teachers to tell about experiences and problems in a confidential atmosphere: they could ask stupid questions without being criticised. Mentoring teams supported actors in their choices, they learned to analyse and assess their own teaching activities. The mentors saw their task primarily as that of listening and supporting new teachers. The mentoring teams talked about the problem students, interaction with their parents, the actors' own work communities, and collaboration with fellow teachers. The mentoring meetings had served as an useful interaction situation in supporting novices in their work and enabled them to learn from each other and from an experienced mentor.

The development of teachers as professionals in the Hong Kong primary school context
Yin Wah Lo-Fu, The Hong Kong Institute of Education, Hong Kong

This paper is dual in purpose. First, it describes what a professional learning community is and how it develops in schools in Hong Kong. A professional learning

community is one where teachers relate their own professional learning to the improvement of their students' learning; take collaborative responsibility for students' learning; and work together to maximize their learning. Learning Study, which is premised on a conceptual framework that builds on three types of variation, is employed as the key agent in the development of such community. The three types of variation are: variation in students' understanding of a specific object of learning (V1); variation in teachers' understanding and ways of handling the object (V2); and the use of patterns of variation based on the Theory of Variation (V3). By focusing on the three types of variation in a specific object of learning, teachers in the professional learning communities are able to learn from their students, from each other and from researchers what should be worthwhile for their students to learn, how they can help students learn better and find out if each child is learning. Dissemination through public presentations is also an integral part of the participating teachers' professional learning, as they reflect and prepare a presentation on the results of the Learning Study. Each teacher's personal professional development thus contributes to a collective knowledge base. Second, this papers draws on the data of a Learning Study about the teaching of Three states of water at Primary 3 level to illustrate how teachers' learning can be enhanced through engaging in the study that permits a professional dialogue among colleagues; enhances collaboration with tertiary institution; encourages teachers taking inquiry stance; opens opportunities for multiple means of dissemination; opens opportunities for teachers to reflect on their own practices in a more systematic way.

How to create collaborative teaching and learning culture?
Saara Repo-Kaarento, University of Helsinki, Finland
Sari Lindblom-Ylanne, University of Helsinki, Finland

The aim of this study is to describe the process of developing an academic teaching and learning culture in one university Faculty. The aims of this developing process were to enhance the quality of teaching and learning, and especially emphasise the social aspects of learning. Theoretical background was the socioconstructivistic theory of learning, and cooperative working methods were used. The development process lasted for five years and all ten departments of the Faculty took part in one-year training. Altogether, 145 participants took part in the training. A questionnaire concerning the evaluation of the process was sent to 87 people one year after the whole prosess was finished. The persentage of the returned questionnaires was 65.5. The research questions are: Did the collaboration between departments and between teachers and students increase during the training? Has the collaboration

become a part of everyday practice? Have the cooperative learning principles and methods been implemented in teaching and learning practices? The result showed that the collaboration between the departments and between teachers and students increased during the training and that the collaboration became a part of an everyday practice. Social aspects of learning became more important, and new cooperative teaching methods were adopted. The results further showed that the cooperative learning methods were considered very useful and effective in developing the whole teaching and learning culture of the organization. The socioconstructivistic theory of learning and the cooperative learning methods offer tools for developing, not only the conceptions of teaching and learning, but also the teaching and learning practices. On the other hand, social approach to learning highlights the socio-emotional aspect of academic work and challenge the individual, competitive and cognitive learning and working culture at the university.

M 15   26 August 2005   14:30 - 15:50   Room A107

Paper Presentation
Comprehension of Text and Graphics

INTEGRATION OF SCIENTIFIC INFORMATION

Chair: Cor Aarnoutse, Radboud University, Netherlands

Inferences and Representations: Effects of Misconceptions on Text Comprehension
Panayiota Kendeou, University of Minnesota, United States
Paul van den Broek, University of Minnesota, United States

In the current studies, we investigate the processing of scientific texts as a function of the quality of readers' prior knowledge related to the text. Our investigation follows the three-pronged method suggested by Magliano and Graesser (1991) that coordinates predictions based on theories of discourse processing, evidence from verbal protocols, and evidence from behavioral measures. In Experiment 1, we use a think-aloud methodology to investigate the cognitive processes that take place when readers with and without misconceptions read scientifically correct information presented in a simple science text. Reader's memory for the text is also assessed via free recall. In Experiment 2, we use a reading time methodology to provide converging evidence for and expand upon the results obtained in Experiment 1. In both experiments we used a text on electrical current because students

often have misconceptions about the nature of electrical current and its properties (e.g., Heller & Finley, 1992; Osborne & Freyberg, 1985; Stocklmayer & Treagust, 1996). In Experiment 1, the results of a think-aloud task showed that readers with misconceptions engaged in the same types of processes during reading as did readers with no misconceptions. The content of these processes differed, however, as a function of prior knowledge. In Experiment 2, reading time results showed that the two groups of readers spent equal time reading, both for individual sentences and for the text as a whole. In both experiments, recall results showed that readers with misconceptions remembered less from the text, and included more invalid inferences and fewer valid inferences in their recalls than did readers with no misconceptions. These results suggest that readers' misconceptions often do not affect the online processes themselves but do influence the content of those processes and, consequently, the offline memory representation for the text after reading is completed.

An Experimental Study into the Effects of Illustrations in Two Textual Health Education Instructions.
Marieke Kools, Maastricht University, Netherlands
Margje W.J. van de Wiel, Maastricht University, Netherlands
Rob Ruiter, Maastricht University, Netherlands
Gerjo Kok, Maastricht University, Netherlands

In the development of health education materials, very little research is done into how various design characteristics affect retention and comprehension of the information. Based on theory and findings from cognitive psychology, pictures were developed and applied in instructions for the use of two asthma-devices, the inhaler chamber and peak flow meter. In a 2 (inhaler chamber, peak flow meter) x 2 (text (T), text and pictures(TP)) between-subjects design, the effects of pictures was assessed on reading times, recall and comprehension scores. The quality of recall, assessed with the number of correct propositions recalled, mistakes made in propositions recalled, number of instructions, and number of important words mentioned, generally improved for both instructions when pictures were added. Regarding the quality of participants' actions upon the inhaler- and the peak flow meter instructions, results were less straightforward. Measured with a dichotomous 'correct right away'-score and two continuous scores on 'expressed verbal or behavioural doubts' and 'mistakes made in each instructional step', especially performance with the inhaler chamber instruction improved with the pictures. Performance with the peak flow meter instruction hardly differed between the text and text-picture versions.

The results can be explained by characteristics of the devices and their textual instructions, the inhaler chamber being less obvious in use and its instruction being more ambiguous than the peak flow meter. Thus, simple line-drawings can contribute remarkably to relatively simple instructional information, although their contributing value may depend heavily on the specific contents of the instruction they are placed with.

Differences in monitoring and reading comprehension strategy use of narrative and science texts among poor and good readers
George Botsas, University of Thessaly, Greece
Susana Padeliadu, University of Thessaly, Greece

The aim of the study was to investigate differences in metacognitive monitoring and cognitive and metacognitive strategy use in reading comprehension of narrative and science (technical) text among poor and good readers. One hundred and twenty two 5th and 6th graders from elementary schools of urban, semi – urban and agricultural regions of Northern Greece took part in the study. Half of them (N = 61) were poor readers. They were not mentally retarded, non diagnosed dyslexic pupils, phasing severe reading comprehension problems and attending resource rooms in their mainstream schools. The rest sixty one were good readers attending the very same mainstream classes with poor readers. Two think – aloud procedures were used in order to assess monitoring and strategy use. A narrative and a science text were chosen from reading and science textbooks of 5th grade. Various inconsistencies like lexical, internal, external, structural, grammatical and syntactical error were inserted. The texts were segmented in parts and presented to pupils on a PC screen. After reading aloud the text part presented, pupils had to retell what they had read along with anything that crossed their mind. Pupils' think – alouds were taped and recorded to a coding key sheet. Reading comprehension of narrative and science texts were assessed by measuring blocks of meaning that have been recalled after think – aloud procedure completion. Additionally, reading comprehension performance was assessed by the relative subscale of the Greek standardized reading test TORP (Test Of Reading Performance) (Sideridis & Padeliadu, 2000). Data were discussed in light of reading comprehension disabilities, metacognition and domain specificity nature of cognitive and metacognitive abilities.

The role of note taking to integrate scientific information from multiple documents
Eduardo Vidal-Abarca, University of Valencia, Spain
Laura Gil, University of Valencia, Spain

It is not clear whether note-taking is helpful to integrate information from multiple documents as some authors have found that taking notes makes students to concentrate on explicit information, but not on elaborations. An experiment was conducted to clarify the question. A group of undergraduate students read four expository texts and wrote an essay to answer a complex question on a computer that recorded the student's behaviour during the task. Students were randomly assigned to one out of three conditions: (a) note-taking with notes available when writing the essay, (b) note-taking but notes not available when writing the essay, and non-taking notes. It was found that students who did not take notes outperformed the other two groups on comprehension. Preliminary analysis of on-line data indicate that note-taking made students to concentrate on copying text information to write the notes instead of concentrating them on understanding text information

M 16   26 August 2005   14:30 - 15:50   Room A008

Paper Presentation

READING

Chair: Herre van Oostendorp, University of Utrecht, Netherlands

The role of phonological awareness when learning to read an Alphasyllabary
Ranjita Mishra, Institute of Education, University of London, India
Rhona Stainthorp, Institute of Education, University of London, United Kingdom

This study investigates the role of phonological awareness in word-level reading in Oriya, which is an alphasyllabary (Bright, 1996). Oriya is one of the national languages of India. It has graphemes for consonants and vowels (like an alphabet) but orthographic representations are consonant-vowel combinations (like a syllabary) in which the vowel graphemes act as a diacritic to the consonant graphemes (Akshara). Reading in English requires segmentation at the phoneme level but reading in Oriya requires to segment at the akshara level. The acquisition of reading skills in Indian languages have received little attention so far. Studying the development of reading skills in India is further complicated by the fact that most children learn to read English in their primary schools. The design of this study provides an opportunity to explore the contribution of phonological awareness in word-level reading in Oriya in two groups of children. One group learned to read initially in their first

language (Oriya) with English as a second language of instruction. The other group learned to read initially in English, their additional language followed by subsequent instruction in learning to read in Oriya (their first language). Participants were 99 fifth-graders with a mean age of 9.7 years: 51 came from English medium schools and 49 came from Oriya medium schools. Oriya word reading, pseudo word reading, and phonological awareness tasks were administered to all participants. As predicted, Oriya-English Participants performed significantly better in word reading and pseudo word reading in comparison to their English-Oriya counterparts. However, there was no statistical significant difference between the two groups on Phonological awareness tasks. Moreover, phonological awareness was strongly associated with word-level reading in Oriya. Finally, regressional analyses showed that phonological awareness was the only factor that contributed significant variance to Oriya word reading.

The role of phonological awareness skills in reading and spelling skills in a highly transparent orthography
Rhona Stainthorp, Institute of Education London University, United Kingdom
Selma Babayigit, Institute of Education London University, United Kingdom

The concurrent and longitudinal relationships between phonological awareness and literacy skills across the five primary grade levels were explored in Turkish, a highly transparent orthography. Three different groups of children from grades 1, 2 and 4 were followed into grades 2, 3 and 5, respectively. There were 54 children at grade 1, 48 at grade 2, 45 at grade 3, 56 at grade 4 and 54 at grade 5. Measures of phonological awareness, vocabulary, phonological short- term memory and letter knowledge were obtained. The phonological awareness measures included phoneme deletion, syllable deletion, rime awareness, onset awareness and spoonerism. The literacy outcome measures included word reading, pseudoword reading and spelling. A series of hierarchical regression analyses was conducted whereby vocabulary, phonological short-term memory and letter knowledge acted as control measures. Overall results suggested a stronger relationship between phonological awareness and literacy skills than previously reported for other transparent orthographies. Phonological awareness was strongly related to both reading and spelling at all grade levels. Analyses of the longitudinal relationship between phonological awareness and subsequent literacy were also conducted. Overall, prior reading and spelling skills mediated the effect of phonological awareness skills at each testing period. Results are discussed in relation to a growing cross-linguistic literature on the relative role of phonological awareness skills and their educational and clinical

implications.

Effects of adaptive instruction on comprehensive reading
Thoni Houtveen, Utrecht University, Netherlands
Wim van de Grift, Dutch Inspectorate of Education, Netherlands
Jerry Andriessen, Utrecht University, Netherlands

This paper addresses the evaluation of the Comprehensive Reading Improvement Programme (CRIP). The major goal of the CRIP-programme is to improve pupil results with regard to comprehensive reading in grade 5 (9 year olds) in Dutch elementary schools. The research question is: Does implementation of adaptive instruction lead to improvement of pupils' results in comprehensive reading in grade 5 of elementary education? In order to answer this question, a quasi-experiment was set up (untreated control-group design with pre-test and post-test). Twelve schools were selected as experimental group and fifteen schools constituted the comparison group. A study on implementation preceded the post-test. This study was meant to determine whether the implementation of the experimental variables was sufficiently higher in the experimental group compared to the control group, to expect differences in pupil results due to the teacher behaviour expressed in the experimental variables. The experimental variables are the following aspects of adaptive instruction:
· stimulating self confidence and competence of pupils,
· creating an explorative learning environment,
· extending instruction and learning time for comprehensive reading,
· working according to the 'strategy instruction model',
· setting targets,
· regularly testing pupils' results.
The results of co-variance analysis show that the programme improved the learning results of pupils in grade 5. After correction for pre-test, sex, age, intelligence, social economical background, effect sizes of .25 and .46 on tests for comprehensive reading and meta-cognitive strategy use were found. The sizes of these effects can be characterized as small respectively moderate. After one year a follow up study was carried out. It turned out that the effects remained.

Allegorical versus Experiential reading styles in Undergraduate English Students
Shelley Sikora, Athabascau University, Canada
Carolin Kreber, University of Alberta, Canada

Approaches to literature in classroom settings tend to emphasize the sociohistorical and political dimensions of the text. However, literary works also have the capacity to implicate the self and deepen self-understanding. Little is known about the processes by which texts influence the expressive agency of readers or how to facilitate the development of such processes in students' experience of the text. Phenomenological methods, because of their emphasis on description, provide appropriate means for exploring issues related to the internal dynamics of different types of reading experience. We will report on results of a phenomenological study of 40 undergraduate English students' responses to Coleridge's poem, Rime of the Ancient Mariner. Each of the 40 participants chose five passages from the poem that they found striking and then provided detailed verbal descriptions of their experience of each passage. This yielded 198 commentaries. In the analysis, the commentaries were scored for the presence or absence of each item in an array of phenomenologically derived features. A cluster analytic algorithm was used to group commentaries according to the similarities in their profiles of features. Six distinct patterns were identified. Among the distinct styles of engagement, one in particular reflected expressive self-implication. Commentators in this cluster evidenced a pattern in which (1) explicit descriptions of feelings in response to situations and events in the text; (2) blurred boundaries between oneself and the narrator of the text, and (3) active and iterative modification of an emergent affective theme. In characterizing this mode of engagement, the language of enactment seems most appropriate; it contrasts with the five other modes of response that were identified, including abstract interpretation (allegoresis), elaboration of autobiographical associations that seemed to dissipate engagement with the poem itself, and sensuous involvement in imagery and stylistic aspects of the text.

M 17   26 August 2005   14:30 - 15:50   Room E004

Paper Presentation

WRITING

Chair: Tibor Vidakovich, University of Szeged, Hungary

Argumentative and persuasive text: what strategies use students in text writing or multimedia design?
Vassili Tseptsov, Institute of Psychology RAS, Russia (Moscow)

We studied writing of argumentative and persuasive text under conditions of simple text versus multimedia presentation (Tseptsov, 2002). We used writing production analysis technique and inter - individual experimental schemata. The results had shown that there was the significant difference between conditions at planning phases. Depending on task type, there was found that planning of argumentative text had logic based proving strategy, whereas persuasive text had addressee based effect prediction strategy. The results shown also that standard text writing task is much more dependent on linguistic competence, but there is the deficit in means for the definition of skills necessary for the multimedia design.

The influence of the complexities of the Spanish code in spelling acquisition
Sylvia Defior-Citoler, Universidad de Granada, Spain
Francisca Serrano Chica, Universidad de Granada, Spain
Gracia Jimenez Fernandez, Universidad de Granada, Spain

This transversal study aims to examine the development of spelling acquisition in the early phase of this acquisition as a function of the complexities of the Spanish code. Spanish is considered a shallow orthographic system in reading. However, it is unpredictable in spelling, due to the existence of inconsistent graphonemes. Inconsistency and other complexities are studied in this work, namely digraph, contextual and position influence, silent letter, double complexity, inconsistency, consonant cluster, and diacritic mark. Participants were Spanish children from first to fourth grade, testing in several dictation tasks. Both word and pseudoword spelling was evaluated, in other to study lexical as well as sublexical procedures imply in spelling in a transparent language. Four variables were manipulated: frequency), length, lexicality and type of complexity. Results are present as a function of type of complexity and the findings are discussed in the framework of the dual route model. Finally, practical implications are considered.

Do computer keyboards disrupt the organisation of young Children's writing
Charles Crook, Nottingham university, United Kingdom

The use of computer keyboards for typing is not normally a matter for classroom instruction. We expect the writing of experienced adult typists to benefit in both speed and fluency. Is young Children's typical lack of such experience proving an impediment to their computer-based writing? 72 children aged between 6 and 11 were invited to carry out simple writing tasks with both a traditional pen and a computer keyboard. The pen was a cordless inking device applied to paper fixed to

a graphics tablet. Software monitored keystrokes but also tracked their pen movements – allowing these to be replayed later for close temporal analysis. In addition, patterns of visual attention to the writing draft that served as model in some of these tasks were recorded. The tasks required either writing short sentences from memory (i.e., familiar text) or reproducing unfamiliar (but simple) text from a pre-written draft model. Under all conditions the younger children wrote more quickly with a pen than at the computer. Older children wrote from-memory text at comparable speeds. However, writing from a model was reliably slower when using a keyboard. No children adopted a style of keyboard use that corresponded to strategic or touch typing. However, older children were evidently gaining skill in hunting and pecking the relevant keys. However, it is argued that writing must be considered as a coordination of action, cognition and attention. In these terms, the potential fluency of keyboard text entry is readily disturbed by the frequent shifts of visual attention required by external notes or model. Writing with a pen, however, is more easily integrated with this sequential execution of the writing act.

Microgenesis of effective learning and teaching literacy
Madelon Saada-Robert, PSE, Switzerland
K. Balslev, PSE, Switzerland
C. Gamba, PSE, Switzerland
C. Martinet, PSE, Switzerland

Inspired by the microgenetic models focusing on the on-line processes of knowledge acquisition, this paper is concerned with a situated research in kindergarten, involving 18 children aged 4 with their teacher in emergent reading of a picture book in the course of two 45 min. sessions. Considering the way teacher and pupils interact in the classroom as a determinant factor for learning, the teaching microprocesses are also focused on. The research question is twofold. How do the teacher and the children adjust to one another, in order to reach a common zone of meaning, allowing the teacher to progress in his semiographical object of instruction (i.e. text-based comprehension opposed to semiopicturality as picture-based comprehension) and allowing the children to acquire the semiographic principle? What is the evolution of the linguistic competencies resulting from the learning-teaching processes? These questions are tested longitudinally, at the beginning and the end of the school term. Two methodological tools are used: a) the microgenetic analysis of the verbal interactions between teacher and pupils in the two 45 min. sessions, based on video recording; b) the individual psycholinguistic testing, requiring letters and words' identification and production. They aim at pointing to the stability

of knowledge when acquired in a guided learning (focused by the microgenetic analysis) and its evolution during the 9-months school year. The outcomes concern in one hand the on-line processes of the co-construction of semiography, in the first and last sessions of the term, in the other hand the evolution of linguistic competencies between these two times. A discussion is finally presented about the on-line learning-teaching processes that foster the awareness of semiography and its relationship with the specific individual competencies acquired by the children.

M 18   26 August 2005   14:30 - 15:50   Room E005

Paper Presentation
Computer-supported Learning Environments

ENHANCING DIALOGUE AND ARGUMENTATION

Chair: Eleni Kyza, University of Cyprus, Cyprus

Online discussions in higher education: Effects of computer-supported collaboration scripts on argumentation, self-explanation and knowledge acquisition
Karsten Stegmann, University of Tuebingen, Germany
Armin Weinberger, Knowledge Media Research Center, Germany
Frank Fischer, Knowledge Media Research Center, Germany

In higher education, online discussions play an increasingly important role for collaborative learning. Students are supposed to engage in collaborative argumentation to acquire knowledge. By constructing arguments, learners generate self-explanations, which in turn facilitates acquisition of domain-specific knowledge and knowledge on argumentation. However, collaborative learners rarely construct sound arguments. Computer–supported collaboration scripts have been regarded as means to facilitate online discussions. This contribution presents two consecutive studies. In the first study with a one-factorial design (N=60) we examined effects of a computer-supported collaboration script on the construction of arguments and individual knowledge acquisition in online discussions in higher education. The script aims to support the construction of single arguments. Results show that learners could be supported to construct single arguments by the script. The script for argument construction also supported the acquisition of knowledge on argumentation, but not the acquisition of domain-specific knowledge. These results indicate that either the assumption that the construction of arguments fosters the amount of

self-explanations is wrong or that self-explanations do not always facilitate acquisition of domain-specific knowledge. Therefore, in a second study, we analysed the effect of the script for argument construction on cognitive processes during collaboration. Fifty-four students were assigned to two conditions of a one-factorial design. Think-aloud protocols were used to capture individual self-explanations during collaborative learning. Effects of the script on argument construction, acquisition of domain-specific knowledge, and acquisition of knowledge on argumentation could be replicated in the second study. Furthermore the script increased the frequency of self-explanations, which did not lead to improved knowledge acquisition.

Web-based Inquiry Learning in Secondary Schools: Effects of Internal and External Collaboration Scripts on Argumentation
Frank Fischer, Knowledge Media Research Center, Germany
Ingo Kollar, University of Tuebingen, Germany

Web-based collaborative inquiry learning environments present an arena in which students engage in collaborative argumentation about science problems in secondary schools. Unfortunately, these environments rarely provide learners with specific support concerning collaborative argumentation. By embedding external collaboration scripts, argumentation processes might be improved, leading to higher domaingeneral and domain-specific knowledge acquisition. However, external collaboration scripts can have differential effects for learners holding differently structured internal scripts on collaborative argumentation, i.e. their procedural knowledge that guides them in argumentation. We investigated how differently structured external scripts play together with learners' internal scripts concerning processes and outcomes of collaborative argumentation. 98 students from two German secondary schools worked on a curriculum unit in biology, into which two versions of an external collaboration script (low vs. high structured) were embedded. Learners' internal scripts on collaborative argumentation were assessed prior to collaboration and classified as either low or high structured, establishing a 2x2-factorial design. Results concerning the acquisition of domain-general knowledge show that the high structured external script supported all learners, regardless of their internal scripts. Considering the acquisition of domain-specific knowledge, learners' internal scripts were more influential, favoring learners with high structured internal scripts over learners with low structured internal scripts. Concerning processes, case studies revealed that learners holding low structured internal scripts were not able to engage in high-level argumentation processes (e.g., arguments lacking data and reasons) whereas learners with high structured internal scripts often backed their arguments

up with data, gave reasons why a particular piece of data supported a claim, and more often generated counterarguments. Results suggest that web-based collaborative inquiry learning environments can be improved by implementing high structured external collaboration scripts, but that learners' internal scripts appear to be more influential with regard to how domain-specific information is processed. Results are discussed concerning their theoretical and practical relevance.

Students Dialogue in computer supported collaborative learning environments
Claes Malmberg, Malmoe University, Sweden
Gunilla Svingby, Malmoe University, Sweden

Within education it is often assumed that students learn more effectively when working in groups. However, the learning processes that take place in groupdialogues have been very little investigated. This study analyses the dialogue of a small group when working with two different types of tasks. The tasks deal with ethical conflicts in connection with the exploitation of natural resources. One type was problembased, the other type of task was product oriented. The study is based on the theoretical traditions of Vygotsky and on Bakhtin's reasoning on dialogicality and multivoicedness. The research data was gathered in 'natural' settings, as part of a computer supported course taken by teacher students in Mathematics and Science during their first year. The aim of the study is to analyse a) the relationship between type of task and type of dialogue and b) qualities of dialogue. Independently of the type of task students' dialogue did mainly focus on completing the task. The utterances in the product oriented task were about 'activity exchange' in contrast to 'knowledge exchange'. The result is a dialogue with unconnected utterances and a final report consisted of students individually contributions added to each other without revision from the group. In the problembased task the utterances were about 'knowledge exchange'. The students reported facts from external sources. The students do not, however, use the external voices in each others utterances as a tool for construction of shared knowledge. In both types it is recognized that students may learn individually from the external resources they employ but they do not use each others utterances as resources for shared meaning construction.

Voices in the Online Computer Conference: Task, text, moderator and learners as part of dialogic knowledge building
Sarah Schrire, Kibbutzim College of Education, Israel

This paper presents a follow-up study to research that examined the relationship

between interaction, cognition and discourse in asynchronous computer conferencing. In the original research, a relationship was found between the level of cognition and the interaction pattern type in online discussion, with synergistic or collaborative interaction associated with higher levels of critical thinking. The present study, which is based on an analysis of six online discussion forums, continues this inquiry and considers the role of the instructional task and related text in the knowledge-building process. The forums were part of a blended learning environment in a higher education setting. The online discussions in the new courses were based on a variety of tasks and texts and the approaches to forum moderation were varied. Some of the tasks were of a practical nature; some were theoretical, requiring different levels of analysis. Each task required a focus on different types of texts. The instructor's presence in the forums ranged from active moderation in three forums to minimal intervention in the other three. In addition, the study validated a new scheme for evaluating knowledge building against Garrison, Anderson and Archer's Practical Inquiry Model, on which the scheme is based. Using the new scheme, content analysis was performed on the forum transcripts. The results indicate that, although collaborative knowledge building is associated with higher levels of cognition, attention needs to be paid to the potential contribution of the task presented to the learners and the text on which the task is based. The highest levels of cognitive processing were found in forums that combined theoretical tasks and texts with moderator moves encouraging learners to relate to one another's messages. In the learner-learner and learner-instructor online dialogue, the text represents an additional voice with which learners can be encouraged to interact.

M 19   26 August 2005   14:30 - 15:50   Room E103

Paper Presentation
Technology in Education and Training

TECHNOLOGY ENHANCED LEARNING

Chair: Beatrice Ligorio, University of Bari, Italy

The educational relevance of the video diary genre
Peter Medway, King's College London, United Kingdom

The availability of cheap and compact camcorders has resulted in the widespread popular production of 'video diaries'. While often confessional and reflective in

tone, the video diary may be created with an audience in mind; while employing the medium of speech, the video diary is writing-like in being monologic and extended--a form of composition, in fact. As a vehicle in which extended verbal (and visual) representations of self, experience and world are constructed and in which, apparently, substantial cognitive work may be done, the video diary is clearly of potential interest to educators. Examining the genre also affords an opportunity to look again at the educational issue of the value of narrative in knowledge-making. The reported study aims to begin to identify the 'affordances' of the video diary genre for young people's knowledge-making, 'identity work' and social engagement, and to examine non-narrative knowledge-making within a largely narrative genre. The paper will present a case study of many hours of video diary recorded by two Afghani teenage boys, formerly asylum seekers, attending a Glasgow high school. The analysis on which the paper draws generally examines the function (cognitive, social, language-learning) that the video diary serves for its creators. It will draw on standard techniques of discourse analysis and on the methods of 'language and learning' studies that track the evolution of speakers' knowledge in the course of their oral production. The work is theoretically significant in departing from the pattern whereby scholars working on academic discourse within genre theory study written, not oral composition; more formalised rather than improvised genres; and the acquisition of academic discourse and appropriate styles of self-presentation rather than knowledge-making. The paper will also seek to spell out some possible educational uses of video diaries.

Instructionally Designed On-Screen Videos as an Effective Learning Tool
Anna Ertelt, Educational Psychology, University of Freiburg, Germany
Alexander Renkl, Educational Psychology, University of Freiburg, Germany
Hans Spada, Department of Psychology, University of Freiburg, Germany

The goal of this study was to analyse the effects of instructionally designed on-screen videos on the acquisition of computer application skills. Videos show how to perform tasks within an authentic environment. A common critique on videos for learning is that a framework is missing how to design and use dynamic visualisations. Therefore, we built on results from research on example-based learning and on multimedia learning. We put special focus on making the single actions in the computer application meaningful so that they can be re-applied in transfer tasks. In order to support the learners in the acquisition of meaningful building-blocks for problem solving, we employed two different versions of segmentation within the on-screen videos. One form of segmentation was content-related. A label for every

single solution step within one task was presented. The second experimental condition was related to the application flow and called 'pacing'. In order to avoid the well-known 'couch potato attitude' while watching videos and the consequentially superficial processing of the learning content, the users were actively involved in the application flow via click control at the beginning of each segment. Learning success was measured with a declarative knowledge test (multiple choice/ open questions) and a procedural knowledge test (near and far transfer tasks). The results showed that on-screen videos, particularly those with labels, substantially improved the learning outcomes compared to a standard introduction to the computer application. In addition, we assessed errors during task handling, actual task handling time, acceptance, and motivation. All these effects will be presented at the conference. We will discuss the implications of these results to current instructional theories.

The role of interactions in Science learning using three educational mediums: video, technology-based learning environment and real objects
Zacharoula Smyrnaiou, Univ. of Thessaly, Greece
Panagiotis Politis, Lecturer, Univ. of Thessaly, Greece
Angelique Dimitracopoulou, Associate Prof., Univ. of Aegean, Greece
Vassilis Komis, Assistant Prof., Univ. of Patras, Greece

In this paper we discuss the interactions between students and among teacher and students. It is pedagogic delusion the thought that the work of students in groups involves automatically their collaboration (Amigues, 1988). The interaction between students depends among other things on their personality (Kempa and Ayob, 1991). Many times, their oppositions lead them to conflicts that prevent the problem's solution (Goffard and Goffard) or a student with an error representation accomplishes to convince the other (Gomatos, 1996). Dillenbourg (1999) states that students do not learn from each other merely by solving the same problem at the same time, but because they interact (e.g. by explaining something or by negotiating about several solutions).The teacher's role as tutor is very important (Dumas-Carre & Weil-Barais, 1998). The innovative paradigm concerns Science teaching and specifically Hooke's Law. It exploits three different mediums: a video, real objects and the technology-based learning environment ModellingSpace. First, students look at a video. A spring is in its equilibrium position (neither compressed nor extended). The length is perturbed slightly and the spring tends to come back to the equilibrium position. Then a mass is hung from the spring and it is displaced from the equilibrium position and so on. They describe and explain the video, expressing their first representations. Next, they carry-out the experiment using everyday ob-

jects. Finally, they design and virtually run the experiment using ModellingSpace which is an open-ended learning environment that allows students to create models. Results show that the use of three media and the cooperation between students and among teacher and students facilitates students' understanding in a more intuitive way, particularly concerning the meaning of abstract concepts.

The recourse to educational games software in high school educational intervention: An exploratory study

Francois Larose, University of Montreal, Canada
Johanne Bedard, University of Montreal, Canada
Vincent Grenon, University of Sherbrooke, Canada

This paper presents the results of a preliminary study conducted with 66 high school pupils (14 to 17 years of age) who were asked to experiment with four software games recommended by the Quebec Ministry of Education: two teacherware games and two software games for commercial purposes. Our intent was 1) to gather information on the profiles of daily utilization practices of an electronic game by high school pupils and 2) to establish a first profile of their representation with regard to the utilization of educational games environments in school contexts. The research protocol included a double procedure for data gathering. After being presented with a brief survey relevant to their sociometric profile and their daily recourse to domestic practices with electronic games, pupils tested the software for a period of 90 minutes and were interviewed on four dimensions pertaining to their perception of the game, representation of its qualities and defects, game strategies and relevance to their level of schooling. Pupils had difficulty conceiving that a games context could be of some use to support school learning. This directly questions the significance of recourse to authentic learning contexts implementing curriculums of a socioconstructivist orientation. The reseach process already begun will eventually help us measure the distance between the representations of teachers concerning their recourse to educational game software in the classroom compared to evaluation of educational software made by larger samples of primary and high school pupils. The study will provide precious indicators for practitioners with regard to the integration strategies of pedagogical informatics to be privileged to support the authentic character that teaching and learning situations should adopt.

M 20   26 August 2005   14:30 - 15:50   Room E003

Paper Presentation

LIFELONG LEARNING

Chair: Mien Segers, University of Leiden, Netherlands

Autobiographical learning: Narrative approach to discourses in the life course
Eero Ropo, University of Tampere, Finland
Anna-Maija Gustafsson, University of Tampere, Finland

Purpose of this study is to investigate learning processes from the point of autobiography. Autobiographical approach to learning is an attempt to understand learning as a process of constructing and reconstructing one's self in discoursive ways. In describing the discourses in autobiographical learning we apply the Positioning Theory proposed by Langenhove and Harre (1999). The study is based on empirical data gathered from nine informants. They are both men and women, all between 40 to 60 years and all are experienced professionals in different fields (e.g. teachers, actors, a reporter, a priest and a politician). The interview data are considered as narrative. The data are analyzed qualitatively. The analyses show that there seems to be four major autobiographical processes in informants' learning. The first main category of processes can be described as an intraindividual dimension of learning. The second main category was described as the social dimension of learning. Two other categories were named as contextual dimension of learning and holistic dimension. Overall the results indicate that the chosen framework on studying autobiographical aspects of learning can reveal processes and categories of processes that are new to the past or current learning research. An analogy of learning as simultaneous, multilevel discourses both at the intra- and interindividual levels adopted in this study seems to offer a fruitful approach of reconceptualising and describing learning processes in the lifelong perspective.

Learning and Active Ageing
Gillian Boulton-Lewis, Queensland University of Technology, Australia

This paper describes preliminary results from a project on active ageing with a sample of 2645 respondents (aged from 50 to 74+ years) to a 178 item postal survey in Australia. The focus of this paper is on learning and how it relates to factors concerned with work, social, spiritual and emotional status, health, vision and home, life events and demographic details. The sample included a good balance of gender and state representation. The majority were living with a companion, in their own home and had above average education and financial security. Clustering analysis showed that the Learning and 'Health and Home' aspects were the most prominent (12 items and 14 items respectively). This suggests that an individual's health and attitude to learning are most important in active ageing. This was further supported by classification analysis. The relationship between variables will be further investigated using factor and regression analysis. The initial analysis of more than half (57%) of the open statements showed that 6% discussed learning. These responses will be further analysed to identify specific learning issues. Globally the population is ageing and this research will inform policy about learning for older adults.

Learning and aging: Adding culture to the equation
Mina O Dowd, Lund University, Sweden

Rubenson maintains, the main problem [with lifelong learning] is that it fails to critically assess how conditions for individual development, ethnic and social background, previous schooling and working life conditions create very different preconditions for lifelong learning (1996, p. 43). This paper reports the results of a longitudinal study that support Rubenson's criticism, while also showing that culture plays an important role in understanding learning, especially as regards aging learners. It argues that whether or not education systems, educationalists and educational research will be able to provide for and/or understand the learning needs of the growing numbers of persons who have reached mature adulthood or will shortly do so, may arguably depend upon the extent to which a re-conceptualisation of adult learning is undertaken.

The adjustment of mature-aged women returning to formal study
Jill Scevak, University of Newcastle, Australia
Robert Cantwell, University of Newcastle, Australia

Seven mature-aged women from the University of Newcastle's enabling course (Open Foundation Certificate) participated in the study. Measures of Approach to Learning (Biggs, 1987) and Causal Attributions (Chan, 1994) were taken in the first and last weeks of the semester. Two focus groups were also held at the beginning and end of semester. Data revealed a general decline in deeper learning and increase in surface learning in conjunction with a shift from personal control to self-blame for failure attributions. These changes were reflected in the qualitative data, where the women revealed negative feelings about time management, about a perceived competitive assessment regime, and a sense of alienation from aspects of the learning environment (particularly feelings of inadequacy and anxiety, as well as a fear of possible humiliation, in lectures). Additionally, the women reported lowered self-efficacy sentiments and perceived lack of family support as major reasons for a general feeling of loss of coping. The data is seen as consistent with prior research into women's experiences in adult education (e.g. Ancis & Phillips, 1996). Recommendations for change are outlined.

M 21   26 August 2005   14:30 - 15:50   Room E007

Paper Presentation

CORPORATE LEARNING

Chair: Aki Enkenberg, TIEKE Helsinki, Finland

ICT support for workplace learning: Network models of eLearning in SMEs
Wilfried Admiraal, Utrecht University, Netherlands
Maarten de Laat, University of Sourthampton, United Kingdom
Ditte Lockhorst, Utrecht University, Netherlands
Wilfred Rubens, Utrecht University, Netherlands
P. Robert-Jan Simons, Utrecht University, Netherlands
Elmo de Angelis, Training 2000, Italy
Graham Attwell, KnowNet, United Kingdom
Cecilia Katzeff, Interactive Institute, Sweden
Nick Kearney, Florida University, Spain

Katarzyna Piwonska, Progress & Business Foundation, Poland
Klaus Reich, Institute for Future Studies, Austria
Friedrich Scheuermann, Institute for Future Studies, Austria
Andrzej Skulimowski, Progress & Business Foundation, Poland

In this contribution, we investigate the possibilities of ICT to support employees' learning in SMEs, More specific, we focus on identifying network models that can facilitate and support eLearning in SMEs. Prior conclusions from our literature study on ICT supported workplace learning in SMEs suggest that attention needs to be paid to informal learning processes and the establishment of relationships or networks between workers and companies. In a former joint Cedefop-European Commission study of eLearning in SMEs five network models have been identified. These models were:

• Supply chain learning and training
• Umbrella agency facilitating learning in SMEs using eLearning applications
• Academic organization promoting learning and innovation in SMEs
• Individual SMEs devising their own tailor-made solutions
• Cooperative model: SMEs collaborating with each other for mutual learning

These five networks models will be the start of our analyses. Data have been gathered in seven European countries. First, a Business survey has been administered to get quantitative data on the perspective of more than 400 employers and managers on challenges and barriers of ICT supported learning. Secondly, 35 SMEs have been studied in more detail by conducting semi-structured interviews with employers, human resource managers, and/or employees. Thirdly, 39 national en international policy makers have been interviewed to get an insight into their ideas on policy on the use of ICT in learning and human resource development. Fourthly, 12 focus groups meetings will be organized in order to trigger a discussion between policy makers and experts on a national level, and formulate conclusions on how policy can promote eLearning in SMEs. This data will be analysed in a iterative way to (re)develop the network models. In the presentation, the results from each country will be presented in terms of the network models developed in this study.

Fostering acceptance as a central challenge for the implementation of e-learning into companies -the meaning of personnel-related and organizational measures as well as technical conditions-

Oliver Buerg, Ludwig-Maximilians-University Munich, Germany
Heinz Mandl, Ludwig-Maximilians-University Munich, Germany

The study examines factors that are important for fostering acceptance when implementing an e-learning in companies. Acceptance models which focus on attitudinal and behavioral aspects form the theoretical background of this study. Acceptance thus includes attitudes towards the usage of new technologies and the behavior itself. In these models, behavioral acceptance is seen as a consequence of attitudinal acceptance. However, the models rarely offer any insights regarding the influence of contextual factors such as the general framework of the e-learning implementation. Findings from research on implementation serve as the theoretical background for the identification of possible influencing factors. In many implementation approaches, personnel-related measures as well as organizational measures and technical conditions are identified as factors that foster acceptance. This study's research was conducted at a pharmaceutical company that implemented an e-learning. The results thus show that the factors examined directly influenced attitudinal acceptance and indirectly influenced usage (behavioral acceptance). This outcome suggests that these aspects should be given special consideration during the implementation of e-learning in companies

Learning processes within a service company: issues related to participation, identity and motivation.
Cristina Belardi, University La Sapienza Of Rome, Italy

The aim of the research is to analyse knowledge acquisition and the sharing of cognition processes that take place within a community of practice where people carry out services (immaterial objects) instead of making goods. In particular we will address issues like participation, identity and motivation by means of the analysis of a novice (V.) who began working in the community of practice. In particular we will address issues like participation, identity and motivation by means of the analysis of a novice who began working in the community of practice. We will refer to studies based on the concept that cognition is distributed among individuals, that knowledge is socially constructed through collaborative efforts to achieve shared objectives in cultural surroundings and that information is processed between individuals and the artefacts provided by culture (Lave, Wenger,1991; Orr,1990; Chaiklin, Lave, 1993; Salomon, 1993). Data were collected using several methods: the researcher audio-taped conversations and wrote ethnographic notes through the method of participant observation, carried out some interviews with the novice, with some of her colleagues (3 of whom were also novices) and with the president of the company. Some data refer to socialization and to the fact that novices are permitted to observe colleagues working in the vicinity of their desks. However, in

this type of context novices learn above all by talking to their nearby peers, reading texts written by experts and carrying out a small or simple part of a larger and more complex working activity as well. At present we could say that the learning process we studied is similar to those described by other researchers, but some data evidenced some differences about identity and knowledge acquisition.

Heterogeneity of prior knowledge of business management
Iris Trojahner, Dresden University of Technology, Germany
Barbel Furstenau, Dresden University of Technology, Germany

Theories of learning and instruction stress the high significance of prior knowledge for effective learning processes. The question is how students` prior knowledge can adequately be taken into account in class. This question is especially important in vocational education since the composition of the students in one grade is very heterogeneous. The study conducted by Furstenau deals with the problem of collecting and analysing prior knowledge of business management and has been accomplished in two classes at the vocational business school of the Bertelsmann Corporation located in Gutersloh, Germany. The students attended a vocational training in their first year for becoming Industrial Business Management Assistants. Before starting the vocational training the majority of class U2 went to a vocational school whereas the majority of class U3 passed their A-levels at a school of general-education. The data were gathered by using the networking technique. It was the students` task to depict the work processes in a printing house (the Mohnmedia Mohndruck Company) from the request of a client to the payment of the final product. By using paper and pencil the students had to create a multi-relational network whereas neither concepts nor relations were given. In terms of data analysis we used quantative methods as well as qualitative methods, in particular modal networks and prototypical networks. Even though the analysis of the data is not completed yet we are able to present some first results: The data shows that class U2 possesses a more elaborated prior knowledge of business management than class U3. Whereas the students of class U2 mostly already have anchors for a deeper examination of business processes students of class U3 still need to acquire them. This can for example be fostered by complex learning environments.

M 22   26 August 2005   14:30 - 15:50   Room E102

Paper Presentation

SELF REGULATION

Chair: Eduardo Vidal-Abarca, Universidad de Valencia, Spain

Metamotivation: Students' (self)regulation of their motivational processes
Erik De Corte, University of Leuven, Belgium
Peter Op 't Eynde, University of Leuven, Belgium
Katrien Gerits, University of Leuven, Belgium

Whereas the extensive metacognitive research over the years has resulted in a growing understanding of students' regulation of cognitive processes, this is far less the case for students' regulation of emotional and motivational processes. Already in 1989 Kuhl & Kraska introduced the concept metamotivation as complementary to metacognition. However, since then very few studies have investigated students' use of metamotivational strategies. In this paper we present the results of a survey study that investigated students' use of regulation strategies to direct and control their motivational processes in school. A questionnaire was developed to identify students' use of motivational regulation strategies in school. To get a broader view on students' motivation we also investigated students' self-efficacy and goal-orientation beliefs. In a first study, we administered the respective questionnaires to 248 students who were in their first or fifth year of secondary education following either a classical, humanities, or vocational track. Factor analyses were performed to analyze the exact structure and reliability of the questionnaires and to make adjustments if necessary. The optimized versions of the questionnaires were in a second study presented to a similar group of 246 students. Discriminant and variance analyses were performed to clarify the relations between students' track level, age, achievement level, and gender, their self-efficacy and goal orientation beliefs, and the use of motivational regulation strategies. Results indicated that there is an important difference in the use of motivational regulation strategies between girls and boys. Girls use significantly more motivational regulation strategies than boys. An interesting finding that might clarify some of the gender differences in the use of motivational regulation strategies is that girls much more than boys think they are good in something (self-efficacy beliefs) because of the context and/or the effort they have put into it (compared to boys who refer to talent).

The influence of context on Children's learning goal adoption
Amanda Harris, Univsersity of Sussex, United Kingdom
Nicola Yuill, University of Sussex, United Kingdom
Rosemary Luckin, University of Sussex, United Kingdom

Research in the field of achievement motivation has identified two distinct orientations or attitudes towards learning which inform the adoption of different learning goals (Elliot & Dweck,1998; Ames, 1992). A mastery orientation concerns the desire to develop competence whereas a performance orientation indicates the desire to demonstrate competence (Harackiewicz & Elliot, 1993). These two approaches are associated with distinct behavioural, cognitive and affective patterns evident in learning contexts (Elliot & Dweck, 1988). They are typically referred to in the literature as 'orientations' implying they are stable individual traits with little research directly addressing the influence of context on the adoption of learning goals. My research seeks to explore this influence with results directly challenging the trait approach. Short, context specific scenarios were designed to measure learning goals in 3 learning contexts (individual, collaborative and whole class) in 2 perceived ability conditions (high and low perceived ability) in a sample of 26 primary school children. Using a repeated measure design the aim of the study was to assess whether the learning goals each child adopted remained the same across different learning environments or whether they varied across these contexts. Results support a situation specific approach in that no child adopted the same goal across all 6 conditions. The whole class learning environment had a particularly strong contextual influence with a significant number of children adopting a mastery goal in the high perceived ability condition ($p < 0.001$) whereas in the low perceived ability condition a significant number adopted a performance goal ($p = 0.01$). The results of this study suggest that learning goals are not stable individual traits but are influenced by different contexts and learning environments which has implications not only for the measurement of learning goals but also for the application of achievement motivation theory to the classroom context.

Self-regulated learning practices in elementary school: teacher motives, conditions and actual use
Koen Lombaerts, Dpt. of Education - Vrije Universiteit Brussel, Belgium
Gwendoline Hotton, Dpt. of Education - Vrije Universiteit Brussel, Belgium
Nadine Engels, Dpt. of Education - Vrije Universiteit Brussel, Belgium

Self-regulated learning (SRL) has broadly been introduced within higher educa-

tion, and progressively gains importance in secondary schools. Although many of the strategies for SRL (such as planning and evaluating) are regularly trained in elementary schools, where pupils often have an active and independent contribution during learning processes, the research on self-regulated learning at elementary school level is limited. In this paper, elementary school teachers' perspectives, on how and to which extent self-regulated learning processes occur in elementary schools, are described. The first aim is to examine the motives elementary school teachers report to introduce self-regulated learning in their classroom. Secondly, the conditions teachers consider to be important when introducing self-regulated learning are investigated. A third aim is to analyze the actual use of self-regulated learning methods in elementary schools. In order to answer the above questions, a survey is conducted among elementary school teachers (n=300). Questionnaire data are collected among the teachers using a developed instrument which will be presented in terms of content and reliability. The statistical output of our analysis will be presented, and a framework relating 'teacher motives towards SRL' on the one hand to the 'actual teacher use of self-regulated learning methods', and on the other hand to 'school and class context conditions', will be discussed.

Measuring Self-Regulated learning by self-report and by learning task
Christoph Metzger, University of St. Gallen, Switzerland
Daniel Jabornegg, University of St. Gallen, Switzerland
Charlotte Nueesch, University of St. Gallen, Switzerland
Andrea Zeder, University of St. Gallen, Switzerland

Fostering of Learning Strategies (LS) is an explicit goal in the three-year curriculum of Vocational Education in Switzerland. Therefore, a case-study alike three-year research and development program has been started focusing on the following research question: To which extent does the fostering of LS during the three years of school improve the students' LS? In order to measure the continuous and final effects of this intensive LS-instruction, the students' knowledge and use of LS has to be recorded before, during and after the intervention. Since the exclusive use of self-reports has been increasingly criticized, the students' LS- knowledge and -use before intervention were measured by two means. (1) A LS-inventory was given to 100 students from two schools before any LS-instruction took place. (2) The students were given a specific learning task, asking them to write a summary about a newspaper-article on a consumer-issue, since summarizing is relevant for vocational students and the teaching of LS is emphasizing the cognitive strategies required. Afterwards, the students had to reflect on their task-specific LS-use and to evaluate

their knowledge and use of different forms of summarizing in general. Both the summaries and the students' self-reflections were analyzed by experts, focusing on the summary's quality, its relation to LS-knowledge and the reflection of LS-use. Further on these outputs were compared to the students' LS-profile. Qualitative as well as quantitative analyses were applied. The discussion will be twofold. (1) With regard to methodology: How far a LS-inventory is sensitive to show differences of the students' strategies to summarize text material, and how far additional information can be gained by letting students perform a learning task? (2) With regard to instruction: To which extent planning and developing a LS-intervention can be tailored specifically to LS-knowledge and -use of students in vocational-education?

N 1   26 August 2005   15:55 - 17:15   Room A019

Paper Presentation
Assessment methods

PSYCHOMETRIC APPROACHES

Chair: Doug Smith, Duke University, Canada

Development of edumetrical indices for the analysis of the spectral quality of higher education standardized tests
Jean-Luc Gilles, University of Liege, Belgium

The confidence degrees technique associated to the MCQ makes it possible to by-pass the binary character of students assessment performance (the selected proposal is either correct, or incorrect) provided that a series of methodological rules are followed called admissible probability measurement procedures by Shufford & al. (1966). Usually, the confidence percentages which accompany the MCQ answers are used to deliver more subtler feedback on each student's spectral performances. The innovative aspect of our approach lies in the fact that we have exploited the confidence percentages provided by the students to provide spectral information on the quality of the questions (as opposed to information on the quality of students performances). Our research thus led to the development of a series of original indices for the analysis of assessments' spectral quality. These spectral indices are intended to be used when the assessor must highlight problematic MCQ and, within those, the proposals which contain anomalies.

Psychometric properties of the attention checklist (acl) among cypriot school children
Timothy Papadopoulos, University Of Cyprus, Cyprus
Georgia Panayiotou, University Of Cyprus, Cyprus
Rebecca Georgis, University Of Cyprus, Cyprus

A psychometric assessment of the Greek version of the Attention Checklist (ACL; Das, 1986) was undertaken among Cypriot school children, between 5 and 12 years of age. The teachers of 810 children from 23 schools (6 school-districts) completed the ACL for each of their students. Grade distributions and age means were as follows: kindergarten, n =114 (Mage = 5.14, SD = 0.76); grade 1, n = 145 (Mage = 6.57, SD = 0.49); grade 4, n = 258 (Mage = 8.91 SD = 0.43); and grade 6, n = 291 (Mage = 10.82, SD = 0.54). A series of principal component factor analyses run by grade yielded, in every case, the single-factor structure of the instrument that had been obtained in a previous study with a Canadian grade 4 population, accounting for 71%, 69%, 70% and 59% of the variance, for kindergarten, grade 1, 4, and 6, respectively, and a 68% of the overall variance. Cronbach's Alpha reliability scores were consistently high for all grades: kindergarten? = .959, grade 1? = .932, grade 4? = .968, and grade 6? = .953, with an overall? = .954. Further, grade 4 means and SDs of the total scale were similar to the Canadian data. In addition, ACL scores were positively correlated with scores on a hyperactivity scale (based on DSM-IV diagnostic criteria) and cognitive measures of attention (from the Cognitive Assessment System, CAS, Naglieri & Das, 1997). Overall, results supported the convergent validity of the ACL across ages. Notably, kindergarten teachers appeared to be the most sensitive raters with regard to hyperactive-impulsive behaviour. Inattentive behaviour, however, was comparatively more stably and accurately assessed by teachers regardless the age of the students. Concluding, ACL appeared to show satisfactory psychometric properties in its Greek version with a normal population.

Ratings of teaching standards: The impact of psychological variables
Carmine Maiello, University of Fribourg, Department of Education, Switzerland
Christoph Staedeli, University of Zurich, Inst. of Teacher Education, Switzerland
Christine Steiner, University of Fribourg, Department of Education, Switzerland
Amelie Perroud, Swiss Institute of Professional Education, Switzerland
Maja Kern, University of Fribourg, Department of Education, Switzerland
Cyrill Schwaller, University of Fribourg, Department of Education, Switzerland
Ursula Renold, Federal Office of Professional Education, Switzerland
Fritz Oser, University of Fribourg, Department of Education, Switzerland

The present study is part of a broader project on the development, validation and assessment of teaching standards for vocational school teachers. According to the results of three independent studies, 45 competence profiles for vocational teachers have been worked out and grouped into the 4 main content domains of 1) teaching-related standards, 2) learning process-related standards, 3) learning environment-related standards and 4) self-management/cooperation-related standards. The main purpose of the present study (N=853) was to explore whether psychological variables such as teacher self-concepts and teacher empathy affect ratings of the importance and applicability of teaching standards. Rating of importance, handling and applicability of each standard were given by students, teachers, politicians, school inspectors, school leaders, school consultants and educational scientists on 4 point Likert scales using a standardized questionnaire. The main hypothesis was that teacher empathy would correlate positively with cooperation-related and learning process-related standards. Further we assumed that self-concepts are mainly related to self-management standards. Results support our hypotheses and indicate that ratings of standard importance and applicability as well as daily application routines are significantly associated with teacher self-concepts and empathy. Research on standards should therefore take into account these variables while attempting to assess competence profiles of teachers at vocational schools.

Examining test item meaningfulness across cultural groups
Guillermo Solano-Flores, American Institutes for Research, United States

This paper reports on the methods of visual representation of information developed in an investigation on cultural validity with the purpose of examining how diverse cultural groups differ on item meaningfulness—the way in which students relate the content of test items to their personal experiences—and how item meaningfulness accounts for group differences on performance on tests. The study is a part of a project that examined how students from different cultural groups differ on the ways in which they interpret test items. Cultural validity is the extent to which assessment addresses the socio-cultural influences that shape student thinking and the ways in which students make sense of items and respond to them. Research on cultural validity is based on examining evidence from two sources: (1) individual interviews—whose intent is to probe item meaningfulness—and (2) group-administered tests—which allow for identifying statistically significant test score differences between cultural groups. In this study, pattern charts were constructed as forms of visual representation that combine the qualitative information obtained from individual interviews and the quantitative information obtained from testing

large samples of students. By using pattern charts, it has been possible to observe that the patterns of significant statistical differences between cultural groups on test scores are similar to the patterns of item meaningfulness differences between those groups. These findings speak to the fact that socio-cultural factors different from formal instruction are a powerful influence that shapes performance on standardized tests.

N 2   26 August 2005   15:55 - 17:15   Room A007

Paper Presentation
Cultural Diversity in School

INTEGRATION OF IMMIGRANT STUDENTS

Chair: Lanwan Chang, National Taichung Teachers College, Taiwan

Do Young Children from Immigrant Families Learn Differently in Multicultural Classes: Teachers' Points of View
Miriam Mevorach, Levinsky College of Education, Israel
Yehudit Konforti, Tel Aviv University, Israel
Sidney Strauss, Tel Aviv University, Israel

The main goal of this research was to examine teachers' concepts of how learning takes place in Children's minds. Specifically, we wanted to find out if preschool teachers share a common naive understanding (Espoused Mental Models) of how learning occurs in the minds of children from different cultural backgrounds. Our research goal was to examine differences within the teacher's EMM about the minds and learning of young children from different cultural backgrounds. It includes two main theoretical frameworks: cognitive psychology components that refer to the teachers' espoused mental models of Children's learning and cultural psychology that refers to the learning abilities of children from cultural backgrounds different from the mainstream dominant culture. We used methodology that was developed in previous research (Strauss at al., 1998). The subjects included 18 preschool teachers that taught children from the mainstream cultural group as well as children from Ethiopian immigrant families. The findings show the existence of the original EMM components while speaking about the mainstream children's mind and learning. While analyzing the parts of the transcribed narratives that referred to Ethiopian children, we found a Meta-category cultural and contextual aspects that

didn't exist in the original model. We found that preschool teachers considered that children from Ethiopian immigrant families are at a lower starting point, lack parental support and proper learning environment and have difficulties in creating communication with authoritative figures, which in our case are represented by the preschool teacher. Our finding will help create teacher's awareness about children's different cultural backgrounds. Consequently this will improve their teaching in multi-cultural classes. From a theoretical perspective, this study contributes to the conceptual debate as for the place the cultural aspect is taking in the espoused mental model theory.

Preventing Racism, Exclusion and Ethnic Violence in Schools
Christine Riegel, University of Fribourg, Switzerland
Sabine Tanner, University of Fribourg, Switzerland
Fritz Oser, University of Fribourg, Switzerland

Teachers today are often overcharged by the challenges of dealing with ethnically heterogeneous school classes, particularly when ethnic conflicts at school threaten to escalate and young people with racist and right-wing extremist attitudes and behaviours stand out. Teacher training in Switzerland has only just begun to develop concepts and implement concrete education and continuing education programs that explicitly address these problems. This research project targets prevention of and intervention against xenophobic attitudes and forms of communication in the everyday life of the schools, develops concepts that teachers can implement and evaluates the effectiveness of those concepts at changing pupils' narratives. The goal is to qualify teachers to deal appropriately with conflict situations and xenophobia in schools. The research project contains different components: youth research, teacher training, interventions in schools as well as the evaluation of this intervention program and its impacts. The intervention study has a quasi-experimental design using quantitative and qualitative methods. In the evaluation study – involving teachers and pupils – the effects of various intervention strategies in school classes will be analysed and compared using a pre-post test design and a qualitative process evaluation. One focus is on the comparison of ethnic heterogeneous classes (with a lot of pupils with migrant background) and more homogeneous classes (with mostly Swiss pupils) and their respective developments through the intervention. In this paper we will present first results of the current project.

Acculturation and Educational Achievement of Children with an Immigrant Background in Primary School
Leonie Herwartz-Emden, University Augsburg, Germany
Kristina Reiss, University Augsburg, Germany

A longitudinal study is being carried out at primary schools in a south German city to analyse the reasons why children with an immigrant background do not do as well at school as children without an immigrant background (PISA). It is presumed that immigrant children have to achieve acculturation in addition to their developmental tasks. Furthermore, there is the presumption that the acculturative process takes place at primary school more than anywhere else. The educational achievements in the subjects German and Mathematics and the exclusion/inclusion in the class community serve as measurements of adjustment for acculturation. In the pilot study instruments of self-concept and self-esteem were being tested with regard to their intercultural validity and utilizability at primary schools. The results show that the instruments measure these features in both groups: immigrants and others. Inference statistics and descriptive analyses also show that the acculturative process is gender-specific, the immigrant background undermines gender-effects, the self-esteem of immigrant children is adapted earlier than the self-concept. Girls with an immigrant background are significantly different from boys with an immigrant background and German boys and girls. Boys and girls also have different competences. These results will be represented at the conference and discussed in detail. We also will present the results of the survey concerning the socio-demographic variables of the pupils and the evaluation of the first wave of the longitudinal study. In addition to the main research we are going to discuss the first results of an associated project: Mathematical Achievement of Immigrant Children (Kristina Reiss).

Learning potential and sensitivity to cognitive intervention of new immigrant students
Alex Kozulin, ICELP, Israel

The goal of this study was to determine whether the learning potential of under-achieving new immigrant students is a better predictor of their sensitivity to cognitive intervention than their standard psychometric scores. The answer to this question has an important implication for planning educational intervention with cultural minority students. Subjects in this study were nine to ten year old new immigrant children who studied in one of the primary schools in the north of Israel. At the beginning of the year students were pre-tested on Raven Colored Matrices.

Then the assessment of students' learning potential was carried out using Feuerstein's Learning Potential Assessment Device (LPAD) in a group format. Students' learning potential score was operationalized as a combination of the gain score (pre-test to post-LPAD) and the approximation to maximal obtainable score. Cognitive-educational intervention that lasted for nine months included five weekly lessons of Feuerstein's cognitive Instrumental Enrichment (IE) program, five hours of intensive Hebrew, and five hours of intensive math. At the end of the school year the students were post-tested using the Raven Colored Matrices. The students' pre-test scores were significantly below the Israeli standard norm for this age. LPAD procedure, however, was effective in revealing the students' good learning potential. Post-tests at the end of the year placed new immigrant students slightly above the Israeli standard norm for this age. Regression analysis confirmed that the learning potential score is a significantly stronger predictor of end of the year performance than the students' pre-test scores. The educational implication of the study is that dynamic assessment procedure can be used for identification of those students who most readily benefit from cognitive enrichment intervention and planning more extensive intervention for those with lower learning potential.

N 3   26 August 2005   15:55 - 17:15   Room A109

Paper Presentation

GENDER AND EDUCATION

Chair: Angelica Moe, University of Padova, Italy

Am I considered able to do this? Effects of gender ability beliefs in a MRT task performance
Angelica Moe, University of Padova, Italy
Francesca Pazzaglia, University of Padova, Italy

Research has widely demonstrated a general male superiority in some spatial tasks, such as mental rotation (Voyer, Voyer & Bryden, 1995). Biological, strategic and cultural explanations have all been suggested to account for these differences. The present research explored a rather different interpretation of gender differences in spatial abilities. Taking as a departure point the stereotype threat hypothesis (Aronson, Quinn & Spencer, 1998) we argued that males do better than female in the mental rotation test (MRT) of Vandenberg and Kuse (1978), because they consider

themselves and are considered by significant others as more capable of performing this kind of task. Beliefs about spatial abilities were experimentally manipulated in a sample of 90 male high school students (experiment 1) and in a sample of 107 females (experiment 2). They were divided into three groups. The first was told that males are more capable than females in this task, the second that females are more capable than males and the third received no manipulation. This feedback was given between the first and the second administration of the two parts in which the MRT was divided. Data showed that males expecting to be more capable than females and females expecting to be more capable than males outperformed their counter-parts in the second part of the MRT, i.e. after the manipulation. Males expecting to be less capable than females and females expecting to be less capable than males dropped their performance in the MRT after the manipulation. No difference be-tween the pre- and post-experimental manipulation administration of the MRT was observed for participants receiving no manipulation of expectations. Results are discussed in a socio-cognitive framework of individual differences in spatial abili-ties. The effects of personal or induced beliefs in motivation and performance are stressed, rather that innate factors, particularly in the educational context.

Role models, school improvement and the 'gender gap' - Do men bring out the best in boys and women the best in girls?
Peter Tymms, University of Durham, United Kingdom
Bruce Carrington, University of Newcastle, United Kingdom
Christine Merrell, University of Durham, United Kingdom

A number of countries are running role model recruitment drives under the as-sumption that like is good for like: ethnic minority teachers should teach ethnic minority children, women should teach girls, and so on. The empirical basis for this would appear to be case study and personal reflection. This paper will examine quantitative data to test the hypothesis that male teachers produce more positive attitudes amongst boys and female teachers amongst girls. Using data from the Per-formance Indicators in Primary Schools (PIPS) Project, information from 413 sepa-rate classes for 11 year olds were examined. One hundred and thirteen were taught by males and 300 by females. All the pupils completed questionnaires that were designed to measure attitude to school, reading, mathematics and science. In addi-tion, background data on those pupils were collected, including cognitive measures, attainment scores, ability measures and home background measures. The data were examined to look at attitudes using multilevel models controlling for background factors. The analysis concentrated on interaction effects between the gender of the

teacher and the gender of the pupil and the results gave little support for those who advocate recruitment drives with role models in mind.

Sex Differences in the way students perceive the curriculum in Primary Teacher Education

Gerda Geerdink, Vocational University of Arnhem And Nijmegen, Netherlands
Theo Bergen, Radboud University of Nijmegen, Netherlands
Hetty Dekkers, Radboud University of Nijmegen, Netherlands

The paper presents a part of a more extensive research project to explore the question: 'Can sex-specific student factors be identified in relation to school internal factors which lead to differentiated performance of male and female students in primary teacher education?' For this paper we focus on school internal factors: Is there any difference in the way male and female students perceive the curriculum in primary teacher education? Research questions are related to the different aspects of the curriculum. To that end. we have collected data among a research group consisting of fifteen female and fifteen male students from one teacher training college. We used parts of their portfolios in which students are supposed to describe how they have learned from special courses, for a content analysis. There were no differences found in the way they perceive the aspects of the curriculum but we found significant differences referring to the sexe-specific student factors. Like in their motivation and expectations male students seem more product-oriented and female students more process and pupil-oriented. In addition, it appears that male students are less enthusiastic about the offered curriculum be it assignments, lectures and tasks. Female students are more likely to see the offered curriculum as something they need for a better understanding of their future job, whereas male students are more likely to see if the different aspects from the curriculum fit in the programma they designed for themselves.

Children's motivations for reading: gender effects and changes across age

Vera Monteiro, Instituto Superior de Psicologia Aplicada, Portugal
Mata Lourdes, Instituto Superior de Psicologia Aplicada, Portugal

The present study focuses on the effects of age and gender, in reading motivation. Recent studies describe motivation for reading as a multidimensional construct (Baker & Wigfield, 1996; Guthrie & McGough, 1996) that becomes structurally more complex with age. Authors seem to be unanimous when they say that as children grow older it is possible to identify more dimensions of the motivation

to read, and it, also, seems that their motivations for reading and their attitudes towards reading decrease (Baker & Wigfield, 1999; Gambrell, Palmer & Codling, 1996; McKenna, Kear, and Ellsworth, 1995; Monteiro & Mata, 2000; Wigfield & Guthrie, 1997). In this paper we will consider Portuguese students' reading motivation. The instruments we used to assess reading motivation allow us to identify different components of reading motivation. Using the results of several studies we have developed, we will examine the effects of gender and grade on Children's motivation for reading from pre-school to 10th grade. 1601 children participated in those studies: 450 preschool children, 574, first-, second-, third- and fourth-grade students, 434 children from the 5th to the 9th grade and 143 10th grade students. We verified a significant gender effect but only after starting primary school and just on some of the dimensions of motivation for reading. The findings, also indicate that there are significant grade effects on reading motivation. Recent research suggests that reading motivation declines across the school years. Wigfield (2000) consider that the largest decreases in reading motivation seem to occur across grades 1-4. However, our study shows that this decline continue after 4th grade, even from 5th to 9th grade.

N 4   26 August 2005   15:55 - 17:15   Room A108

Paper Presentation
Arts Education

ART AND MUSIC EDUCATION
Chair: Andri Savva, University of Cyprus, Cyprus

Using graphical representations to assess the impact of age and formal music education on Children's listening competence and sense-making of music
Lieven Verschaffel, University of Leuven, Belgium
Mark Reybrouck, University of Leuven, Belgium
Sofie Lauwerier, University of Leuven, Belgium

This paper analyzes children's spontaneous graphical representations while listening to and making sense of music. Starting from the theoretical and empirical state-of-the-art, we set up two exploratory empirical studies aiming at getting an overall picture of the development of listening competencies and musical representations. Our research questions were threefold: (i) what is the impact of age on graphical representation of music, (ii) what is the impact of formal music education on

these representations, and (iii) what is the impact of specific musical parameters on the representational format? In the first study, we used existing musical fragments wherein a particular musical parameter such as melody, rhythm, dynamics, structure or voice leading was prominently present. In the second study, we used shorter and simpler self-composed musical fragments wherein the prominence of one of these musical parameters was maximalized. In both studies an attempt was made to understand and categorize Children's representations. A major finding of the first study was the emergence of two main categories, which we called type-I-notations – where the fragments are represented in a holistic way by one overall pictorial image – and type-II-notations – which try to capture at least one of the musical parameters in its temporal unfolding. There was a strong dominance of type-I over type-II-notations and a negligible impact of age and type of fragment on the kind of representations. The second study revealed much more type-II-notations, with a significant impact of age and formal music education: older children and children with music education used more type-II notations than younger children and children without music education. The combined impact of age and formal music education, finally, was only obvious in younger children.

What pupils say about learning and instruction in art: building an instrument
Victoria Pavlou, University of the Aegean, Greece

Attitudes are influencing teaching and learning processes and potentially affect the way pupils engage with art as adults. However, there is limited research in this area and lack of a standardised instrumentation. This paper presents the construction of an instrument for measuring pupils' attitudes towards art experienced in primary school. The construction of the ASAES (Attitude Scale for Art Experienced in School) involved a four-step procedure with different samples used for each step. The ASAES comprises of five subscales namely: enjoyment, confidence, usefulness, support needed and learning preferences. The paper aims to demonstrate that this is a valid and reliable instrument and that it can be used to investigate pupils' attitudes and factors that influence these. Moreover, the dimensions support needed and learning preferences also provide clear guidance to art educators and teachers about learning and instruction in art education. The ASAES was used to investigate the effect of pupils' characteristics, in particular gender and perceived ability, as well as factors such as teachers' level of art specialisation and attitudes towards art and art teaching, in relation to pupils' attitudes towards art. The results have implications about who, according to pupils, was the most effective teacher in supporting their learning and in better responding their learning preferences.

Learning to teach the arts: Student teachers' views to arts and arts education
Andri Savva, University of Cyprus, Cyprus

Cypriot student teachers' attending compulsory visual arts, music education courses as part of their teacher education appear to have little experience of formal arts education (visual arts, music, dance, drama) and in many cases we know little about how future teachers think about arts and arts education. There seem to be no valid and reliable instruments to test student teachers' views to the role of the arts and arts education. Moreover, the dearth of relevant measuring instruments means inevitably that information on factors such as gender, study year, previous experiences that may influence student teachers' views, is also limited. In order to determine issues that may have an impact on future primary teachers and their views to arts and arts education, a survey design involving a self-completion questionnaire developed from interviews with groups of student teachers' attending Art Education unit study and completed by a sample of 134 student teachers. Principal Component Analysis revealed 4 reliable scales. Descriptive statistics were used in exploring the nature of student teachers' views to arts and arts education. Two-way analysis of variance was employed to ascertain the influence of (i) gender and (ii) years of study. The results have important implications for teacher education and highlight the need for further research in identifying the role of artistic experiences, knowledge and background in the arts and whether these have an impact on student teachers' views on arts and arts education. This may give arts educators further information to assist with their presentation of relevant and carefully arts experiences as well as with the use of appropriate pedagogical strategies in undergraduate training institutions.

Assessment Practice in Visual Arts Higher Degrees
Kerry Dally, University of Newcastle, Australia
Allyson Holbrook, University of Newcastle, Australia
Anne Graham, University of Newcastle, Australia
Miranda Lawry, University of Newcastle, Australia
Liz Ashburn, University of NSW, Australia

The recent mergers of art schools into academic institutions and the consequent proliferation of higher degree courses in the visual arts has created pressure for these courses to justify that their research content 'measures up' to more traditional research practices. There has been vigorous debate within the Visual Arts field about the place held by research and the characteristics of artefacts as doctoral outcomes alongside the written thesis in traditional disciplines. There are concerns that

in an attempt to attain academic legitimacy, artistic research may be manipulated to adhere to the traditional and dominant models of established research in science and social science. Some art academics and practitioners argue that the nature of artistic research is often 'chaotic' and such a process should not try to emulate conventional scientific research models, while others argue that an artwork can only be deemed 'competent' if it is accompanied by a written theoretical elucidation. Because Fine Art Higher Degrees are still evolving, current evaluation practices and the criteria examiners adopt, play a crucial role in shaping learning outcomes, research practices and standards. The study reported in this paper aimed to investigate how examiners approach and reconcile the dual demands of assessing both the academic and practice components of a Visual Arts thesis. This perspective gives an insight into the qualities that examiners value in a Visual Arts exhibition as well as exploring the framework and discourse that examiners employ to communicate their evaluation.

N 5   26 August 2005   15:55 - 17:15   Room E111

Paper Presentation
Science Education

THE ROLE OF TEACHERS

Chair: Loucas Louca, University of Cyprus, Cyprus

Producing high adoption and quality implementation of reform science curricula through researchers-district-teachers collaboration
Yaron Doppelt, Univeristy of Pittsburgh, United States
Matthew M. Mehalik, Univeristy of Pittsburgh, United States
Christian D. Schunn, Univeristy of Pittsburgh, United States

A close-knit collaboration between researchers, a school district and teachers enabled the development and implementation of a design-based learning (DBL) module. This study investigated the contribution of DBL in the context of science education at the middle school level by engaging pupils in team projects that followed a DBL approach. This study presents a three-stage intervention program. The first stage involved investigating the existing learning environment and applicable science standards. The second stage included the development of a learning module that aimed at bridging the gap between the existing learning environment

and science standards. No concepts were explained declaratively until there was a need for a pupil to have such concepts explained, and only after a period in which pupils themselves attempted to investigate/discover the concept. The final stage involved implementing the module with in nine middle schools with 859 pupils. The principles the intervention program adopted were: defining goals, creating learning materials, designing lessons plans, reflecting on difficulties which arose from teachers' experiences in the classes. In-service teachers' training was used to encourage the teachers to reflect on their experiences in teaching the module. This reflection enabled the teachers not only to share ideas and solve problems but also to feel ownership of the new module. Both quantitative and qualitative tools were used to investigate the research effort. The researchers observed 220 lessons and collected pupils' portfolio from 34 classes. Findings show that design-based learning is associated with a higher level of engagement and achievement. Three approaches were identified in the ways teachers' implemented the program. The methodology that was implemented in this research can be repeated in different educational and research settings.

The Nature and Quality of Science Teachers' Explanations in Physics as influenced by Interactive Computer Simulations
Zacharias Zacharia, University of Cyprus, Cyprus

The purpose of the study was to investigate the effect of interactive computer simulations or science textbook assignments on the nature and quality of postgraduate science teachers' explanations regarding physical phenomena in Mechanics, Waves/Optics, and Thermal Physics. The use of interactive computer simulations or science textbook assignments was implemented according to the Predict-Observe-Explain model (POE model) and integrated into a one semester class for practicing science teachers who served as participants in the study. Data were collected through semi-structured interviews and were analysed using a qualitative content analysis approach. Our results indicate that the use of interactive computer simulations along with the application of the POE model had a positive impact on the nature and quality of science teachers' explanations. They improved science teachers' ability to generate scientifically accurate explanations and fostered in-depth advancement in teachers' search for explanatory scientific information regarding the physical phenomena under investigation. In addition, teachers' explanations became more explanatory, reflecting cause-effect reasoning and formal reasoning.

What do teachers make of curriculum guidelines and syllabuses? Study of differential pedagogic practices in the primary science classroom

Ana Morais, University of Lisbon, Portugal
Isabel Neves, University of Lisbon, Portugal
Preciosa Silva, University of Lisbon, Portugal
Helena de Deus, Secondary School, Portugal

The study is focused on primary science education, and is part of a broader research which aims at studying the recontextualising processes that occur when curriculum guidelines and learning activities are put into practice by teachers. Theoretically, the research is based on Vygotsky's social constructivism and Bernstein's theory of pedagogic discourse. This paper addresses the following problem: What is the extent to which well organised teaching materials can lead teachers to implement effective pedagogic practices in a condition where they have not received direct training? Starting from this problem, the study is focused on the following main objectives: (1) analyse the direction of the recontextualisation made by teachers of learning activities potentially capable of enhancing effective learning; (2) analyse the relation between this recontextualising process and the learning of socially heterogeneous children. The sample was made up of two primary school classes (ages 6-7) and their two respective teachers. One school class was socially heterogeneous and the other contained working class children only. A comprehensive-interpretative methodology was followed, in a dialectical relation between the theoretical and the empirical. Learning activities to be done along the academic year were constructed in order to lead to the understanding of the concept of growth in living things and to develop scientific competences. The underlying structure of the activities would lead to a pedagogic practice with specific sociological characteristics indicated by former studies as enhancing scientific learning. The results showed that teachers made specific readings of the guidelines leading to different recontextualising processes. The study also showed that these recontextualising processes have crucial implications for Children's learning, particularly that of the socially disadvantaged. The study gives a contribution to the discussion of how teachers, through their practices, reinforce or limit the potential of curriculum materials with characteristics that may enhance effective learning.

Altering students' implicit attitudes towards science: An experimental approach

Ursula Kessels, Free University Berlin, Germany

A shortage of graduates in physical sciences and engineering is a problem that Ger-

many shares with other European countries. In our research, we focus on the image of physics among students and the various ways in which this image might alienate students. The present study concentrates on the negative attitude towards physics and on the perceived heteronomy (without opportunities to create or to express own ideas) of physics. We tested whether confronting students with material linked to physics that does not support this negative image can alter their image of science. As experimental treatment, participants received either a short section from Kuhn's The structure of scientific revolutions (n=37 students, Kuhn condition) or from a textbook for physics (n=34 students, physics book condition). As dependent measure of image activation we used an adapted version of the Implicit Association Test (IAT) by Greenwald, McGhee, and Schwartz (1998). This test uses latency data and operates on the assumption that if two concepts (e.g. physics and unpleasant) have come to be associated in memory, they will be associated more quickly when they are encountered. Such, student's image of physics was measured on the level of implicit (i.e. automatic, non conscious) associations that students had with physics. Results: Participants who had not dropped physics during secondary school and had read the Kuhn text during the experiment showed a significant reduction of the image congruent IAT effect which means that they associated physics less with negative words and words representing heteronomy than participants who had read the physics text book and/or had dropped physics during secondary school. The results support the hypotheses that it is possible to alter students' image of physics and points out what kind of material could be used in order to create physics lessons during which the negative image is not activated.

N 6   26 August 2005   15:55 - 17:15   Room A110

Paper Presentation

METACOGNITION

Chair: Alexander Renk, University of Freiburg, Germany

Developmental differences in accuracy of metacognitive evaluations during adulthood
Karin Bakracevic, University of Maribor, Slovenia
Andreas Demetriou, University of Cyprus, Cyprus

The aim of this study was to research development of different types of thinking,

and especially metacognitive accuracy from adolescence to middle age. The study involved 282 participants, drawn from four different age groups. 13-15-, 23-25-, 33-35-, and 43-45- olds. Adult groups involved persons with university and persons with low education. This participants solved tasks addressed to spatial, propositional, and social reasoning (Demetriou, 1993), evaluated their own performance and difficulty of the tasks. In addition, they answered a cognitive self-representation inventory (Demetriou & Kazi, 2001). Performance in spatial and propositional reasoning stabilized in early adulthood whereas in social reasoning improved systematically throughout the age-span studied. Results showed us that the accuracy of self-evaluation increased with age, especially from early to middle adulthood. We also found that males were more accurate than females. Qualitative analysis of these results clarified that young adults and women were mainly too strict to their performance. In general, metacognitive evaluations were very accurate in spatial domain, less accurate in propositional and quite inaccurate in social domain. Educated persons were considerably more accurate in their self-evaluations than less educated but further analysis showed that these differences seem to be a derivate of the differences in actual cognitive ability. Regarding cognitive self-representations, it seems that persons believe that, with age, become, on the one hand, more reflective and self-aware and more able to understand social issues while, on the other hand, they become weaker in spatial and verbal reasoning. Improvement of metacognitive accuracy with age is in tune with findings that adults become with age more self-reflective and that metacognition becomes with development more effective. This improvement in metacognitive functions may compensate for possible losses in processing efficiency, at least until the age of mature adulthood.

Conceptualisation and Development of an Instrument for Measuring the Metacognition of High School Science Students
Gregory Peter Thomas, Hong Kong Institute of Education, Hong Kong
David Anderson, University of British Columbia, Canada
Hon Suen Ma, Hong Kong Institute of Education, Hong Kong
Samson Nashon, University of British Columbia, Canada

The importance of metacognition for quality learning and problem solving is well documented. However, despite such acknowledgement metacognition remains a fuzzy concept with a range of variously agreed upon definitions. A consequence of this is that measuring and evaluating students' metacognition has been, and remains, a problematic and challenging task. This paper reports on the conceptualisation and development of an instrument that attempted to adopt a view of metacog-

nition that was inclusive of the dimensions proposed across various definitions and that focuses on the metacognition known to be related to the quality learning and understanding of science. Seven dimensions were identified following a review of the general metacognition literature and that metacognition literature specifically related to science education. Items were written to reflect these dimensions and a 72 item questionnaire utilizing a five-point likert scale was administered to 203 high school science students. SPSS was used to assess the internal reliability of dimensions and for conducting exploratory principal components factor analysis. WINSTEPS was used to subject the data to Rasch analysis to explore the unidimensionality of the scale as a whole and to mediate the influence of the use of the likert scale. While the Cronbach alphas for each dimension where high for five of the seven scale dimensions, the factor analysis suggested a single large factor rather than those representing each of the dimensions. Rasch analysis supported this contention. The unidimensionality of the metacognition construct suggested predominantly by this empirical data and its analysis suggests that it may be useful to reconsider conceptualising metacognition also as a more unified construct rather than the sum of its not always agreed upon constituent dimensions.

Classroom strategies for supporting Children's reading comprehension and metacognitive awareness: The reciprocal teaching intervention programme
Olympia Palikara, Institute of Education, University of London, United Kingdom

Research by Palincsar & Brown (1984) showed that reciprocal teaching is an effective way of improving reading comprehension by using metacognitive strategies. In reciprocal teaching the main goal is for students to become proficient enough to regulate and monitor the use of their own comprehension strategies. More recently methods of active story reading have also been shown to enhance reading comprehension ability. Aims: This paper aims to compare the effects of reciprocal teaching with active story reading on the reading comprehension ability in English school children. Sample: A total of 104 children from two primary schools participated in the research project. Methodology: For the purposes of this study, a pre-test/ post-test repeated measures experimental designed was adopted. The efficacy of the intervention programmes was measured by a reading comprehension test and by contacting interviews. Results: The results showed that that both the participants who participated in the two intervention programmes had improved their reading comprehension, as shown by their scores in the post test. However, the students who participated in the reciprocal teaching intervention programme showed significantly more improvement in their reading comprehension ability when compared

to the students who participated in the active story reading intervention programme. Thematic analysis was used to analyze the interviews and revealed that prior to the intervention programme only a few students used some effective reading comprehension strategies, such as contextual guessing and forming of visual representations of the text. However, only a few children used the strategies and they did not show high awareness of the occasions when they used them. The analysis of the interviews conducted after the intervention programmes and the results of the chi-square tests performed showed not many significant changes regarding students' perceptions about the effectiveness of the strategies they used.

Relations between strategic flexibility and the strength of the experienced information stress
Maria Ledzinska, University of Warsaw, Poland
Ewa Czerniawska, University of Warsaw, Poland

Many contemporary learners and workers see the overproduction of information and a fast pace of its transmission as a challenge or even a threat by many. So many people exhibit in cognitive situations psychological discomfort, labeled information stress. This notion is used to describe the situation when the individual is not able to process great amounts of information and different kinds of stimulation, and has by the same negative emotions towards own cognitive possibilities. The first author started in the last years a large research program aimed at a better understanding of the phenomenon of the information stress, its determinants, as well as factors that can strength or reduce this negative emotional and cognitive condition. The paper presents two studies concerning the question of the relations between the disposition towards some types of the strategic control of learning and the magnitude of the experienced information stress. 240 young adults, aged 18-35, took part in the studies. All were learners – half secondary school students, and the other half university students. The strength of the experienced information stress was assessed by the questionnaire KSI, constructed by the first author. It permits to measure the information stress experienced at the information input, during the mental processing of data, and at the information output. The strategic control of learning was assessed by the Strategic Flexibility Questionnaire, constructed by Robert Cantwell, in the Polish adaptation of the second author. The obtained results were submitted to correlation analyses. It appeared that only a disposition towards irresolute control of learning was significantly correlated with the experience of information stress.

Paper Presentation

EPISTEMOLOGICAL BELIEFS

Chair: Kristina Kumpulainen, University of Oulu, Finland

Collective Epistemologies in an Upper Secondary School: A Preliminary Analysis
Andreas Lund, University of Oslo, Norway
Sten Ludvigsen, University of Oslo, Norway

Currently there is a growing interest in how collective entities – groups and teams – go about thinking, problem-solving and learning. The assumption is that fostering collective cognition can be conducive to solving problems too complex or demanding for an individual. Such complex and ill-defined problems are typical of knowledge-producing societies. Also, with increasingly more sophisticated software and increasingly more powerful networks the assumption is that processes that constitute collective cognition can be supported and sustained by technologies. Consequently, the aim of this paper is to pursue questions about how a group of learners goes about building collective knowing, how participants engage in processes of collective cognition that may produce a result exceeding the sum of its individual contributions. The unit of analysis is the mediated actions of a small group. The research is longitudinal in nature, spanning the time from late fall 2004 until spring 2006. Design Experiment as an overall research methodology is used to capture situations of collective cognition during this time. The method is cyclical in the sense that insights gleaned from one situation inform the following design(s). In this way, we can analyze what works as well as what does not and refine the design to promote more productive interactions within groups. I discuss how a sociogenetic and collective epistemology is introduced and applied in a Design Experiment at an Upper secondary School. How practices and institutional context influence and respond to the research project will be discussed. Finally, a most important question is under what conditions we see productive collective cognition emerge. This is an institutional aspect that needs to be pursued in order to understand how learning is a highly contextual as well as interactional and cognitive phenomenon.

Epistemological Understanding and Intellectual Values in Greek-Cypriots
Kalypso Iordanou, Teachers College - Columbia University, United States

The present paper proposes that epistemological understanding supports intellectual values, since only higher levels of epistemological understanding provide the rationale needed for sustained intellectual engagement. This association between epistemological understanding and intellectual values is expected to be observed both within a specific culture, and across different cultures. Moreover, a developmental trend of epistemological understanding is expected to be exhibited with age increases. The epistemological understanding and intellectual values of a sample of 169 Greek-Cypriot students and parents have been studied, through questionnaires. The statistical analysis of the data (chi-square tests) revealed that the findings support the hypotheses of the paper. A developmental trend of epistemological understanding was observed as age increased in the sample. Older groups were more likely to achieve the evaluativism level than younger groups. An association was also observed between one's epistemological understanding and intellectual values. Those who achieve the highest level of epistemological understanding, the evaluativist level, have also the highest intellectual values. Greek-Cypriots' responses in the intellectual values measure seemed to differentiate according to the issue asked. Greek-Cypriots consider discussion on political issues less fruitful than discussion on other issues. Comparison between the Greek-Cypriot sample and samples from other cultures (Kuhn & Park, in press) revealed that Greek-Cypriots differ from Japanese and Korean, but not from Caucasian American, in their epistemological understanding and intellectual values. So, the present paper highlights that epistemological understanding and intellectual values are constructs that have social and cultural meaning and in this context they should be examined and understood. Moreover, the findings of this study shows that epistemological understanding should be a key construct in any attempt to develop students' intellectual values. Students will be willing to invest the required effort for sustained intellectual engagement only once they have reached a sufficient development of epistemological understanding.

Educational Philosophies and epistemological beliefs of Teacher Educators
Arielle Horin, Tel Aviv University, Israel
Tamar Levin, Tel Aviv University, Israel

Acknowledging that pre-service teachers bring to teacher education program well established beliefs, teacher educators are expected to help prospective teachers to

change their long held beliefs to more complex and updated ones. However, any attempt to restructure teacher education programs in directions that challenge the adoption of constructivist views and practices, depends upon the faculty members and their own educational beliefs. It is therefore important to explore two sets of beliefs of teachers' educators: epistemological beliefs and educational philosophies. Moreover, due to evidence showing that epistemological views are domain-specific, this study explores the similarities and differences in the epistemological and educational beliefs of teacher educators belonging to four different expert groups: General Education; Math and Science; General Teaching strategies, and, Content-areas Didactics. The study integrates qualitative and quantitative methodologies, involving a sample of 56 teachers' educators, from 2 education colleges in the center of Israel, teaching prospective teachers at the elementary school level. The teacher educators differ in their subject-areas expertise described earlier, each including 14 educators. The study used the PAEI questionnaire developed by Zinn (1994) and an open-ended questionnaire for exploring epistemological beliefs. The results show that: 1) when taken as a group, teachers' educators hold a multidimensional conceptual profile made up of several concurrent educational philosophies and epistemological beliefs. Most tend to combine two or three educational philosophies and one or two epistemological beliefs, including ones that are conceptually inconsistent; 2) significant relationship exist between the educational philosophy, the epistemological beliefs and the expert group demonstrating that the behaviorist philosophy and the positivist epistemology is the most frequent educational ideology among Math and Science educators, and the least frequent among the pedagogic experts. The study shed light on the contextual nature of educators' philosophies and epistemologies and encourages the use of interdisciplinary programs in the college curriculum.

Fostering Academic Help Seeking – The role of epistemological beliefs and learning strategies
Silke Schworm, University of Regensburg, Germany

Students are often confronted with tasks they cannot solve on their own. However, sometimes they do not try to overcome those impasses. They either remain passive or they unsuccessfully insist on overcoming the difficulties without any assistance. This behaviour can be found in classroom contexts as well as in computer-based learning environments. Academic help seeking can be regarded as a feature of self-regulated learning. It is instrumental in the development of independent skill and ability and it reflects the students? domain specific knowledge, their attitudes about learning and their epistemological beliefs. The study presented deals with help seek-

ing behaviour in the context of blended learning. Participants were sixty students, all of them attended in a course on qualitative analysis. The training sessions were obligatory for all participants and were supplemented by group-activities which were organized in a virtual workspace. Here the students were divided into two groups working independently. Members of both groups had the same tasks to solve and the same support-functions (e.g. discussion forums). During the course, four tasks had to be solved by each participant which explicitly required help seeking of any kind as the solution could not be drawn from the training sessions? content. For each of these tasks the experimental group received a written prompt indicating the importance of effective help seeking behaviour for successful learning. The control group did not receive any prompts. Attitudes towards help seeking, learning strategy use, and epistemological beliefs were assessed by a questionnaire. Results indicated a clear connection between students? attitudes towards help seeking, their learning strategy use, and their believes about the objectivity of knowledge and the status of experts. Further results showed that prompting the relevance of help seeking behaviour led to a greater participation in the virtual workspace and to a better evaluation of the course.

N 8   26 August 2005   15:55 - 17:15   Room A112

Paper Presentation

SOCIAL DEVELOPMENT

Chair: Marja Vauras, University of Turku, Finland

Student Help Seeking: The Influence of Home Characteristics
Minna Puustinen, University of Poitiers (CNRS), France
Riitta-Leena Metsapelto, University of Jyvaskyla, Finland
Lea Pulkkinen, University of Jyvaskyla, Finland

Educational psychologists have amply documented the beneficial effects of selective or self-regulated help seeking on learning and understanding. Self-regulated help-seekers – and learners – do not ask for help when they do not need it, and restrict their questions to what is necessary. Even if numerous studies have reported family background, home characteristics, and parenting behavior to contribute to individual differences in Children's achievement and adjustment at school, few studies have explicitly examined the relations between the home environment and student

help seeking. The aim of our study, which was part of the ongoing Jyvaskyla Longitudinal Study of Personality and Social Development, was to fill this gap, by analyzing the relationship between parenting behavior and students' (99 children aged 8 to 12) help-seeking behavior. Parenting was evaluated using both self-report and observational data. Self-report data on parental nurturance, restrictiveness, and parental knowledge were obtained using a 28-item Child Rearing Practices questionnaire. Observational data on emotional warmth and parental guidance, on the other hand, were gathered in two dyadic (i.e. parent-child) problem-solving situations. Children's help-seeking behavior was analyzed using a naturalistic experimental paradigm in which children were placed in a problem-solving situation and had the opportunity to seek help from the experimenter, if needed. The results showed that parenting behavior was related to Children's help seeking. However, quite different correlational patterns emerged for the different parent-child combinations. In girls, for example, fathers' parenting was, globally, related to more autonomous and selective question asking than mothers' parenting. Only fathers' parenting was related to boys' help seeking. Furthermore, quite different correlational patterns were obtained for the self-report and the observational parenting data. More empirical studies are needed in order to fully understand how home characteristics influence the development of skills and attitudes associated with student help seeking and with self-regulated learning in general.

The social and emotional loneliness of fourth- to fifth graders
Niina Junttila, University of Turku, Centre for Learning Research, Finland
Marja Vauras, University of Turku, Department of Teacher Educati, Finland

The aim of this study was to examine the existence, duration and gender differences of fourth- to fifth graders? social and emotional loneliness. We were also interesting of the social competence, intelligence, and parenting aspects of long-term lonely children. The sample consisted of two cohorts (N = 985) of fourth- to fifth grade elementary school students, including their teachers and parents. The measurement of Children's loneliness (The Peer Network and Dyadic Loneliness Scale by Hoza, Bukowsky & Beery, 2000) was made at three time-points within one year. Comparing our data to the American data from Hoza, et. al. (2000) Finnish girls and boys had higher mean scores for social and emotional loneliness. Comparing to girls, boys reported more emotional loneliness, especially at the grade five. By selecting the children being lonely over three measurement-points, we had 31 long-term socially lonely, 13 long-term emotionally lonely, and 10 both socially and emotionally lonely children. There were several differences between these long-term lonely and

the other children at their social competence evaluated by themselves, their peers, teachers, and parents. The highest effect sizes were within the peer evaluations, indicating that the peers rate these long-term lonely children to be less co-operating and empathic, and more impulsive, and disruptive than others. For intelligence no statistically significant differences were obtained. Besides these, the mothers of long-term lonely children evaluated themselves as having lower parenting self-efficacy, and the fathers felt themselves lonelier than others. The social and emotional well-being of these children must be seriously considered in the contexts of schools and home, were it again seems to have concomitants with the aspects of parenting and parents? social relationships.

A longitudinal study of social skills development in adolescents
Krisztian Jozsa, Department of Education, University of Szeged, Hungary
Aniko Zsolnai, Department of Education, University of Szeged, Hungary

In recent decades, more and more emphasis has been placed in educational research on the study of the development of social skills. The aim of the research presented here was the longitudinal study of the development of social skills occurring in a 2.5 year period between the ages of 10 (grade 4) and 13 (grade 7). Subjects were 720 elementary schools pupils from 32 schools in Hungary. The sample is representative for this country with respect to socio-economic status. Data collection took place in May 2001 and November 2003. Based on Stephens's list of social skills, a 54 item Likert-type questionnaire was developed (SSQ). Items on the questionnaire can be divided into four groups, each corresponding to one of the following skill-groups: interpersonal, self-related, task-related and environmental social skills. The self reported version of the SSQ and both parents' and teachers' ratings were administrated. The child and the adult versions share the same structure and scale items. The SSQ questionnaires for the assessment of the development of social skills proved to be reliable instruments in pre- and post-tests. The results show no spontaneous development in the field of social skills between the ages 10-13. They also indicate that the acquisition of social skills has not been completed by this age in a large percentage of adolescents. All three respondent groups gave higher estimations for girls' social skills than for boys. In the period under investigation, the observed difference between the two genders did not change significantly. That is, the differences neither increased nor decreased in the period observed. Similar results were found regarding socio-economic status and academic achievement.

Paper Presentation
Special Education

THE NEEDS OF SCHOOLS, TEACHERS AND CHILDREN

Chair: Helen Ftiaka, University of Cyprus, Cyprus

An Australian Perspective on Researching and Supporting Low-Achieving Students in the Middle School Grades: The QUICKSMART Intervention.
Anne Bellert, University of New England, Armidale, Australia
Lorraine Graham, University of New England, Armidale, Australia
John Pegg, University of New England, Armidale, Australia

This paper begins with a brief overview of current learning disability definitions and support structures in schools in the state of New South Wales, Australia. The paper will then explore the development of a research-based intervention, described under the generic name of QuickSmart, designed to improve basic academic skills in reading and numeracy for students' with learning disabilities. The intervention features the Computerized Academic Assessment System (CAAS) developed at the Laboratory for the Assessment and Training of Academic Skills (LATAS) at the University of Massachusetts. The intervention draws on theory and research in the fields of education and psychology, focusing on learning disabilities, modularity theory, developing automaticity, the role of working memory and a heirarchical view of students' learning of academic skills. Additionally, the structured approach of QuickSmart, with its appropriate use of technology and an emphasis placed on both practice and strategy instruction, is very much in tune with how many teachers consider students with learning difficulties can be usefully supported. The QuickSmart intervention has been developed and implemented over the last four years, with over 150 middle grades (Years 5-8) student participants, in 15 schools in rural New South Wales. The studies conducted to date have investigated the effects of improved automaticity of basic academic skills on higher order processes such as comprehension and problem solving. Results of the research, coming from a variety of sources, indicate that students' improvement in information retrieval times and accuracy in basic academic skills can lead to subsequent gains on tasks which target higher order thinking skills.

Differing school cultures and teachers' education and perceptions; their impact on the interpretation of policy for addressing the needs of children with Special Educational Needs (SEN) in mainstream school
Paty Paliokosta, Canterbury Christ Church University College, United Kingdom

This paper attempts to present some of the findings from my qualitative ethnographic study, which is based on three case studies conducted in Kent Local Educational Authorities. More specifically, it discusses various discourses describing 'Special Educational Needs' as well as the notion of 'Inclusion' in terms of school differing cultures and different teachers' perspectives. These interpretations of teachers will be related to their perceived responsibilities and the pedagogies/techniques they employ to achieve learning for all. The different discourses that teachers use in each field-either in the interviews conducted or in the classroom context-will be discussed and analysed in relation to the Children's academic and social experiences in a Comprehensive, a High and a Grammar School. The conclusions reached stem from a triangulation of data coming from semi-structured interviews, classroom participatory and non-participatory observations and examination of relevant documentation. So, the triangulation is a methodological one, using multiple sources to increase confidence in the interpretation. The three case studies I have conducted do not serve in terms of 'field-testing research', but rather in terms of 'field-making research', where emerging data from different contexts will create the full picture of my study. This picture is presented in a narrative that is not only interpretative, but also gives my informants the ability to have their voices heard.

Listening to Children's voices for the creation of effective inclusive envrironments
Kyriaki Messiou, Ministry of Education and Culture, Cyprus
Mel Ainscow, University of Manchester, United Kingdom

This paper explores the importance of listening to pupils' voices for better understanding notions of marginalisation, and of inclusion, within a particular school. The aims of the study were twofold: first, to bring to the surface Children's views about how they experience marginalisation at school; and, second, to explore how children come to construct meanings about other children and, especially, those children who seem to be marginalised. There was also a consideration of the relationship between these meanings and the way children behave towards one another. In this paper the focus will be on the factors that influence the way children construct meanings about other children, and especially those who seem to be marginalised. The research involved an ethnographic study in a primary school in Cyprus,

over a period of five months. Mainly qualitative methods were used, particularly, participant observations and interviews with children. In addition, some quantitative methods were used, such as sociometric measures. Interpretation of the data suggests that Children's meanings about other children and especially those who come to experience marginalisation, are influenced by certain factors. In particular, the factors that were identified as influential in Children's constructions of meanings about other pupils were: other children and the interactions between them; adults' way of behaving in the school; the existing structures within the school; and the cultures of the school and the wider educational context. Even though the most powerful factor was viewed to be the adults' influence, it was rather the interweaving between different factors that seemed to lead to the creation of particular meanings for other children. The study concludes that pupils' voices could provide an additional perspective for the creation of effective inclusive environments, but more importantly these voices should be seen as an essential element within the process of developing inclusive practices.

Giftedness and school-absenteeism: Theoretical reflections and empirical results to an unusual connection
Margrit Stamm, University of Fribourg, Switzerland

This paper aims to discuss unexcused absence from school (truancy or school-absenteeism) among gifted students. Empirical data for this research is taken from a Swiss longitudinal study analyzing the impact of pre-school reading and mathemati-cal skills on schooling careers and success. Intellectually gifted students – today 16 years of age – were tested with regard to their truancy behavior compared to average gifted students. The most salient result this study presents is that the assumption, ac-cording to which intelligence is negatively correlated with school-absenteeism, must be rejected. High intelligence can very well be accompanied by truancy behavior. However, school-absenteeism is found to be apparent in highly diverse manners. At-tention is drawn to two types of school-absenteeism: The taking a day off are stu-dents of highly intellectual profile, among whom school-absenteeism poses a struc-tural problem which primarily tangents extracurricular activities. A second type, the dissociate, refers to students with irregular schooling careers and a school aversion, sometimes manifest during their first school years already. They belong to the risk group that is prominently present in the scientific discourse. Hence, above-average giftedness can represent an element in the multifactorial framework of predictors of school-absenteeism.

Paper Presentation
Systems in Education

SCHOOL REFORM

Chair: Maria Cardelle-Elawar, Arizona State University - West Campus, United
        States

*School restructuring efforts and instructional practices in search for alternatives to
ability grouping*
Bracha Alpert, Beit Berl College and Mofet Institute, Israel, Israel
Bachar Shlomit, Beit Berl College, Israel

The papers presents a case study of a secondary school in Israel and its restructuring efforts to provide a flexible organization of instruction so that students' needs will be met within heterogeneous classrooms. It shows the difficulties facing educational practitioners in their attempts to avoid ability grouping and to provide more just and equal opportunities for a diverse student population. In spite of the criticism on tracking and ability grouping research on de-tracking efforts and studies on efforts to eliminate tracking and ability grouping are limited. The school we have explored was established as a developing school based on principles of reform, experimentation and restructuring. The study focuses on two organizational practices: one, called opening triads involves periodical re-grouping of three classrooms into three new groups. The second, called Talan- the additional curriculum encourages students to carry out special assignments, additional to their regular curricular tasks. The study combined qualitative-ethnographic methods with quantitative instruments: teacher interviews, classroom observations and student questionnaires. Results indicate that the school efforts to meet different needs of students by promoting a flexible organization of instruction and avoiding ability grouping and tracking met with some problems, even though there were also some positive influences. Results related to opening triads are presented according to four dimensions: organizational-technical, pedagogical-professional, social and personal. Results related to the additional curriculum indicate no agreement as to what is expected and how the assignments should be evaluated. The study examines models for organizing instruction, their advantages and problems, that may serve other schools. We discuss implications for research on school restructuring and instructional practices aimed at coping with

diversity and differential students' needs.

Changing teaching methods and school organizational culture in elementary schools: Perceptions of teachers and consultants
Hanna Shachar, Bar-Ilan University, Israel
Gavin Suss, Tel-Aviv University, Israel
Shlomo Sharan, Tel-Aviv University, Israel

Teachers from six elementary schools located in two different school districts responded to a questionnaire measuring the organizational culture of school both before and after a period of three years during which they participated in a change project. Teachers studied cooperative learning as well as new forms of collegial cooperation. Results indicate that three schools from one district recorded a significant improvement in their perceptions at the end of the project whereas the teachers from the other district indicated either no change or a significant decline in their evaluations of their schools' organizational culture. Analyses of 500 reports submitted by the six school consultants who coached the schools' teaching staffs over the course of two years provided valuable information as to why the teachers from the two districts differed in their reactions to the change project.

A Comprehensive School-Reform Based on Self Determination Theory
Ofra Feinberg, Ben Gurion University, Israel
Avi Assor, Ben Gurion University, Israel
Haya Kaplan, Ben Gurion University, Israel
Yaniv Kanat Maymon, Ben Gurion University, Israel

This paper describes a school reform program that is based on self determination theory (SDT, Deci, Ryan, & Williams, 1996), and in particular on SDT's concept of internalization. The program includes four internalization-promoting components: Learning Basic Concepts of SDT: Learning of SDT concepts as guides for educational action. Evaluation & Feedback Using SDT Concepts: Assessment of teachers' practices affecting students' needs serves as a basis for feedback to teachers, and for setting improvement goals for the school. A Structured & Focused Plan: Construction and implementation of a structured plan aimed at attaining the goals chosen by the school. In the present reform, the plan was aimed at reducing violence and enhancing caring in the school. Examining & Supporting Staff's Needs in Groups that Meet Regularly: As teachers apply various ideas they examine how the application process, including the atmosphere in the support group, affects their

needs and their motivation to apply the program. The program was conducted for three years in three Israeli elementary schools serving mostly a low SES Jewish population. Program's effects were assessed using both quantitative and qualitative methods. Results show larger increases in caring in the classroom and in limit-setting teacher behavior, as well as a larger decrease in coercive teacher behavior, in the intervention schools relative to the control schools. Qualitative analysis suggests that most of the teachers indeed identify with the program. Overall, the results suggest that SDT can serve as a firm base for school reforms that seek to reduce violence and enhance caring. Interestingly, it appears that the most unique component of the reform – the emphasis on supporting teachers' needs in order to promote internalization of the reform goals – was experienced by teachers as the most significant aspect of the program.

N 11   26 August 2005   15:55 - 17:15   Room E010

Paper Presentation
Teacher Education

DISCOURSE AND NARRATIVE IN TEACHER EDUCATION

Chair: Michal Zellermayer, Levinsky College of Education, Israel

Teacher Coaches' Dialogues with Prospective Teachers. A Study of Transfer of Training
Frank Crasborn, Fontys University of Professional Education, Netherlands
Paul Hennissen, Fontys University of Professional Education, Netherlands
Niels Brouwer, Radboud University Nijmegen, Netherlands
Theo Bergen, Radboud University Nijmegen, Netherlands

In this study, the impact of a training program focusing on the deliberate use of interventions during coaching dialogues with prospective teachers was investigated. Video recordings were analyzed of coaching dialogues carried on in the workplace by 28 teachers in primary education with the prospective teachers under their guidance, both before and after they participated in the training program. The main goal of this program was to broaden the repertoire of interventions which coaches use in their dialogues with student teachers. The video recordings made were transcribed verbatim, coded by three independent researchers and analyzed using descriptive statistics and t tests for paired observations. Coaches' repertoires of interventions

were found to consist of an average of six types of interventions. This average remained stable throughout the training program. After training, a shift from directive towards non-directive interventions was observed. The length of the coaches' speaking time decreased, while the number of their interventions increased. After training, coaches structured dialogues to a greater extent. Considerable inter-individual variability existed between coaches. The relevance of these findings is that the deliberate use of interventions during coaching dialogue can be influenced through training with results noticeable in the workplace. The findings of this study suggest that the training program studied can serve relatively large numbers of teacher coaches, as its setup requires a feasible amount of effort from schools and participants.

Narratives in context of the learning of teachers
den Hertog Jaap, Freudendenthal Institute, Netherlands
Maarten Dolk, Freudenthal Institute, Netherlands

In this paper we will present the findings of a design research study on the use of the MILE-environment for a teacher education curriculum. The purpose of the study is to investigate the role of the teacher educator and the role of the environment in the process of developing one's practical knowledge by constructing narratives of educational situations. MILE is a Multimedia Interactive Learning Environment for prospective primary school teachers, with content for primary mathematics teachers' education programs. In our study, the student teachers were offered a set of guidelines for their investigation in the digital environment. This orchestrated use of the multimedia cases allows student teachers to construct a model for learning from activities in a classroom. One of our research questions was related to the effectiveness of these guidelines and, in general, to the role of the context of the investigation and the role of the teacher educator in constructing an open learning situation on the edge between guiding and directing. A second question concerned the approaches teacher educators can use to support student teachers in developing narrative knowledge through investigations. In particular, we were interested in the function of evaluation and reflection in the student teachers' learning processes. Our findings confirm the idea that student teachers' investigations become more purposeful through evaluation and reflection. Being aware that they are not solely investigating some clips, but that they are problematising their own profession makes them aware of the importance of the kind of questions they ask themselves. Teacher educators need much help to capitalize on crucial moments in the interaction amongst student teachers. The study showed that teacher educators needed

resources to recognize those moments and to optimize class discussions.

Relating Teaching to Learning: Learning Study in Hong Kong
Po Yuk Ko, The Hong Kong Institute of Education, Hong Kong

This paper explores how Learning Study, a Hong Kong version of the Japanese Lesson Study, serves to relate teaching to learning at the classroom level. Learning Study is premised on a conceptual framework that builds on three types of variation in a specific object of learning: variation in students' understanding of the object of learning (V1); variation in teachers' understanding and ways of handling the object (V2); and the use of patterns of variation based on the Theory of Variation (V3). Each Learning Study begins with a careful consideration of what pupils are supposed to learn (i.e. object of learning) and what is/are critical for them to be able to learn it (i.e. critical features). A pre- test is used to help the team to collect pupils' prior understandings of the object of learning which may constitute their learning difficulties. Taking into account students' different understandings of the object of learning, teachers collaborate with researchers from tertiary institutes to develop ways to structure the lesson in terms of pattern of variation aiming to make possible the learning of the critical features identified for the object of learning. Teachers in the team then teach the lesson in cycles. Lesson observation, post-lesson conference, post- test and post-lesson student interview are arranged after each cycle of lesson and the data collected are analyzed and triangulated to optimize the improvement that can be made in the next cycle. This paper draws on the data of two learning studies supported by the government-funded Progressive and Innovative Primary Schools Project of the Hong Kong Institute of Education and discusses how the teachers became aware of what was crucial in teaching the chosen topic – the critical features that students had to attend to, by relating the act of teaching to the corresponding student learning outcomes.

Learning study and teacher professional discourse
Derek Sankey, The Hong Kong Institute of Education, Hong Kong

Professional conversation is an art. It is different from everyday conversation in that it is situated in practice, in order to understand practice. It involves a high level of interpretation and reinterpretation, and therefore exhibits many hermeneutical characteristics. This paper outlines and discusses how some key features of hermeneutics, drawing on the work of one of its most distinguished advocates, Hans-Georg Gadamer, are helping to illuminate the kinds of conversations about practice

that teachers engage in when conducting Learning Studies. A hermeneutic model is particularly applicable to the pre and post-lesson conferencing, as an example of professional conversation in which all participants are engaged in enhancing their own learning. The paper suggests that in conducting professional conversation and trying to understand each other's point of view teachers are doing more than merely re-creating someone else's meanings. They are also modifying their own meanings in a dialectic process that may be viewed as a fusion of horizons. Evidence of this occurring within the context of Learning Study is presented as a way of better understanding how professional discourse is not only part and parcel of teacher professional development, but also formative in achieving that development.

N 12   26 August 2005   15:55 - 17:15   Room B107

Paper Presentation

TEACHING AND INSTRUCTIONAL DESIGN

Chair: Lucy Avraamidou, University of Cyprus, Cyprus

Learning to teach secondary school mathematics: a case of multiple learning environments
Merrilyn Goos, The University of Queensland, Australia

This paper addresses the question of how teachers learn from experience during their university pre-service program and early years of teaching. It outlines a theoretical framework for studying the role of experience in learning to teach that may help us better understand how teachers' professional identities emerge in practice. The framework draws on sociocultural theories that interpret learning as increasing participation in social practices. It extends Vygotsky's concept of the Zone of Proximal Development to enable analysis of teachers' interactions with their environment and other people, over time and across different contexts, by introducing two additional zone concepts. The Zone of Free Movement represents environmental constraints, such as student characteristics, curriculum and assessment requirements, and availability of teaching resources, while the Zone of Promoted Action symbolises the efforts of a teacher educator or more experienced colleague to promote particular teaching skills or approaches. These three zones constitute a system that allows us to analyse changing relationships between teachers' actions, beliefs, and contexts. The framework is used to analyse the contrasting pre-service

and initial professional experiences of a secondary school mathematics teacher in integrating computer and graphics calculator technologies into her practice. Implications are then identified for supporting teachers' professional learning.

What is this Lesson Really About? Implicit and Explicit Aims
Helen Timperley, University of Auckland, New Zealand
Parr Judy, university of Auckland, New Zealand

This empirical study explores the relationship between teachers' practice and students' understandings of what they were supposed to be learning in 30 reading comprehension and writing lessons. The analysis of teacher practice focused on the extent to which they shared the aims of the lesson with the students, aligned the lesson activities and student feedback and provided criteria for success. Students' understandings of what it was they were supposed to be learning was much clearer in those lessons in which the teachers were more explicit about these attributes of the lessons. Failure to share these attributes of the lesson led to superficial understandings on the part of students with a focus on spelling, punctuation and length in writing. They were mostly vague about what they were learning in reading. When these attributes were shared, students gave more sophisticated responses about their learning. In writing, these comprised communicating particular content and structuring their writing for particular purposes, and in reading the students talked about learning particular strategies to understand text. Feedback to the teachers about the students' understanding provided a major catalyst for change in practice. Professional development in pedagogical content knowledge was provided over a period of 18 months and changes in teacher practice recorded. When teachers became more explicit with the students about their lesson aims and better aligned their teaching activities, student achievement improved.

Evaluating TEE in an everyday school context: Students and teachers perspective, organizational conditions and constraints
Jenny Krist, TU-Dresden Psychology of Learning and Instruction, Germany
Susanne Narciss, TU-Dresden Psychology of Learning and Instruction, Germany
Hermann Korndle, TU-Dresden Psychology of Learning and Instruction, Germany

TEE (The Electronic Exercise) is an authoring tool for building well-structured learning environments. Knowledge is separated into small units (nodes), which can be linked by surmise relations (knowledge structure) or various types of thematic relations (knowledge map). Each unit may contain learning material (text, links,

images etc.) and related exercises. The knowledge structure or knowledge map is structurally presented to the learner in form of a permanently visible diagram. In the TOOLKIT project TEE was implemented in an everyday school context to support the development, presentation and communication of knowledge domains and their connections between the nodes. The aim of this paper is to report on evaluation results concerning three perspectives of the impact of TEE in school education: student assessment, teacher assessment as well as organizational conditions and constraints. In cooperation with 5 schools in Saxony we carried out several projects with teachers of English and French A-level classes. The use of TEE was integrated in appropriate learning scenarios which required active knowledge development and communication by the students. These scenarios involved activities in which the students worked individually as well as in groups. Our evaluation found contrasting results. On the one hand, students and teachers were highly motivated to use TEE and carry out the learning scenarios. They reported an enhancement of concentration on learning contents and more possibilities for differentiation. On the other hand, due to the organizational aspects in the school context, students and teachers felt there is a certain lack of prospects for realizing such learning scenarios in the future. The effective use of TEE requires longer implementation phases and considerably more teacher training in the development of appropriate learning scenarios.

Posing Questions as a Tool for prompting Professional Development, In a Digital Teaching Trainees' Forum
Zvia Lotan, Levinsky College of Teachers Education, Israel
Nili Mor, Levinsky College of Teachers Education, Israel
Michla Shahar, Levinsky College of Teachers Education, Israel

The study focused on how questions, asked by colleagues in a professional on-line, forum promote the construction of a professional self among first year teaching trainees. Researches on a-synchronic textual forums on the internet indicate that textual interactions in the forum can promote self expression and self-awareness (Suler, 2002; Anderson and Garrison, 2000; Hara et al, 1998). First year trainees, who have just begun practicing, are extremely focused upon themselves (Fuller, 1969). Glaubman and Kula (1992) indicate that questions develop learner's sensitivity and his critical thinking. The unique contribution of this research is studying the use of questions in the context of an a-synchronic digital forum in promoting self awareness and improving the understanding of the interpersonal and pedagogical components of practice. The current study took place in a teacher-training

college experiencing a novice teacher education program. During the first three months of practice, every week, three different first year teaching trainees were asked to document and analyze their observations at school and share them with the forum. Heir colleagues responded to their descriptions by posing questions and two weeks latter, the senders rewrote their observations according to the questions. The study showed that the questions asked by the colleagues help the teaching trainees' change the nature of the observations from ego oriented, to task oriented, developing a richer professional identity. Colleagues' questions helped teaching trainees to restructure their image of school, redefine the problem they encountered while practicing, to find ways of managing their dilemmas and to gain better self confidence in their work.

N 13   26 August 2005   15:55 - 17:15   Room E005

Paper Presentation

INSTRUCTIONAL DESIGN

Chair: Maria Evagorou, University of Cyprus, Cyprus

Using Concept Maps Effectively as Structural Support: The Role of Active Construction
Ilonca Hardy, Max Planck Institute for Human Development, Germany
Beate Stadelhofer, Max Planck Institute for Human Development, Germany

Recently, the question of an adequate degree of structural support within constructivist learning environments has been raised (e.g., Mayer, 2004). We investigated effects of different degrees of structural support in visual representations, using concept maps which required students to actively construct parts of concept maps to varying degrees. In phase one of our experiment, one group of adult learners used expert-designed concept maps (EM) to understand the content of three short texts on meteorology and a second group used fill-in concept maps (FM) which already provided some structure as to nodes and links but left it up to the learners to add on to this structure. A third group produced self-constructed concept maps from the texts (SM). In phase two, all participants were required to construct concept maps themselves for texts in the new domain of parasitism. As dependent measures, learners' understanding of meteorological concepts and the quality of self-constructed concept maps with regard to content and structural characteristics were

assessed. As expected, structural support facilitated students' understanding of scientific content, with significantly greater scores of the groups of FM and EM on the test on meteorology. For the application of concept mapping, however, the active construction and selection of concepts during the first phase was pivotal, with significantly higher quality of self-constructed concept maps on parasitism in the FM and SM groups, especially regarding the structural components. An implementation check ensured that students of all groups had read the texts on meteorology equally well. Thus, the fill-in concept map combined the advantages of content-wise understanding and successful concept mapping in a new domain due to its balance of structural support and active construction, enabling students to both focus their attention on relevant aspects of the meteorology texts and on the general structural design components of concept mapping.

Tutor guidance in Problem-Based Learning
Luc Bude, Maastricht University, Netherlands
Tjaart Imbos, Maastricht University, Netherlands
Margje W.J. van de Wiel, Maastricht University, Netherlands
Nick Broers, Maastricht University, Netherlands
Martijn Berger, Maastricht University, Netherlands

With problem-based learning (PBL) students study conform constructivist ideas predominantly in a self-directed, active, and self-exploring way. During tutorial group meetings students discuss problems that raise questions about the subject matter. The problems direct students to main topics and ideally steer the discussion. Next, the students study the material based on their own learning goals, which were extracted from this discussion. Finally, in a subsequent group meeting they discuss collaboratively what they have learned. Our study examined whether the many benefits of PBL, like collaborative and intrinsic initiated learning, could be combined with more than usual guidance by the tutor in a statistics course. We specifically examined whether it is more effective when tutors guide the discussion in statistics tutorial groups according to a protocol. With this protocol the tutor guided students through successive statistical topics in the way an expert would do. In knowledge domains that are highly structured, hierarchical and abstract, the subject matter might preferably be studied in a prescribed order. In, e.g. mathematics and computer programming, guided methods of instruction are consistently shown to be more effective than pure discovery learning. Our question was whether extra guidance by the tutor in a statistics course had a surplus value. This was examined by comparing the guided tutorial groups with more traditional functioning tutorial groups, from

a first year statistics course of Health Sciences at the University of Maastricht. The results showed that students in the guided condition evaluated the course in general as significantly more valuable and educational. They also indicated that the discussions were more in-depth and productive. Furthermore, the functioning of the tutor was evaluated more positive on several points. Finally, although not significantly, students in the guided tutorial groups scored considerably higher on the test at the end of the course.

Curriculum mapping: Integrating multiple perspectives on the curriculum
Marjon Bruinsma, University of Groningen, Netherlands
Ellen Jansen, University of Groningen, Netherlands

Ideally, the curriculum is designed according to principles of learning and instruction. The designed curriculum is implemented in such a way that it induces appropriate teaching, learning processes and l0earning outcomes. In practice this is not always the case; more communication on the curriculum is needed. Departments, teachers and students need to exchange information about what is to be taught and learned. However, without a context for planning and discussion, communication will be hard. This paper discusses a tool, which might provide a context for communication, namely the curriculum map. A curriculum map concerns …representing the different components of the curriculum so that the whole picture and the relationships and connections between the parts of the map are easily seen (Harden, 2001, p123). The experiences with mapping in general, let alone mapping in higher education, are limited. We decided to illustrate the concept of curriculum mapping with data from the University of Groningen. The paper illustrates a map for three stakeholders, designers, teachers and students, and indicated several aspects. The map indicated that there was no explicit information on aspects, such as, education on different levels and providing students with deficiency sets. Further, the map indicated that one of the domain-specific learning outcomes was not explicitly linked to the learning opportunities in terms of courses. The map illustrated the coherence of the curriculum; several courses integrated the main goals of the curriculum. The map also showed that the department used activating instructional methods, e.g. small workgroups. Even though curriculum mapping appears a promising approach, experiences with mapping are limited. This might be related to the problems related to mapping: the amount of financial and time investment. The concept of curriculum mapping, the (dis)advantages, and practical implications are discussed during the paper-session.

Motivational Effects of Learning with Complex Tasks
Theo Bastiaens, Open University of the Netherlands, Netherlands
Rob Martens, Leiden University, Netherlands

(Socio)constructivist learning models claim cognitive and motivational improvements, but these claims are rarely proved, and clear developers' guidelines are rare. The Four-Components Instructional Design Model (4C/ID) of van Merrienboer (1997) offers such designers' guidelines. The backbone of the model is formed by learning tasks which are defined as concrete, authentic and meaningful 'whole task experiences'. The second component is called supportive information. This is information that is supportive to the learning and performance of non-recurrent aspects of learning tasks. Just-in-time information is the third component and is prerequisite to the learning and performance of recurrent aspects of learning tasks. The last component is called part task practice. These are in fact additional exercises when a high level of automation is required after instruction. There are two motivational claims: First, it is presumed that the structure of the 4C/ID model, especially the different sequencing principles (simple to complex, high level of support to no support) and the difference between supportive and just-in-time information will have positive effects on learning and motivation; Second, learning tasks are defined as realistic and authentic situations and problems which are derived from professional practice. These tasks are expected to be more stimulating and challenging for learners. Ecologically valid empirical evidence from the classroom regarding students' motivation and perception of these materials was until now hard to find. This study examines higher education students' (n=224) perceptions, by comparing learning modules based on the 4C/ID methodology with other modules. It can be concluded that students perceive positive changes in the 4C/ID module, but that the effects on perceived control, relatedness and control are small. Therefore no effect on intrinsic motivation was found. It is concluded that a systematic incorporation of motivational processes into instructional design models would be a valuable supplement.

N 14   26 August 2005   15:55 - 17:15   Room E102

Paper Presentation

SOCIAL INTERACTION IN LEARNING AND INSTRUCTION

Chair: Achtenhagen Frank, Georg-August-University Goettingen, Germany

Relational work and productive interactions in an asynchronous conferencing environment

Karen Littleton, The Open University, United Kingdom
Dorothy Miell, The Open University, United Kingdom
Martin LeVoi, The Open University, United Kingdom
Eva Vass, University of Southampton, United Kingdom
Denise Whitelock, The Open University, United Kingdom
Rupert Wegerif, University of Southampton, United Kingdom

In this paper we use socio-cultural methods of discourse analysis to analyze data from a 'virtual summer school' of around 500 psychology students at the Open University. We focus on two groups of six students, 12 students in total, who were supervised working on an undergraduate psychology project. The electronic record of their online interactions with their tutors and with each other is supplemented with 30 minute telephone interviews conducted with students and tutors. Our analysis explores the role the tutor plays in supporting joint meaning making and fostering a collaborative community of enquiry and also seeks to understand the ways in which students collaborating on a piece of psychology project work negotiate shared understanding and support each other in the process of learning at a distance. We found that complex and subtle relational work was an essential part of establishing and maintaining the kinds of interactions in which productive teaching and learning exchanges are possible.

Goal preferences in peer groups: a study on the island of Curacao

Janna Fortuin, Leiden University, Netherlands
Paul Vedder, Leiden University, Netherlands

Social network analyses have received relatively little attention in educational research, although there are many advantages associated with this research. One of the main issues in social network (or peer group) research is the definition of the factors that govern the formation of peer groups, the selection factors. In this paper, we present the results of a study on motivation as a selection factor with 205 secondary vocational students on the island of Curacao. A second goal of this study was to describe the relation between individual motivation, group motivation, perceived social support, and class climate. It was found that motivation, conceptualized as goal preferences, is a selection factor for peer groups. There is also evidence of influence of the peer group on perceived social support and school climate. Implications of these results for both theory and further research are discussed.

The impact of collaborative group work on social relations and self-esteem in primary classrooms

Donald Christie, University of Strathclyde, United Kingdom
Andrew Tolmie, University of Strathclyde, United Kingdom
Christine Howe, University of Strathclyde, United Kingdom
Keith Topping, University of Dundee, United Kingdom
Allen Thurston, University of Dundee, United Kingdom
Emma Jessiman, University of Dundee, United Kingdom
Kay Livingston, Univestiy of Strathclyde, United Kingdom

This paper outlines key findings on the socio-emotional impact of collaborative group work drawn from a large-scale intervention study in 24 Scottish primary schools funded by the UK Economic and Social Research Council's Teaching and Learning Research Programme. Children participating in the intervention received an initial period of teacher-led training in group work skills followed by structured group work in science over a period of 8 to 10 weeks. Pre- and post-test measures of classroom relations revealed that group work led to significant increases in the number of class members with whom children liked both working and playing. Overall change in levels of self-esteem were not significant, but individual improvements in this, as well as the more widespread gains in classroom relations, were all consistently predicted by Children's observed levels of group work skills, indicating direct socio-emotional benefits of productive collaborative exchange. The paper also reports positive evaluations by teachers of the impact of the intervention on children's group work skills an on their own professional practice in supporting collaborative group work.

N 15   26 August 2005   15:55 - 17:15   Room A009

Paper Presentation

STUDENT LEARNING IN HIGHER EDUCATION

Chair: Francis Hazel, University of London, United Kingdom

Disciplinary identification as the development of interest in specialist discourse communities: The role reading and writing plays in undergraduate education
Paul Richardson, Monash University, Victoria, Australia

This paper examines the development of disciplinary interest and identification in specialist discourse communities. By comparing accounts from university faculty and students, it scrutinises the role played by reading and writing in mediating student interest and participation in the biological sciences, sociology and economics and examines how assigned reading and writing tasks mediate identification within the specialist discourse communities. Although there have been valuable studies of writing in the disciplines, we have largely taken these discursive practices of the disciplines for granted. The study employed self-report in the form of semi-structured interviews lasting approximately 40 minutes with 9 faculty and 24 students. Student volunteers also provided copies of the writing they did in relation to their course of study, and faculty provided copies of their course outlines, including assignment tasks and course readings. This study provides insights into the literacy practices of undergraduate biological sciences, sociology and economics, exploring the differential ways in which students participate in and, perhaps, become aligned with the attitudes, values, beliefs and forms of life, signalling the development of interest and disciplinary identification. Evidence from the study indicates that students are expected to 'pick up' discipline-specific literacy practices and therefore consistently confront superficial and substantive differences between the disciplines that university faculty overlook. However, these literacy practices mediate interest, participation and alignment, foregrounding the mediating role of reading and writing in the development of both situational and individual interest as well as the differential nature of participation and alignment across specialist discourse communities. Further, it renders problematic the assumption that students simply apply their literacy skills to learning new knowledge which in the first instance, requires the sparking of situational interest, at least until the required writing tasks are complete, and then the development of individual interest if disciplinary identification and alignment are to occur.

An exploratory comparison of teacher versus student regulated learning in higher education
Joan van den Ende, Hogeschool Rotterdam, Netherlands
Cornelis de Brabander, Leiden University, Netherlands
Jeroen S. Rozendaal, Leiden University, Netherlands

This study entailes an exploration of the differences between two student regulated and two teacher regulated courses in informatics and 'small business' in higher education. Investigated were the students' perception of autonomy and of aspects of competence (personal efficacy, organizational efficacy, and personal value) using

a range of common learning tasks and their epistemological beliefs. A total of 164 students participated. Principal components analyses established all variables as separate scales with sufficient to good internal consistency. Subsequently analyses of variance were performed with regulation type (student versus teacher), subject type (informatics versus 'small business'), grade level (second or fourth year students) as factors. On the measure of autonomy only small business students in the student regulated group reported a higher level compared to their teacher regulated counterparts. No differences were found on personal efficacy or personal value. However, students in student regulated programs reported a substantial higher level of organizational efficacy. Students in student regulated environments experienced better organizational conditions to support their task performance. The instrument thus proved to be susceptible to contextual characteristics. With respect to epistemological belief the most important factor was subject type, with students in the small business group reporting a more relative conception of knowledge. Informatics students in their second year, furthermore, reported the least relative conception of knowledge. However, regulation type was not related to epistemological belief. The generalizability of the results are discussed in the light of the limited number of respondents, the danger of capitalization on specific characteristics of the four institutions involved, and characteristics of the list of tasks. With these comments in mind the results of this study are taken not as definitive answers, but as an encouragement to pursue this research in the direction chosen.

University students' perception of teacher openness and reaction towards questioning and its impact on motivation to learn within the Expectancy-Value model
Anastassis Kozanitis, Ecole Polytechnique, Canada
Jean-Francois Desbiens, Universite de Sherbrooke, Canada
Roch Chouinard, Universite de Montreal, Canada

This research looks at how some instructor behaviors can influence student motivation at the university level. Its goal is to examine if the perception of teacher's openness and reaction towards student questioning has an impact on their motivation to learn. We also want to verify whether students differ on their motivational characteristics based on gender and age. We refer to the Expectancy-Value model (Pintrinch & Schrauben, 1992), which is embedded in the socio-cognitive perspective, to elucidate students' motivation. Participants are students who were attending two different degree programs from a Quebec university (Canada), (kinesiology (KIN), n = 582 and teaching of physical education (TPE), N = 431; 52% males and 48% females in both programs) in a cross-sectional scheme of research. A questionnaire

was administered once to every student in each classroom, and took approximately 15 minutes to complete. Multiple analyses of variance (MANOVA) were used to explore differences in Expectancy and Value across students. Results indicate that older students show higher mastery goals and interest for subject matter while younger students seem to be more performance oriented, suggesting that grades are of greater concern to the younger students. A positive perception of teacher's reaction to student comments leads to higher levels of mastery and performance goals, as well as interest, control and self-efficacy beliefs. Teachers' openness towards questions contributes to student interest, control and self-efficacy. Finally, students with female instructor report higher scores for all of the motivational variables. On the other hand, students' gender shows no influence on any of the motivational variables. This result is not consistent with earlier studies, and might bear important theoretical implications, particularly for the socio-demographic aspects of the model. Furthermore, these very compelling results have high practical relevance, thus these are variables under teacher control that can be modulated with adequate preparation.

Introducing multiple choice alongside short answer questions into the end-of-year examination: the impact on student learning in first year economics
Nicola Reimann, University of Durham, Open University, United Kingdom
Rui Xu, University of Edinburgh, United Kingdom

The study investigates the impact of a change to the format of the examination of a module in economics. Originally, the examination included both essay questions and short answer questions (SAQs), subsequently the essay questions were replaced by multiple choice questions (MCQs). Economists tend to stress the ease of marking MCQs, the absence of marking bias, the advantage of coverage as well as their validity and reliability, while the student learning literature is more likely to focus on their potential to encourage surface strategies and the difficulty of constructing MCQs which tap into higher levels of understanding. The paper explores the students' perceptions of modes of assessment, revision strategies, approaches to studying and exam performance. The data comprised two inventories, semi-structured group interviews with students, interviews with teaching staff, documentary data and students' grades. It was found that the introduction of MCQs did not have quite the negative effect which had been expected. There were no significant correlations between approaches and grades obtained for either MCQs or SAQs, nor between approaches and the students' perceptions of MCQs and SAQs. However, the students' approaches to studying were significantly related to their overall grades for

the examination, and the students who obtained high scores on MCQs also scored highly on SAQs. The new examination format was well aligned with the rest of the module and forced the students to revise the entire syllabus. Most students seemed to prefer SAQs, while their attitudes towards MCQs varied considerably. For answering SAQs, knowing diagrams and the ability to apply economic concepts to real-life situations were seen as crucial. Most of the concerns expressed by students were about MCQs being ambiguously worded. The findings of this study highlight the complexity of real-world assessment and illustrate that equating MCQ assessment with surface strategies may be too simplistic.

Paper Presentation

TEACHER EDUCATION AND PROFESSIONAL DEVELOPMENT

Chair: Astrid Pettersson, Stockholm Institute of Education, Sweden

Towards an Inclusive Teacher Education Programme: exposing student teachers to how they learn.
Carol Evans, University of Durham, United Kingdom
Mivhael Waring, Loughborough University, United Kingdom

This paper reports on a pilot project designed to encourage student teachers to better appreciate how they learn, and in so doing enhance the process of learning to teach that they go through. As part of a six week programme, eighty undergraduate primary student teachers studied the topics of cognitive style and learning preferences. The Cognitive Styles Analysis (CSA) (Riding, 1991) and two questionnaires exploring their learning preferences and perceptions of good teaching were administered to all students at the beginning of the programme. In addition, the students completed Enwistle's (1997) ASSIST. Qualitative and quantitative analyses of data revealed differences in the responses of the wholist, intermediate and analytic classifications (CSA) of the student teachers towards the impact of the programme on their learning and teaching. Significantly, however, all were unaware of the notion of cognitive style, never before being presented with as explicit an opportunity to discuss their learning needs in such specific terms. While this was welcomed, they reported feelings of inadequacy when giving their opinion about different forms of instruction due to the impoverished diet of learning experiences they had received

throughout their educational career. This manifest itself in a clear preference for sequential step by step learning which in part creates a barrier to individualising learning. Such a situation reinforces a status quo, highlighting the negligible impact that research into cognitive and learning styles and preferences have had to date in higher education as part of attempts to enhance the learning of students (Evans and Waring, 2004). But surely, interest in cognitive and learning styles has to be afforded if one intends to offer a truly inclusive education for all learners?

Teachers' Individual Learning Differences: Do They Make a Difference?
Melodie Rosenfeld, Tilburg University, Netherlands
Sherman Rosenfeld, Weizmann Institute of Science, Israel

Students have various modality, thinking and learning/cognitive styles, which we call individual learning differences (ILDs) (Rosenfeld & Rosenfeld, 2004). These ILDs make a difference for students (Sternberg & Zhang, 2001). Do teachers also have ILDs which make a difference? What is the distribution and strength of these teachers' ILDs? What is the effect of the workshops on teachers' professional growth, as measured in the change of beliefs about students? What is the connection, if any, between a teacher's ILDs and this change of beliefs? A professional development course was developed and taught by the first researcher to eight classes (30-60 hours long, N= 234) in a teachers' college of education in Israel to inservice and third-year preservice teachers. We mapped the distribution and strength of the teachers' preferred styles. We compared their scores with measured changes in their beliefs about students on a pre and posttest. Field notes were taken after workshops and 14 teachers were interviewed individually or in focus groups to gain further insights. The data showed that teachers' ILDs scores were skewed. The teachers' most common learning styles were those most matched to traditional learning environments. Those with balanced (vs. extreme or preferred) styles all reflected pathognomonic (blaming the student) beliefs on the pretest. As a result of the course, teachers with all the measured ILDs (including the balanced) showed growth in their interventionist beliefs (intervening to help the student). We conclude that a course -- in which teachers are actively sensitized to the diversity of ILDs in themselves and their colleagues -- can have a positive effect on preparing teachers for diverse learning environments. Furthermore, understanding why some teachers resist making changes, while other teachers readily make changes, might help us sustain new learning environments (de Kock, Seegers and Voeten, 2004).

Teachers' ongoing professional knowledge acquisition: A view from memory structures

Elizabeth Walcot-Gayda, University of Sherbrooke, Canada
Denis Bedard, University of Sherbrooke, Canada

This paper details a model of teacher's knowledge acquisition within an ongoing professional development program. It relates the model to a case study of three elementary teachers who participated in a three-year program to develop their instructional practices in the domain of writing. A key feature of the model is the focus on influential components within the individual's memory structures. The model underlines the importance of evaluating and addressing these components when designing teachers' professional development programs or teacher training at the post-secondary level. Designing a recurrent professional development project is a challenge. According to current research, sessions should be designed so that they meet the expressed needs of teachers. Recommendations have been made that: sessions should be scheduled regularly and have varying formats; and, the content be applicable, but not prescriptive while respecting what teachers perceive as possible within their classroom structure. Usually the main purpose of professional development is for teachers to gain knowledge that will result in higher student achievement. Many reasons have been given as to why one model or another of professional development does or does not produce the results desired. This paper presents one such project and the implications of the results for a model of ongoing teacher learning from the perspective of the individual participants' memory structures. It explores influential elements in this process. We argue that the model derived from the data collected is useful to explain and predict teachers' professional knowledge acquisition at all academic levels.

An International Study of Gifted Students' Perceptions of Effective Teachers

Wilma Vialle, University of Wollongong, Australia
Kornelia Tischler, University of Klagenfurt, Austria

The teacher is not only an expert at his subject, but also passionate about teaching and [one] who focuses on the topic and can explain things in greater detail, wasting no time on making things pleasant will produce better students. These comments were made by students participating in an international study, which explored and compared gifted students' perceptions of the most desirable characteristics and competencies of effective teachers. The participants were students attending academically selective secondary schools in Austria, Australia and the United States. More

than 850 students participated in this study, which involved the administration of a questionnaire with forced-choice items and open-ended questions, and interviews. By utilising forced-choice items, the questionnaire sought to determine whether the personal or the intellectual qualities of the teachers were more highly valued by the students. The questionnaire also included a number of open-ended questions to supplement the quantitative data. All three cohorts of students exhibited a strong preference for the personal qualities of their teachers with significant differences found for grade and gender when an ANOVA was employed. Qualitative data gathered from the open-ended questions and focus group interviews revealed that the teachers' intellectual qualities and their teaching style were also highly valued by the students. In all three cohorts the students' perceptions are very similar, as the teachers' intellectual competencies (such as in-depth knowledge of subject, tie subject to other subjects), their teaching style and knowledge about teaching, and their personal characteristics are highly valued by students. This paper will discuss similarities and differences among the three cohorts, age groups, and between female and male students, as well as the competencies of successful teachers of the gifted.

N 17   26 August 2005   15:55 - 17:15   Room E113

Paper Presentation

COMPREHENSION OF TEXT AND GRAPHICS

Chair: Lucile Chanquoy, University of Nantes, France

Effect of the time factor on the modality effect
Sylvie Merlet, LACO - University of Poitiers, France
Jean-Francois Rouet, LACO - University of Poitiers, France

According to cognitive load theory (Sweller, 1999) and the generative theory of multimedia learning (Mayer, 2001) narration should systematically be used in multimedia documents designed for learning purposes. In this study, we set out to test this principle of modal complementarity in a situation where understanding was not subject to temporal constraints. Forty-eight university students studied a multimedia sequence in a text or auditory version. The unfolding of the sequence was either imposed (presentation time matching the length of the narration) or controlled by the subject. We found that the effect of modality mainly occurred when the pace of presentation was imposed, disappearing or even being reversed in the user-con-

trolled situation. Moreover, this benefit of user-control was greater for the text than for the auditory version. These findings suggest we need to reinterpret the modality effect.

Using Visualization in Multimodal Text Comprehension and Production of 8th Grade Students
Efi Papadimitriou, National and Kapodistrian University of Athens, Greece
Svetlana - Lito Gerakakis, National and Kapodistrian University of Athens, Greece
Katerina Chryssanthopoulou, National and Kapodistrian University of Athens, Greece
Eleni Renzoula, National and Kapodistrian University of Athens, Greece
Georgia Rovatsou, National and Kapodistrian University of Athens, Greece
Olympia Palikara, Institute of Education, University of London, United Kingdom

With the present study we try to create a framework of principles and learning conditions aiming at facilitating students to become aware of the strategies that they use when they interpret or produce multimodal texts. Multimodality is a new concept that was developed during the last decade by Cress and Van Leeuven (1991) and refers to the combination of more than one semiotic ways (e.g. language, images, photographs etc.) within the same text. The sample of the research was 60 8th grade students in two experimental groups (one teacher based and one technology based) and one control group. The materials used in the pre and post-test were narrative, expository and argumentative/persuasive texts. Based on this material students were asked to: a) Answer comprehensive questions, b) Fill in graphs and charts with the crucial information of texts and produce a summary based on graphs-charts. Preliminary results show that the pre-test and post-test comparisons have significant differences between the experimental groups and the control group and they have confirmed our hypothesis that the technology based learning environment would result in metacognitive gains for the participating students. Improvement of metacognitive skills for both reading and writing tasks was greater in the students that participated in the technology-based environment. These findings suggest that it is useful for teachers to enhance their teaching by aid of visual support since it seems that manipulating multimodal information supports the comprehension and production of written discourse

Comprehending Science Texts: Effects of Computerized Reading Strategy Training

Rachel Best, University of Memphis, United States
Tenaha O'Reilly, University of Memphis, United States
Danielle McNamara, University of Memphis, United States

iSTART (Interactive Strategy Training for Active Reading and Thinking) is a computerized reading strategy tutor designed to facilitate and enhance students' understanding of challenging textbooks. Students are taught to self-explain a text using active reading strategies (e.g., elaboration using prior knowledge and information cited in previous parts of the text), which are known to facilitate comprehension. Our study investigated the effects of iSTART on middle-school students' ability to successfully self-explain and comprehend science texts. The participants were forty-two eighth-grade students from an east-coast school in the United States. Half of the participants were trained with iSTART whereas the remaining students were in a control condition, which did not receive strategy training. After training, all of the students self-explained a 291-word text about heart disease and answered comprehension questions. iSTART participants produced more elaborations than control students. Further, the quality of elaborations produced by iSTART students was superior, such that trained students produced more relevant elaborations (i.e., elaborations that contributed to understanding information in specific sentences, or the text more globally) than control students. There was also a trend, approaching statistical significance, indicating that iSTART participants performed better on the comprehension questions than control students. Importantly, there was a positive correlation between students' production of elaborations and level of correct responding on the comprehension questions. A subsequent analysis showed that the number of relevant elaborations students' generated correlated with accurate responding on the comprehension questions. However, the number of irrelevant elaborations did not correlate with successful performance on the comprehension questions.

Information literacy – a core competence in Education

Mikael Alexandersson, Gothenburg University, Sweden
Louise Limberg, University College of Boras and Gothenburg Universit, Sweden

The purpose of this paper is to present the major findings of a series of empirical research studies directed at exploring the interaction between students' information seeking and use for learning assignments and their learning outcomes. The ability to seek and use information effectively in various situations is often talked about as

information literacy. The concept has evolved parallel to the development of information technology and has been adopted as a main concern in education and librarianship. The research studies are based on various aspects of the interaction between information literacy and knowledge formation in school contexts and particularly on the use of ICT tools for learning. Major findings indicate that information seeking was characterised by procedure rather than content. Information seeking is commonly understood as fact-finding. This fact-finding approach was prevalent regardless of the type of source used by the student; books, the Web, multimedia resources, film, etc. Our data indicate that the notions and experiences that students develop through their assignments mean that research is to choose a topic, to find one or several sources, to read, to write and to present. To formulate questions did not seem to be part of students' conceptions of research. Major conclusions are that students' interaction with artefacts in the library and their communication with fellow students or adults are determined by the school context, where students define their task according to the school's discursive practice, that is, that the school is a non-research environment, not based on genuine research questions but on the understanding that there are right answers to find, compile and re-present. What will be the consequences for the relation between the ways students handle information and what they learn about subject matter?

N 18   26 August 2005   15:55 - 17:15 Room A010

Paper Presentation
Reading

PRIMARY SCHOOL CHILDREN

Chair: Tommy Dreyfus, Tel Aviv University, Israel

School, classroom and individual factors influencing reading performance in grades 3 and 4 in Sweden
Jan-Eric Gustafsson, Gothenburg university, Sweden
Monica Rosen, Gothenburg university, Sweden

In the Progress in International Reading Achievement Study (PIRLS) 2001 study reading achievement of 9-10 year old students was assessed in 35 countries. Swedish grade 4 students had the highest level of performance of all participating countries. However, Sweden also participated with grade 3 students, and their level of

performance was considerably lower, and with a wider range of performance than in grade 4. These results make it particularly interesting to investigate which factors explain the difference in level of performance between grades 3 and 4. Since the participating grade 3 and grade 4 classes to a large extent were sampled from the same schools, the effects of contextual variables and school characteristics may be analyzed with multilevel modeling techniques. In the analysis recent developments in multilevel modeling in the Mplus 3 program, which allow multilevel modeling with latent variables and randomly varying intercepts, were taken advantage of. It was first established that there was a significant variation between schools in the amount of difference in level of performance between grades 3 and 4. In the following steps of analysis attempts were made to find contextual variables and school level variables which accounted for the variation in performance differences between grades 3 and 4. In a two-level model, latent school-level and individual-level cultural capital variables were identified, and the school-level cultural capital variable was found to be negatively related to the difference between grades. This suggests that schooling in grade 4 in Sweden serves a compensatory function, making students with less stimulating home environment catch up. There also were tendencies that properly educated teachers, and availability of special education resources for remedial teaching of reading in grade 4 contributed to explaining why in some schools there was a stronger effect of schooling.

Effects of explicit reading strategy teaching and peer tutoring on 5th graders' meta-cognition and reading attitudes

Jean-Pierre Verhaeghe, Ghent University, Belgium
Ling Li, Ghent University, Belgium

A quasi-experimental study involving 40 5th and 2nd grade classes in urban primary schools in China, was designed to investigate the effects of a year-long experimental program combining explicit reading strategy teaching and peer tutoring practice. Students were assigned randomly to either a control condition or one of three experimental conditions: Reading Strategies Only (SO), Reading strategies + Same-age tutoring (SA) and Reading strategies + Cross-age tutoring (CA). Previous results have shown positive effects on students' reading comprehension achievement. In this study, we focus on the effects on 5th grade students' self-reported strategy use, their meta-cognitive awareness and their reading attitudes. A total of 642 5th graders participated in this study, all enrolled in one of 8 primary schools, representing a mixture of different types of schools in different parts of the city, serving students from a wide range of social backgrounds. For each of the investigated outcomes fac-

tor analysis revealed well interpretable underlying dimensions. Multi-level analysis was applied to investigate the effect of the experimental treatment. With respect to (1) students' reading strategies use, a significant overall effect was shown in favor of the experimental students. The effect size differs according to the experimental condition, with the effect for the CA condition being most prominent. Analysis of (2) self-related thoughts during and after reading, showed a decrease of negative thoughts and significant increase of positive thoughts for all experimental conditions. In general, students in the experimental conditions showed a significantly more positive evolution in (3) reading attitudes compared to the control condition, with bigger effects for CA and SO. Explanations and applications of the results are discussed in the paper.

Impact of question format and reading process on gender equity indicators in reading literacy assessments
Dominique Lafontaine, University of Liege, Belgium
Christian Monsieur, University of Liege, Belgium

Several characteristics of comparative reading literacy assessments – supports for the assessment, types of texts, question format – have a potential impact on the results and on the indicators based upon those assessments. The aim of the present study is to explore the impact of question format and reading process on gender equity indicators drawn from different reading literacy comparative assessments (IEA Reading Literacy Study, 1991; PISA 2000). To what extent is an apparent increase of the achievement gap between males and females true, to what extent does it reflect the technical parameters of both studies? While assessing the same object (reading literacy), both studies indeed differ on several crucial aspects, among others definition of the population, types of support, balance of different question formats, reading processes assessed. Among those numerous potentially influential factors, this paper will focus on the impact of question format and reading process on the gender gap achievement. Main results: the hypothesis of a larger gender gap for constructed open ended questions than for multiple choice questions (in favour of females) is confirmed. Besides, the impact of question format is larger for the reading process 'reflecting upon the text' than for 'interpreting the text' and 'retrieving information'. The variance analysis shows that the reading process assessed has a larger impact (25,39 % of variance explained) than the item format on the difference of reading achievement between males and females. But item format also makes a difference (17,60 % of variance explained) and the interaction reading process – item format accounts for an additional 6,65 % of variance. In conclusion,

this study provides evidence that parameters of reading literacy assessments influence to some extent the width of the gender gap. Consequently, one should interpret very cautiously indicators of gender equity based upon different assessments.

An investigation into the reading difficulties of children learning to read Greek living in Cyprus.
Maria Constantinidou, Institute of education - University of London, United Kingdom
Rhona Stainthorp, Institute of Education - University of London, United Kingdom

The objectives of this study were to investigate whether Greek-speaking children identified as having reading difficulties: 1) have particular problems with speed of word and pseudoword reading rather than accuracy relative to chronological age matched and reading age matched controls who do not have reading difficulties. 2) show phonological deficits relative to chronological age matched and reading age matched controls who do not have reading difficulties. 3) show reduced performance on reading comprehension tasks. Sixty children took part in the study. They formed three groups: a group of 20 reading disabled (RD) children was matched with a second group of 20 age matched normal readers (CAC) and a third group of 20 younger children who had the same reading ability as the RD group (RAC). The data obtained related to performance on an experimental phonological assessment for Greek speaking children, word and pseudoword reading tasks and a reading comprehension task. The results showed that reading accuracy of the RD children was predictably weaker than that of the CAC group but equivalent to that of the RAC group. However, the reading speed of the RD group was significantly slower than that of the RAC group. The results also suggested that even in a transparent orthography such as Greek, RD children show a phonological deficit. The RD children showed a degree of competence in simple phonological awareness tasks, but weaknesses in the more complex tasks requiring phoneme manipulation. Decoding would appear to be compromised by a phonological deficit leading to slow word identification. Slow and laboured decoding was a major hindrance to reading comprehension for the RD group. It is recommend that diagnostic assessments for children with reading difficulties in Greek should include phonological awareness, single word reading and pseudoword reading tasks that measure both accuracy and speed.

Paper Presentation

WRITING

Chair: Pietro Boscolo, University of Padua, Italy

Meta-awareness of cognitive process and linguistic choices in writing: Children's perspectives on their own writing
Debra Myhill, University of Exeter, United Kingdom

Set in the English context of a writing curriculum which is heavily influenced by Gravesian process approaches and more recently by the linguistic analyses of genre theorists, this paper explores secondary age writers composing processes and their meta-awareness of both cognitive processes and linguistic choices.   The research which the paper draws upon is a two year research project, funded by the ESRC, involving a sample of 360 children stratified by ability, age and gender. In the first year of the study, 720 samples of writing were analysed in detail using two analytical coding frames focusing on sentence level features, and text level features. In the second year of the study, a sub-sample of 24 children were observed writing in the classroom using a specifically-designed annotated timeline, and were interviewed immediately after the lesson using a semi-structured interview schedule to investigate their awareness of their own composing processes and their understanding of linguistic choices made.   This paper reports the outcomes of the observations and interviews with children. It illustrates statistically the different composing patterns of writers and the different composing patterns prompted by narrative and argument writing.   It presents the varying chronologies of the composing process, showing how pause time, flow, and text marking vary across the sample. The paper also presents the analysis of the interviews, revealing the difficulties many children face in articulating both metalinguistic understanding and awareness of their own composing processes, and signaling those aspects of composition which are best understood and most clearly expressed.

Improving 4th-grade students' composition skills: Effects of strategy instruction and self-regulatory procedures
Cornelia Glaser, University of Potsdam, Germany
Joachim Brunstein, University of Potsdam, Germany

Recent models of skilled writing (e.g., Hayes, 1996) emphasize that writing is a complex cognitive activity, requiring extensive self-regulation. Previous research has shown that inexperienced writers have difficulties with acquiring the strategies associated with good writing (e.g., Scardamalia & Bereier, 1986). Harris and Graham (1996, 2003) designed an instructional approach, the self-regulated strategy development (SRSD) model, to help students master the skills involved in composing. Extending on Harris and Graham's SRSD-model, we examined the effectiveness of an intervention program (SAT-program) designed to promote 4th-graders composition skills. We contrasted students who were taught composition strategies in conjunction with self-regulatory procedures (SAT-condition) with students of two comparison groups: (a) students who were taught the same set of strategies but received no instruction in self-regulation procedures (strategy-only condition), and (b) students who received conventional classroom teaching in composing (control condition). For a 4-week period (one 90 min session per week) students of both intervention conditions received in groups of five to six participants instruction in task strategies required to write good narratives. In addition, SAT-students received explicit instruction in the following self-regulation procedures: criterion setting, strategic planning, self-evaluation, and self-correction. Compared with the control-students, students of both intervention conditions (SAT; strategy-only) improved in their composition performance from before to after intervention. Furthermore, students who were taught composition strategies in combination with self-regulatory procedures (SAT) surpassed students of both comparison conditions in terms of composition performance, composition length, and number of revisions at posttest and follow-up assessments. They also displayed superior performance at a transfer task. In sum, our findings indicate that a writing program that conjointly addresses both task strategies and self-regulatory procedures is most likely to produce beneficial and lasting effects on 4th-graders composition and generalization performance.

Open space and closed space models in student views on writing in science class
Tili Wagner, Beit berl College, Israel
Tamar Levin, Tel Aviv University, Israel

This study explores how students conceive writing as a mode of learning in the context of writing-to-learn experiences in the science classroom. Believing that writing is one of the most powerful tools for discovering, organizing, and communicating knowledge, the study examines whether, how and why the use of informal writing

experiences in science classes can influence student views on writing. The study explores how students view writing by analyzing the metaphors they use when asked to reflect on their own writing-to-learn tasks. It examines the metaphors and metaphoric themes of 97 eighth grade students, using quantitative and qualitative analyses, and explores how the views on writing are affected by students' classroom writing experiences.The results show that: 1) two multidimensional conceptualizations reflected in the student metaphors, labeled open space and close space, correspond to the constructivist and transmission views of teaching and learning; 2) student views on writing are affected by their writing-to-learn tasks, feedback and reflective writing; 3) student views on writing correspond to various theoretical models, but are not identical to them, and finally 4) the identification of metaphoric themes such as Container, War, Journey, Optics can help to systematize the experiential meanings of writing with reference to 4 dimensions: cognitive, social, emotional and meta-cognitive. Student views on writing in the context of writing-to-learn have not received much attention, particularly at the elementary and secondary level, although they carry important implications for determining the success or failure of teaching and learning strategies that use the writing-for-learning approach. This study is therefore important in that it provides hard data to show how diversified types of writing tasks along with feedback and reflective writing can help students to perceive writing in a more interpretative, interactive, multidimensional and integrative, motivating light, when the writing tasks are non-routine, unexpected, life-oriented, and curiosity-stimulating.

The Effectiveness of Learning Study on Creative Writing Abilities of Primary School Students in Hong Kong
Cheung Wai Ming, University of Hong Kong, China, Peoples Republic of

Creativity is an important element in relation to education and societal growth. It is defined as a person's capacity to produce new or original ideas, insights, restructurings, inventions, or artistic objects, which are accepted by experts as being scientific, aesthetic, social or technological values. Writing and creativity have very close and mutual relationship as writing itself is already a manifestation of creativity. Stimulating creativity is in fact the most effective way of teaching writing. Although teacher is regarded as a significant factor in promoting creative approach of education, it is reported that teachers have been conservative and traditional in Hong Kong. The literature reveals that teachers are generally ignorant as to ways of teaching students to write creatively. The article reported a learning study we developed to ensure teachers have adequate knowledge, skills, and confidence to

use creativity as means to the teaching of writing. In order to test the effect of the learning study, a randomized experimental trial was conducted in a primary school in Hong Kong. Four teachers joined the learning study for one academic year. Some 277 students were randomly allocated into the experimental group (137) and control group (140). The experimental group received creative teaching of writing by the four teachers involved while the control group received traditional teaching. Outcome assessments, the Chinese Creative Writing Scale and the William Scale, showed that the students in the experimental group showed improvement in almost all aspects of creativity whereas the students in the control group did not. This study provided empirical evidence to the positive effects of learning study. The hypothesis that students taught by teachers who participated in the learning study showed improvement in different aspects of creativity as measure by our outcome assessments was supported. Implications to teaching practice and further direction for research were suggested.

N 20   26 August 2005   15:55 - 17:15   Room A107

Paper Presentation

LEARNING AND INSTRUCTIONAL TECHNOLOGY

Chair: Rich Mayer, University of California, Santa Barbara, United States

Fostering critical thinking and cooperative problem-solving with content schemes and scripts in videoconferencing
Birgitta Kopp, University of Munich, Germany
Bernhard Ertl, University of Munich, Germany
Heinz Mandl, University of Munich, Germany

This study examines the support of critical thinking in cooperative learning in videoconferencing. In particular, it assesses how content schemes and scripts support the corroboration of assumptions in discussion and problem-solving which is seen as the main determinant for critical thinking activities. 52 triads were randomly assigned to one of four conditions in a 2x2-factorial design. The factors content scheme (with/without) and script (with/without) were varied. The learners were asked to familiarize themselves with a theory individually before working on a case cooperatively in triads. To measure the effectiveness of the intervention on critical thinking, the learning discourse and the case solution were analysed. The analyses

focused on cognitive and meta-cognitive activities during discussion and on the relation between theoretical classifications and case information in case solution. Results show a main effect of the content scheme on critical thinking activities during cooperative learning. Furthermore, content scheme and script support adequate reasoning in problem-solving. Moreover, a relationship between critical thinking activities and case solution was found.

Collaborative knowledge construction in videoconferencing: About beneficial and less beneficial activities
Ertl Bernhard, LMU Munich, Germany
Kopp Birgitta, LMU Munich, Germany
Heinz Mandl, LMU Munich, Germany

This contribution deals with collaborative problem solving in videoconferencing. The main issue is about how learners proceed with the collaborative task solution and how content schemes and collaboration scripts can support beneficial activities in this context. The theoretical background for this work lies in approaches about collaborative knowledge construction. They state that strategic, epistemic and coordinative activities are indispensable for learners' joint task solution. A further aspect is learners' joint creation of shared external representations as important activity in collaborative knowledge construction. Particularly in videoconferencing scenarios, such shared external representations can be a powerful feature for the learning process, as they are easy to realize with shared applications. An empirical study was conducted with 159 university students as participants. Learners worked in triads in a videoconference-based problem-solving environment. In this scenario, learners were supported by a content-scheme and a collaboration script in a 2x2-factorial design. For reaching deeper insights, the quality of collaborative knowledge construction and spoken discourse were analyzed. The discourse analysis comprised learners' use of strategic, epistemic and coordinative activities. A second aspect was how far learners negotiated with respect to the creation of shared external representations, which can be important for learning in CSCL environments. Results show that both interventions had no effect regarding work on the task when analyzing spoken discourse. However, learners with content scheme reached a higher quality of collaborative knowledge construction. This quality was predictable by over 60% by the content scheme, strategic activities with respect to the creation of a shared external representation and general coordinative activities.

Modes of participation and shared understanding in 3D virtual collaboration

Johanna Bluemink, University of Oulu, Finland
Sanna Jarvela, University of Oulu, Finland

The aim of this study is to examine collaborative processes of shared understanding in a 3D-virtual game. Students' activities during the game playing were analysed in order to find out the modes of participation the individuals use when acting in the group. Interaction is examined in two levels, in the task and content level consisting of the discourse related to the tasks of the game and in the team and relational level consisting of the discourse related to the challenges and opportunities in social interaction (Thompson, & Fire, 1999; Barron, 2003). Furthermore, a concept of the bystander effect, which is borrowed from the social psychology, is applied into educational settings to help to understand the thinking behind the students' behaviour during the game (Hudson, & Bruckman 2004, Latan, & Darley 1969). The data were collected from a design experiment, eScape, in which 24 university students participated in the groups of four into a collaborative game session. All six game sessions and group interviews were videotaped and analysed with the method of content analysis. The analysis was divided in two phases, from which the first one will be reported in this paper. In the first phase of the analysis the video data from the game sessions were analysed by setting each utterance into categories of the analysis. The categories used were 1) Question, 2) Statement (with sub-categories of social and content statement), 3) Suggestion, 4) Encouragement, 5) Instruction, 6) Response, and 7) Unclear. The results show a great variety in the number of utterances between the groups and individual students. Moreover, the division of the utterances in different categories varies significantly between the group members. The findings indicate that the modes of participation vary in every group causing effects also in the process of reaching shared understanding among the collaborators.

Quest Atlantis: Designing a 3-d learning environment at the intersection of learning, playing, and helping
Sasha Barab, Indiana University, United States
Anne Arici, Indiana University, United States
Craig Jackson, Indiana University, United States
Hakan Tuzun, Indiana University, United States

In this presentation we describe the Quest Atlantis (QA) project, an immersive 3-D virtual learning environment with the potential to engage children ages 9-12 in a form of socially-responsive play. This project has intentionally leveraged playing

and helping so as to establish a learning context that is both fun and meaningful, while still engaging children in the rigor of academics. The challenge has been to design a learning environment that is not a game yet remains engaging, is not a lesson yet fosters learning, and is not evangelical yet still nurtures a social agenda. As an example of design-based research, this environment has gone through multiple cycles of revision, with each cycle providing an opportunity for us to better understand the impact of design—especially those that are theoretically motivated. This learning environment has now been used by over 2000 children around the world, and has allowed us to better understand the value of integrating these three components as design principles. In this presentation, we describe three studies that have been core to our design research. First we describe the learning environment, next we present data on Children's perceptions and engagement along three dimensions (learning, playing, and helping), next we present learning and metacognitive data, and lastly, ethnographic data on motivational aspects of Quest Atlantis is presented. Our data suggest that we successfully designed an environment that was engaging, educational, and involved social commitments. Additionally, we found meaningful learning and metacognitive gains among children. Interviews with children also revealed new motivational categories that had not been highlighted when researcher was conducted in laboratory-based contexts or with more simplistic gaming environments. This data suggests that 3-D gaming contexts have potential for supporting the learning of academic content, and that play more generally could be better leveraged in supporting even content learning.

N 21   26 August 2005   15:55 - 17:15   Room A018

Paper Presentation
Educational Technology

TEACHERS AND ICT

Chair: Helmut Niegemann, The University of Erfurt, Germany

What are the Barriers and Enablers to Prospective Teachers' Use of ICTs
Thierry Karsenti, Universite de Montreal, Canada
Stephane Villeneuve, Unoversity of Montreal, Canada
Sophie Goyer, University of Montreal, Canada

The objective of our study was to understand barriers and enablers in prospective

teachers' use of ICTs, as well as their relative importance. In order to achieve our objective, we decided to conduct a survey with all prospective teachers in the province of Quebec (Canada) comprised of 6698 student teachers who took part in our study. The originality of our study lies in the statistical procedure used: A logistic regression. Our results suggest a better knowledge of factors facilitating the use of ICTs by teachers which could help provide both a more appropriate training context for prospective teachers and a richer environment to help actual teachers use ICTs.

Are Canadian Teachers Ready and Willing to Teach with ICTs?
Thierry Karsenti, Universite de Montreal, Canada
Stephane Villeneuve, Universite de Montreal, Canada
Sophie Goyer, Universite de Montreal, Canada

In this study, we first wanted to find out if Canadian prospective teachers use ICTs. Second, we wanted to understand the impact of motivation on its use. The study consisted of a motivation scale administered to 6998 prospective teachers. Statistical analyses were conducted to assess both the use of ICTs and the impact of motivation on its use. The detailed results to be presented highlight how motivation has a strong and positive impact on the use of ICTs by student teachers. They also reveal that a minority of Canadian prospective teachers use ICTs at the high school level.

Psychometric Properties of the Survey of Factors Affecting Teachers to Teach with Technology (SFA-T3)
Elena Papanastasiou, Intercollege, Cyprus
Charoula Angeli, University of Cyprus, Cyprus

There are a number of measurement instruments that exist in the field of education, whose aims are to measure various aspects related to educational technology. However, the psychometric properties of such test measures are not always determined. Therefore, their appropriateness of use is not always existent. The aim of this study was to determine the psychometric properties of the Survey of Factors Affecting Teachers to Teach with Technology (SFA-T3) when used with a sample of Greek Cypriot teachers. The results of this study have shown that the reliability of the questionnaire was adequate towards high. The construct validity of the instrument was also determined based on a factor analysis that created 10 easily interpretable factors. Some gender differences have also appeared in the teacher's responses on

the various factors, which is in accord with similar literature that exists in other countries as well.

Teachers perceptions and use of computerized school management sytems:
Gadi Alexander, Ben Gurion University, Israel
Turky Abu Aleon, Bem Gurion University, Israel

The purpose of the current study was to find out how teachers working in Bedouin schools in the southern part of Israel react to the introduction of a new School Management System (SMS) to their schools. The system was designed to enable teachers to collect and communicate records on student performance or attendance and to record and analyze other educationally significant behavior. Some of the specific aspects that were interrogated in the study were: a. how were the teachers informed about the SMS implementation and in what ways was their reaction taken in account? b. How is the system actually used by them, both administratively and pedagogically? c. What are they thinking about the qualities of the system and its capabilities? d. Is the SMS perceived as a potential resource for their decision making process– both administrative and pedagogical? Method: A questionnaire was presented to a sample of teachers and principles from the Bedouin school system in the Negev. The sample consisted of teachers (N=244) from ten representatives schools. This was followed by an in-depth interview with 10 teachers. Selected results: An analysis lead to the conclusion that four major types of factors could stand in the way of successful implementation of the system: technical problems, the teachers' resistance to change, lack of satisfactory training and a lack of excitement and involvement on behalf of the management. In addition, there seems to be a connection between the teachers' lack of technical experience and the ways that were selected for using, or avoiding the use of the SMS system. The study confirms that although a lip service is paid to the importance of computerized tools there is still a lack of awareness about necessary steps which will turn the implementation of systems like the SMS into a success story.

N 22   26 August 2005   15:55 - 17:15   Room E004

Paper Presentation

WEB-BASED AND CONSTRUCTIONIST LEARNING

Chair: Gisella Paoletti, University of Trieste, Italy

Cognitive Representation and Spatial Displays in Web Learning
Neil Schwartz, California State University, Chico, United States
Mick Verdi, California State University, San Bernadino, United States
Terra Morris, California State University, Chico, United States
Kelly Sayne, California State University, Chico, United States
Nikki Larson, California State University, Chico, United States

110 undergraduates studied a website in one of four conditions—in the presence or absence of a geographic map, and the presence or absence of navigational buttons based on geographic direction. The study was designed to determine whether learners navigating a website use a cognitive representation of the spatial configuration of the site, or an externally derived image of the site to encode the text based information contained there. Results revealed that learners develop a model of text and graphics when the content is familiar, but simply use an image as a mnemonic when content familiarity is low. The results are discussed theoretically in the context of spatial cognition as it relates to navigational website displays and instructional design.

Non Geographic Spatial Displays in Internet Learning
Michael Verdi, CSUSB, United States
Neil Schwartz, Califronia State University Chico, United States
Kelly Sayne, CSU Chico, United States
Terra Morris, CSU Chico, United States

114 psychology students studied a website containing a map or list of locations along with a related text and were directed to study and learn the material. Participants who viewed the geographic list and were instructed to navigate with a directional instruction, were able to recall items from the text and place features on their map reconstructions at significantly higher rates than those who viewed the list without instruction. When compared to those who viewed a geographic map, participants in the list with instruction group showed no significant differences in their recall or reconstruction. This due to the fact that participants in the list with instruction group created functional mental models equal to the images created from viewing a map.

Is Knowledge Building Only for Certain Students? An Exploration of Online Inter-action Patterns in Two Grade 10 Social Studies Courses

Hui Niu, Simon Fraser University, Canada
Jan van Aalst, Simon Fraser University, Canada

In the last 15 years, numerous approaches to learning and instruction emphasizing self-regulation and metacognition have been introduced, including knowledge building, When teachers are introduced to such an approach, they often reveal skepticism whether all students in their classes can participate or whether the approach only works for students with certain levels of prior achievement and motivation, and superficial analysis of server log data seems to confirm such skepticism. This paper explores this issue in two Knowledge Forum™ (KF) databases constructed by honors (n = 30) and regular (n = 28) grade ten social studies classes taught concurrently by the same teacher. The hypothesis was that although there might be significant differences between the classes in terms of quantitative indices describing online work, deeper analysis may reveal interaction patterns in both classes conducive to knowledge buildings as well as interaction patterns that inhibit knowledge building. The following data were collected from a three-week inquiry unit on environmental problems: (a) server log data; (b) ratings of note clusters based on 12 principles describing the socio-cognitive dynamics of knowledge building; (c) portfolios in which students presented some KF notes they considered the best in the database and explained why; (d) a pre- and post-test of domain knowledge; and (e) Foundational Skills Assessments. Preliminary results showed that there was evidence for knowledge building in both databases and portfolios. As expected, analysis of server log data revealed large differences between the two classes. However, analyses using more collective units of analysis – a discussion view or discussion thread – showed that there were only minor differences between the classes. Further analysis revealed that the substantial individual difference results were limited to a few discussions.

Changing patterns of participation - Children and teachers designing computer games in school

Lotta Fritzdorf, Halmstad University, Sweden
Ulla Tebelius, Halmstad University, Sweden

ICT has become a daily part of our lives today, especially for the rising generation. Attempts of implementing use of ICT in school as a pedagogic tool have found that such praxis is relying on the pedagogical attitude of the practitioners. One

area where benefits from the perspective of the learner have been argued is within Children's computer game design (Harel 1991, Kafai 1995, Papert 1996/1999, Tholander 2002). However; within this area of research, few studies have examines learning activity organized as non teacher directed but still within an everyday school setting. The study presented with a field experimental approach here illuminates how different organised participation structures affords different learning situations and interactions when 24 eight year old pupils, together with teachers and researcher are designing and programming self-selected computer games in an everyday school context. Results from the study indicate that, firstly, children developed a strong sense of ownership with their respective projects which also influenced their interactions in the situation. Secondly, that the source for learning observed can be described as: drawing somebody's attention to something, showing by exemplifying, listening and watching in each other, playing with the game, scanning the surroundings frequently. Finally, the computer game design focused on considerations for the prospective player. Teachers used the same sources for learning as pupils, but did not show traces of owning the problem as the pupils did. As concluding remarks, our results indicate how different participation structures influence the learning situation, affordances and interaction between pupils and teachers by shared endeavour instead of subdivided task, creating a game instead of solving a task, scaffolding instead of competition, communication building on comments of others instead of aimed at the instructor, owning the project instead of completing a predefined task.

N 23   26 August 2005   15:55 - 17:15   Room E104

Paper Presentation

LIFELONG LEARNING

Chair: Mien Segers, University of Leiden, Netherlands

Accreditation of Prior Learning in Life Long Learning: a Literature Study
Desiree Joosten-ten Brinke, Open University of the Netherlands, Netherlands
Dominique Sluijsmans, Open University of the Netherlands, Netherlands
Wim Jochems, Open University of the Netherlands, Netherlands

Learners who start an academic competence-based study may have already acquired relevant competences or skills, knowledge and attitudes underlying a specific com-

petency. This is especially the case in adult education, where learners tend to have more work experience and prior knowledge than young graduates from secondary education. During the last years the question has been raised how to deal with experience of learners who do not possess certificates, but who indicate that they have acquired relevant competencies in non-formal ways. In this respect, institutes increasingly use the method of 'Accreditation of Prior Learning' (APL). The admittance of (adult) learners on the basis of APL is an important step in the development of lifelong learning. APL is not a goal in itself, but an instrument that helps to support the life long personal development of people. To present the appropriate evidence, defined as evidence that suits with the need of the institute, it is necessary to gain insight in how (adult) learners select this evidence for APL purposes and how (adult) learners are supported in this selection process. In the paper the results will be presented of an extensive literature study regarding different APL. The focus is both on the role of (adult) learners in this process and on the role of the institutes. The following research questions are explored in depth:

1. How is APL organised that supports the personal development of adults?
2. What problems or difficulties have learners in selecting appropriate evidence?
3. How can institutes support learners in the process of gathering evidence of acquired competences under the condition of limited time?

Learning and development in disability organisations: the case of Cypriot disabled activists.
Simoni Symeonidou, University of Cambridge, Cyprus

This paper presents part of the findings of a research conducted in Cyprus in 2003 which aimed to make sense of disabled people's personal experience of disability and their experience within disability organisations, since the emergence of the disability movement at the end of 1966 to the present. This case study was conceptualised and designed according to the assumptions underpinning hermeneutics, in which the researcher seeks to construct meaning through interpreting multiple realities. Two methods of data collection, oral history interviews and documentary material, were used. In-depth oral history interviews were conducted with a sample of sixteen key-activists, selected on the basis of their long-term and active involvement in disability organisations and balanced in terms of impairment and gender. The documentary material comprised of minutes and correspondence, newspaper publications, periodicals, respondents' archives, legislative documents and other informative material. Data analysis revealed events of personal and collective significance, shared or contradictory values and beliefs, and commonalities or differ-

ences in the respondents' personal experience of disability and in their collective experience within disability organisations. The findings presented in this paper focus on how disabled activists engaged in a process of learning and development in disability organisations which was influenced both by the interplay of identities (individual, group and collective), impairment and gender, and the given cultural context of Cyprus. These findings are located in the spheres of feminism and post-modernism to explain how they can be used as an educational tool for conceptualising and improving disabled adults' participation in disability organisations in Cyprus through an informed process of learning and development.

Lifelong Learning in Transition Society. Estonian Case
Piret Luik, University of Tartu, Estonia
Tiiu Kadajas, University of Tartu, Estonia
Hasso Kukemelk, University of Tartu, Estonia

Current fast changing transition (post-soviet) society needs people educated by a new philosophy – despite the qualification a man has to be ready to improve it continuously – society needs lifelong learners. Socialistic countries had a tradition of a teacher-centred teaching style at school. It doesn't support students' activity and flexible thinking that is needed by modern society. The teaching process at school in Estonia is run mainly by the teachers trained in the Soviet time. Eastern European countries face the similar situation. This contradiction between teachers' training principles in the past and their tasks today to educate young generation for new conditions formed the study question: how do teachers (and do they) manage to educate lifelong learners in transition society. The main attention in the research was paid to the modern society needs and global use of virtual learning environment where computer isn't the goal itself, but is more as a resource. The qualitative approach was used on the bases of semi-structured interviews with five in-service teachers and five pre-service teachers. The collected and organized information was analyzed and interpreted to find out the teachers' perceptions and understandings about teaching and lifelong learning. They state that teachers' role has bean changed and today teachers have much less power and authority in school. Lifelong learning is for teachers obligatory to keep the job but not all in-service teachers are happy with that. According the preliminary results there is a gap between pre-service teachers' and elder in-service teachers' understandings and awareness of teaching and lifelong learning. As the study is still continuing the final results appear during closest months and the presentation will concentrate on it.

Symposium
Collaborative Learning

ADAPTATION IN TUTORING AND COLLABORATIVE LEARNING

Chair: Joerg Wittwer, University of Freiburg, Germany
Organiser: Joerg Wittwer, University of Freiburg, Germany
                    Matthias Nueckles, University of Freiburg, Germany
Discussant: Alexander Renkl, University of Freiburg, Germany

It is widely acknowledged that individual differences play an important role in learning. For instruction to be effective, teachers and tutors must therefore be able to correctly identify the characteristics of particular learners. Only then, they can construct an accurate mental model about the learners' specific needs in order to decide what and how to teach. Human tutoring is most likely the oldest form of individualized instructional settings that enables a thorough diagnosis of learners' knowledge and understanding. Intelligent tutoring systems have captured these benefits and expanded the assessment procedures for evaluating and promoting students' learning. In cooperative learning arrangements, students, like human or computer tutors, are also urged to be aware of the knowledge prerequisites of their learning partners when delivering explanations and feedback. In this symposium, we discuss the potentials of adaptation to the prerequisites of the individual learner as a means for promoting learning and understanding. Against this background, we particularly consider online learning environments, because they impose new demands on tutors' and students' ability to diagnose a learner's knowledge and understanding. At the same time, however, online learning offers new possibilities to implement complex adaptive instructional techniques by using fine-grained assessments of the individual learner. Corbalan Perez et al. present a computer-based training program with adaptive task selection and support to suit a learner's level of expertise. Similarly, Wittwer et al. investigate how instructions provided by online tutors can effectively be adapted to a learner's knowledge through the use of support tools. Rose et al. examine the impact of learner orientation on adaptation of tutorial support in exploratory learning. Schweizer and Paechter analyze the role of different media and of different task types for adaptation in collaborative e-learning. Finally, Topping and McLuckie present instruments for assessing discourse-building skills required for learner adaptation in online peer learning.

System- or learner-controlled instruction? Towards a model for adaptive instruction

Gemma Corbalan Perez, Open University of the Netherlands, Heerlen, Netherlands

Liesbeth Kester, Open University of the Netherlands, Heerlen, Netherlands

Jeroen van Merrienboer, Open University of the Netherlands, Heerlen, Netherlands

There is an increasing tendency to use adaptive education in the selection of suitable or necessary learning tasks for each individual student with a particular learner profile at a particular moment in time. Two experiments will investigate the possibilities of such adaptive education. The first experiment combines two apparently opposite adaptive approaches, namely, a system-controlled approach and a learner-controlled approach. The first approach aims at adjusting the suitability of the learning tasks for the individual student by taking the level of expertise into account, using performance and mental effort measures. The second approach provides learners with some control over the task selection on the assumption that learners are able to select the most suitable task according to their needs and interests. Both approaches are combined in the proposed dynamic model of adaptive learning task selection being examined in the experiments. In the first experiment, twenty-five nursing students of senior vocational education were assigned randomly to two groups. An electronic learning environment presented the practice tasks to the students. A simulator where students could perform all required actions was available. In the system-controlled condition, learning tasks with the appropriate complexity and support level for each learner were selected based on individual performance and mental effort scores. In the learner-controlled condition, the system determined the level of complexity and learner support, but let the student select a learning task from three suitable learning tasks. First results did not show significant differences in the mental effort invested and performance scores between the two conditions. However, the learner-controlled condition was expected to be more appealing for students since the given level of control could lead to higher motivation. A second experiment will examine whether adaptive instruction with limited learner control is more effective and efficient than non-adaptive instruction.

Adaptive transferable skills for online peer learning
Keith Topping, University of Dundee, Scotland, United Kingdom
Joe McLuckie, University of Dundee, Scotland, United Kingdom

Efforts to enhance learning through peer interaction in an electronic forum are now commonplace. However, facilitation and moderation of such a forum by academic staff can be of limited effectiveness and very time-consuming, but participants should not be expected to develop role clarification and discourse-building skills spontaneously. The skills required by peer learners to effectively manage such distributed discourse for themselves have rarely been clearly identified, and this has hindered learner adaptation. This contribution compares the social, organizational and cognitive characteristics of effective peer learning interactions in face-to-face and online environments (with particular reference to peer tutoring and peer assessment). Consideration of the transferable skills involved in face-to-face and online PAL leads to five core areas for the latter: social/affective, organizational, interactive process management, cognitive interactive and reflective/evaluative. It appears that in online environments, the social/affective and interactive process management areas are particularly important and most at risk of under-emphasis. Specification of and training in these skills is likely to enhance the quality of online discourse and also its inclusiveness. All core areas are then explored at the micro level, with commentary on areas needing particular attention if learner adaptation is to be maximised. The implications for assessment of such online distributed discourse process skills are explored with reference to professional practice and future research. The possibility for assessing such process skills is likely to heighten learner motivation to attend to these desiderata, enhance learner engagement and also yield meta-cognitive benefits. Assessment instruments to measure these skills briefly at the macro level could encompass the five core global areas via quantitative rating. However, more detailed skill specification at the micro level would enable richer qualitative feedback from assessors and might have more powerful formative effects. Although more time-consuming, the latter might actually prove more cost-effective. One such tool is presented.

Collaborative learning: Adaptation of discourse strategies over time
Karin Schweizer, University of Education, Heidelberg, Germany
Manuela Paechter, Karl-Franzens-University, Graz, Austria

In an online university seminar in which 96 students learned alone and in groups for a longer period of time, we investigated task-oriented communication and col-

laboration. In the online seminar, groups were to meet several times and to solve tasks together in different communication environments. It was investigated how different types of communication settings such as chats, video conferences, or face-to-face meetings were used by groups of peer learners.

In such environments users adapt their behaviour to the basic conditions in order to achieve their goals. How such an adaptation is done in different communication settings in the context of an e-learning seminar is the main question of this contribution. The adaptation over different points in time is investigated from these points of view:

1. Is there an adaptation in the sense that the groups become more efficient over the course of time?

2. Is there a relationship between the type of task and various computer-based communication settings with regard to group performance?

3. How do groups of learners adapt their discourse strategies over the course of time when solving different types of tasks in different communication settings?

The results showed a relationship between the type of task (no interdependence vs. high degree of interdependence) and the communication settings. Students in synchronous chat groups performed equivalently to videoconference and face-to-face groups except of those tasks requiring a high degree of interdependence. Differences between the settings were also found with regard to the discourse strategies. The discourse in the settings differed strongly with regard to the frequency of contributions and the proportions of contributions. In all settings, however, students adapted their communication behaviour to the requirements of the settings and they developed coordination routines which needed no verbalisation.

Adapting to and from student orientation in guided exploratory learning
Carolyn Penstein Rose, Carnegie Mellon University, Pittsburgh, United States
Violetta Cavalli-Sforza, Carnegie Mellon University, Pittsburgh, United States
Allen Robinson, Carnegie Mellon University, Pittsburgh, United States

In this contribution, we explore the interaction of student goal orientation and dominant tutor style on student learning in an exploratory learning environment. We are conducting our research in the domain of thermodynamics, using simulation software that offers students a rich, exploratory learning environment in which they apply their theoretical thermodynamic knowledge by constructing thermodynamic cycles, performing a wide range of efficiency analyses. Many exploratory learning studies contrasting nonspecific (or learning oriented) goals with specific (or performance oriented) goals have demonstrated an effect on student learning in favor

of learning oriented goals, but few of those studies have included detailed protocol analyses that would illuminate the learning processes of the students, leaving much to speculation. In our study, a human tutor interacting with students over a typed chat interface provides instructional support. We hypothesize that student goal orientation leads students to interact with their tutor in different ways, and specifically that students in a Learning Orientation condition (LO) use their instructional time in ways that are more productive for their learning than those in a Performance Orientation condition (PO). Consistent with prior results, we found a marginal effect on learning gains in favor of the LO condition. Furthermore, our analysis reveals an interesting interaction between student goal orientation and dominant tutor style, suggesting ways in which tutors might more effectively adapt their instructional style to the orientation of their students.

How tutors plan and students learn from adaptive explanations: A think-aloud study in online tutoring
Joerg Wittwer, University of Freiburg, Germany
Matthias Nueckles, University of Freiburg, Germany
Sandra Huebner, University of Freiburg, Germany
Markus Herbert, University of Freiburg, Germany

Web-based online courses are now commonplace in distance education. An important factor that determines their success is the quality of support provided by tutors. When assisting students in achieving a deeper understanding, tutors should adapt their instruction to the individual knowledge of the learner. In computer-mediated tutoring, however, the possibilities to provide adaptive instruction are restricted. Fewer sources of information are available to the tutors they can use for assessing a student's understanding. At the same time, however, tutors have the opportunity to take more time to carefully reflect about the student's knowledge and to plan their explanations accordingly. In order to support online tutoring, a so-called assessment tool was developed that helps tutors diagnose a student's knowledge in computer literacy. The effectiveness of the assessment tool was already successfully demonstrated in previous studies. With the assessment tool, tutors produced more adaptive explanations, which enabled students to acquire substantially more knowledge.
In this contribution, a think-aloud study is presented that was conducted in order to reveal tutors' and students' cognitive processes that underlie the assessment tool effect. It was analyzed how tutors used the knowledge information to construct a mental model of the student's knowledge as a basis for planning their explanations. Moreover, it was investigated how explanations produced with the assessment tool

facilitated students' learning processes. Results showed that tutors with the assessment tool were more often successful in planning explanations that improved students' understanding. In particular, students had fewer problems to comprehend tutors' explanations, as indicated by a greater number of positive monitoring statements. At the same time, they were able to generate more self-explanations for achieving a deeper understanding. The results indicate that the assessment tool helped tutors develop an accurate model about the students to provide adaptive explanations that fostered a deep understanding in computer literacy.

P 2   27 August 2005   08:30 - 10:30   Room A108

Symposium
Higher Education

RETENTION AND DIVERSITY IN HIGHER EDUCATION

Chair: Regina Mulder, University of Regensburg, Germany
Organiser: Sabine Severiens, Erasmus University Rotterdam, Netherlands
Discussant: Hans Hout, van, University of Amsterdam, Netherlands

This symposium combines four research papers on student retention, access and success in higher education among different groups of students. The papers draw from international research, and national research conducted in Ireland and the Netherlands. The research goals include descriptions of the completion rates among different groups of students (first generation students, and students from cultural minority backgrounds compared to their counterparts), differences among groups and explanations for (non-) completion. The underlying common goal is widening access and supporting student success effectively in diverse groups of students. The first paper draws on international comparative research to explore access and success of under-represented groups. In particular, the meanings and implications of first generation entrants with regards to access to, and success (retention) in, higher education is investigated. The second paper presents the findings of a study of non - completion conducted in Ireland. The aim of this study was to examine patterns of non-completion among first year students at third level and to use the findings as a basis for developing measures to address the problem. The third study by Wolff analyses Dutch national data to describe differences in completion rates of students from minority backgrounds in comparison the their native Dutch counterparts. Besides, a comparative qualitative study is conducted among ethnic minority

persisters and non-persisters to study the underlying reasons for dropout. The fourth paper (Severiens and Wolff) examines explanations for progress and achievement in groups of minority and majority students in more detail.

Retaining First Generation Entrants in Higher Education: An international analysis
Liz Thomas, Higher Education Academy, United Kingdom

Throughout the world countries are struggling to increase equity and diversity in higher education, and widening participation has become of paramount importance to the global development of higher education. This paper draws on international comparative research to explore the access and success of under-represented groups in tertiary education through the lens of first generation entrants. Our research found that parental education is a key factor contributing to the access and success of students, but that insufficient attention is paid to this by national systems and institutional interventions. Analysis of research from ten countries suggested that parental education is more important in determining access to HE than employment or financial status. Although closely linked to social class and not implying an individualistic deficit model, educational background has its own significant dimensions. However, within the HE literature, first generation entry tends to be elided with social class, and it lacks interrogation in its own right. For example, there is little analysis of first generation entry as a factor which cuts across other categories such as minority status and disability, and nothing which takes an international perspective on this issue. This paper demonstrates that when first generation entry is used as a lens it disrupts the taken for granted categories of all the target groups used in widening participation and creates new understandings and more effective approaches to targeting access and supporting student success. The paper therefore provides an innovative perspective on a crucially important but neglected HE concern, contributing to the conceptual and theoretical debate and informing policy and practice.

A Systemic Analysis of Student Retention
Anne Carpenter, Institute of Technology, Ireland

Research on student retention has attempted to identify the factors associated with student non- completion. This paper will present the findings of a research study of non - completion conducted in higher education in Ireland. The aim of the study was to examine patterns of non-completion among first year students at third level

and to use the findings as a basis for developing measures to address the problem. A review of the literature on student non-completion highlights the exploration of factors as primarily located in the individual student and/or in the institution. This study advanced an alternate analysis in terms of exploring student non – completion from the personal, social, family, academic and institutional contexts in which it occurs. The study used a multiple approach combining a records analysis and a survey by postal questionnaire of two populations i.e. the students who completed first year and those who did not. Data from 1, 526 first year students' admission records were combined with the data from the questionnaires to examine a range of variables including student and family characteristics, student's expectations and goals, their experience of teaching, academic support, other services and student life. The findings from the study indicate that not only do personal and institutional factors impact on student non – completion but that the wider family and social contexts also contribute. The paper will also consider the strategies that have been implemented in the Institute of Technology sector in Ireland as a result of the research findings.

(Non-) persistence of ethnic minority students in Dutch higher education
Rick Wolff, Institute for Migration and Ethnic Studies, Netherlands

A body of research on ethnic minority students in Dutch higher education suggests a more problematic position of these students than that of Dutch background students (Boogaard, 1997). Partly, these problems seem to be caused by background characteristics of students such as skill deficiencies (language problems), lack of family (and friends) support and of familiarity with higher education, financial problems and personal circumstances. Also, factors on the institutional or course level are mentioned (cultural distance between faculty/student support staff and ethnic minority students, ethnocentrism). These problems may lead to study delay and even early withdrawal. However, no national data were available to confirm these assumptions. Crul and Wolff (2002) analysed national retention data for the period 1997- 2001. Indeed, it appears that dropout rates of ethnic minority students are higher compared to rates of native Dutch students. However, differences are found between higher professional (vocational) education and (research) universities. Moreover, the group of ethnic minority students appears to be a heterogeneous group. Retention rates differ between and also within ethnic groups. On the other hand, dropout rates are highest among mature students of every ethnic group, including native Dutch students. Wolff and Crul (2003) conducted a comparative qualitative study among ethnic minority persisters and non-persisters to study the reasons of high dropout among ethnic minority students. 22 persisters and 10 non-

persisters were interviewed on their experiences in higher education. Partly both groups encounter(ed) similar (study-)problems. However, persisters seem more capable of dealing with these problems, for exampling by creating a support network of peers, teachers and/or student support staff. This indicates that Tinto's theory of academic and social integration is applicable to ethnic minority students in Dutch higher education. Finally, dropout seems to be caused by an accumulation of factors. Some factors are general while others are minority specific.

Explaining study success of minority and majority students in higher education
Sabine Severiens, Erasmus University Rotterdam, Netherlands
Rick Wolff, Institute for Migration and Ethnic Studies, Netherlands

A recent study of Wolff and Crul (2003) shows higher drop out rates among minority students in higher education compared to their native Dutch counterparts. They also show that departments vary in their drop out rates among minority students. This raises the question why some departments are more successful in retaining minority students compared to others. The paper aims to explain the higher drop out rates among minority students. The central research question is: What are the most important explanations for success in higher education for minority students and for majority students? Method: 512 (135 minority students and 377 majority students) students from three different universities and three different departments completed a questionnaire on background and individual factors, learning environment factors and institutional factors. Study success is indicated by two dependent variables: study progress, and achievement. Results: The present study shows differences in study progress as well as in achievement. Minority students obtain less study credits and achieve less well compared to majority students. Furthermore, the determinants of study success for minority students are different compared to the determinants for majority students. For example, 'teaching for excellence' shows a negative effect on study progress in the group of minority students, and a positive effect in the group of majority students. A second difference is that in a constructivist learning environment minority students perform better compared to minority students in a more traditional environment. For majority students, the effect is opposite: majority students obtain higher results in a more traditional environment. In the paper, the results will be presented and discussed in detail.

Symposium
Teacher Professional Development

VIDEO-BASED REFLECTION ON TEACHING AS AN AID FOR PROFESSIONAL DEVELOPMENT

Chair: Christine Pauli, University of Zurich, Switzerland
Organiser: Christine Pauli, University of Zurich, Insitute of Education,
                Switzerland
                Eckhard Klieme, German Institute for Int. Educational Research,
                Germany
Discussant: Harm H. Tillema, Leiden University, Department of Education,
                Netherlands

This symposium addresses the question of whether and how reflective learning on the part of teachers can be supported with the help of classroom videos.

Recent research on teacher learning has shown that reflection on teaching is crucial for the sustained learning of teachers and consequently for the improvement of the quality of instruction. Teacher education programmes that are not linked with the beliefs and conceptions of the teachers have proved to be largely ineffective. Through reflection on teaching, the largely implicit and consolidated professional knowledge base of teachers is consciously examined and developed. Effective interventions into professional development should therefore create suitable settings for the reflection on teaching and at the same time make available suitable arrangements for the targeted further development of teacher knowledge. It is our assumption that video recordings of teaching have great potential in this respect. Videos of their own teaching and that of others allow teachers to reflect on classroom behaviour without having to respond directly to ongoing processes. Thus, video based teacher training may provide an opportunity for a differentiated and critical perception of teaching events. The confrontation with the teaching of others can, in addition, provide impulses for the broadening of one's own action repertoire. Implemented in groups, videos enable a collaborative reflection on teaching. Through the conceptual exchange among peers, the co-constructive exploration of new concepts and teaching strategies in the sense of situated and inquiry-based learning should be fostered. As yet there are only few empirical analyses on the use and effectiveness of teaching videos in professional development. The symposium

will make a contribution here. Four different projects on video-based teacher learning from Germany, Switzerland and the USA will be presented. With these projects, conditions and effects of video-based reflective learning in teaching development should be discussed.

Do videos really matter? – An experimental study on the use of videos in teacher professional development
Tina Seidel, IPN, University of Kiel, Germany
Manfred Prenzel, IPN, University of Kiel, Germany
Rolf Rimmele, IPN, University of Kiel, Germany
Mareike Kobarg, IPN, University of Kiel, Germany
Katharina Schwindt, IPN, University of Kiel, Germany
Lena Meyer, IPN, University of Kiel, Germany

The computer-based learning environment LUV (Learning from Video Tapes) aimed to investigate the effects of the use of different video material and instructional aids on the improvement of professional perceptions and appraisals of classroom situations. The learning environment was based on a tool box of video material, analyses methods and empirical findings that resulted from the IPN Physics Video Study. Despite the fact that the use of videos has a substantial tradition in teacher training, systematic studies on the effectiveness of videos on teacher professional development are still lacking. Thus, an experimental study was designed in order to investigate (1) teachers' evaluation of contents, usability of the technology and applicability to teaching practices, (2) the quality of how teachers professionally perceive and appraise instructional situations, (3) the role of the video material and instructional aids in the improvement of the teachers' professional perceptions and appraisals. Within an experimental setting, the video material was varied according to the provision of (a) own-video and external-video material (condition 1), and instructional aids were varied according to (b) structured vs. unstructured analysis tasks (condition 2). In order to implement and test the objectives of the study the computer-based learning environment LUV was created. The design of the study included 2 experimental and 1 control group (1: own-video/structured, 2: external-video/structured, 3: control, external-video/unstructured). During and after the experiment, the teachers were asked to evaluate the contents, usability of the technology and applicability to teaching practices. Overall, the evaluation of the learning environment (objective 1) showed positive ratings for all experimental groups. Furthermore, differential effects for the video material chosen (own vs. external-video) were found. The results of the study provide evidence on how to

effectively use videos in teacher professional development and on how to embed video material in long-term teacher training.

Confronting Mathematics Teachers with Videotaped Classroom Situations – Do Teachers' Judgements on Components of Instructional Quality Depend on Individual Professional Knowledge?
Sebastian Kuntze, University of Augsburg, Math.-naturwiss. Fak., Germany
Kristina Reiss, University of Augsburg, Math.-naturwiss. Fak., Germany

In this study, we report on first results of a study with mathematics teachers from Germany and Switzerland who took part in a video-based in-service teacher education program. We wanted to find out whether the interpretation of videotaped classroom situations was influenced by the teachers' professional knowledge and instruction-related beliefs. When confronted with videotaped classroom situations, teachers activate general and situation-specific instruction-related cognitions and beliefs (cf. Shulman, 1986, 1987; Bromme, 1997; Leinhardt & Greeno, 1986; Staub & Stern, 2002). With respect to mathematics, the study focused on the introduction of geometrical proof (e.g., Kuntze & Reiss, 2004). In order to find out about the domains of professional knowledge and the judgements on instructional quality of classroom situations we used questionnaires consisting of multiple-choice and open items. The results show that most of the domains of professional knowledge of the participating teachers correspond to findings in the representative study done by Lipowsky, Thussbas, Klieme, Reusser, & Pauli (2003). This is particularly true for cognitive constructivist or direct-transmission views of teaching and learning. Views seeming to be important for situation-specific beliefs and for the rating of domains of instructional quality in the videotaped classroom situations. For example, teachers observed situations showing patterns of instruction close to the typical German script. The teachers with a strong constructivist orientation judged the interactions in the classroom to contain less cognitively activating situations and less argumentational exchange than did teachers with a low constructivist orientation. The findings indicate that cognitive constructivist or direct-transmission views of teaching and learning might have an impact on situated beliefs of teachers and their interpretation of videotaped classroom situations. For video-based reflections of teaching in teacher learning projects, the results emphasise the importance of finding and defining a way how to look at classroom situations in cooperation with the participating teachers.

Do they really get it? Using video to help teachers identify students' misunderstandings
Karen B. Givvin, LessonLab, United States
Rossella Santagata, LessonLab & UCLA, United States
Nicole Kersting, LessonLab & UCLA, United States

As supported by the papers in this session, video can be a powerful aid in supporting teachers' reflections on practice. We suggest that video can be used to assess the attainment of classroom learning goals as measured by students' verbal responses and written work. Other research has shown that when asked to consider lesson effectiveness, teachers focus largely on teacher-, rather than student behavior (Morris, 2004). We are in the midst of a two-year professional development (PD) program conducted with sixth-grade mathematics teachers in Los Angeles. For six days a year, teachers analyze subject matter content and analyze a related classroom lesson. In examining student learning, we ask teachers view a lesson and answer three questions: (1) Did the lesson meet its stated learning goals? (2) Does the student work from the lesson suggest that the students reached the learning goals? and (3) What evidence of students' understanding do you see in the video? With regard to the first question, the majority of teachers expressed no doubt that the learning goals were met for all students. Many of their forms of proof however, were expressed in terms of what the teacher did, rather than in how students responded (e.g., The teacher showed… The students are introduced to… The teacher made…). When pressed to examine student work (in questions 2 and 3), less than a quarter of teachers claimed that all students reached the learning goals fully. This suggests that most teachers are able to see gaps in student understanding, but don't naturally rely on this information to make a judgment about the effectiveness of a lesson. The goal of our PD program is to increase student learning and we believe that increasing teachers' focus on student work is a necessary step toward that end.

Teacher learning using web-based classroom videos
Kathrin Krammer, University of Zurich, Institute of Education, Switzerland
Nadja Ratzka, German Institute for Int. Educational Research, Germany
Eckhard Klieme, German Institute for Int. Educational Research, Germany
Frank Lipowsky, German Institute for Int. Educational Research, Germany
Kurt Reusser, University of Zurich, Institute of Education, Switzerland
Christine Pauli, University of Zurich, Institute of Education, Switzerland

Stimulated by new technological possibilities as well as by video-based instruction-

al research, the use of classroom videos in teacher education is currently receiving a great deal of attention. From the perspective of the psychology of learning the use of classroom videos is of great importance for the construction and the extension of job-related knowledge and action. In spite of the great attractiveness of videos for teacher education, there are, as yet only few empirical findings on the effectiveness of its use. To examine the effectiveness and conditions of learning with classroom videos we are carrying out a yearlong bi-national in-service teacher education programme and accompanying it from a scientific perspective. In online and face-to-face phases (blended learning), 25 teachers from Germany and Switzerland are examining videos of their own and others' teaching. In groups spanning across the two countries they are able to analyse and discuss the videotaped lessons with respect to the cognitive activation of the learners in the mathematics instruction and develop measures for the improvement of their own teaching. Through a pre- and post-survey, the evaluation aims on the one hand to gain information about the effectiveness of the training with regard to the subject-didactical gain in knowledge and the differentiated teaching observation. On the other hand the goal is to obtain information regarding the processes within the online phases from the internal perspective of the teachers. For this purpose, the teachers fill in an online questionnaire with open and closed questions in which they assess the construction and contents of the training, their collaboration, their own individual learning activities and their gain in knowledge. In the presentation, results from the online questionnaire are presented. Based on the results, conclusions on the use of videos in teacher education will be drawn.

P 4   27 August 2005   08:30 - 10:30   Room A111

Symposium
Development of Expertise in Specific Domains

CHILDREN'S AND LAY ADULTS' UNDERSTANDINGS OF ILLNESS: IMPLICATIONS FOR HEALTH EDUCATION

Chair: Gregg Solomon, National Science Foundation, United States
                Giyoo Hatano, University of the Air, Japan
Organiser: Gregg Solomon, National Science Foundation, United States

In this symposium, five speakers and a discussant, from the perspectives of five different countries and four different scientific disciplines, will present findings and

discuss issues concerning how it is that children and lay adults understand illness. Not only does this symposium engage central debates about the nature of cognitive development, but it also has direct implications for a range of issues in health education. Educational programs are built, whether implicitly or explicitly, on assumptions about the nature of learning: what students know initially; what they are capable of learning; how their initial knowledge frames new knowledge; what the target knowledge is; and, of course, how best to get students' understandings from the initial to the target state. Yet, it is a truism across the sciences that the findings and interpretations of one field are often understood in outdated fashion in allied disciplines. Indeed, there has been a radical change in the field of conceptual development such that even young children are said to be able to engage in real scientific thinking about the biological world, they possess na?ve theories, as it were. This change is little reflected in most public health initiatives. The five papers presented here share a recognition of children's theoretical ability, but each comes at the issue of biological reasoning about illness from a different perspective and in a different cultural context, characterizing the nature of that underlying reasoning differently. The discussant, a leading figure in the field of Behavioral Medicine, will comment on the papers from the perspective of one who translates laboratory research into field trials and on to actual public health interventions.

Mind-Body Interdependence in Illness Causality
Kayoko Inagaki, Chiba University, Japan
Giyoo Hatano, University of the Air, Japan

Two experiments were undertaken to investigate whether young children consider susceptibility or resistance, which varies depending on daily activities (e.g., how balanced persons' diet is), to be a critical factor in whether one is taken ill. In Experiment 1 sixty kindergarten children aged 4-6 years were presented with two protagonists, who were allegedly different in terms of the biological-physical (e.g., imbalanced diet) or psycho-social or moral factors (e.g., telling a lie) in their daily activities, and asked which of the two was more likely to catch common cold. Most of them recognized that physical aspects of daily activities would affect one's susceptibility to illness, but at the same time they believed that psycho-social factors also contributed. Thus, Experiment 2 examined whether children would differentially apply physical factors to illness and moral factors to social phenomena (i.e., being invited to a party). Forty children aged 4 and 5 years were presented with a pair of hypothetical children, one who engaged in biologically good activities (e.g., eats a lot of vegetables) but behaved badly (often tells a lie) and the other

who engaged in biologically bad activities (eats few vegetables) but behaved well (doesn't lie) and asked which was more likely to catch cold or be invited to a classmate's birthday party. The 5-year-olds made biological-cue dominant responses (i.e., making a choice relying on the biological condition more than the moral one) more often than social-cue dominant responses (i.e., making a choice relying less on the biological condition than the moral one) for the cold questions, and social-cue dominant responses more often than biological-cue dominant responses for the party questions. In contrast, the 4-year-olds showed as many social-cue dominant responses as biological-cue dominant responses for the cold questions, although they made social-cue dominant responses more often for the party questions.

Children's, young adults' and elderly adults' understanding of illness causality in China
Liqi Zhu, Chinese Academy of Sciences, China, Peoples Republic of
Giyoo Hatano, University of the Air, Japan

This study investigated Chinese Children's, young adults' and elderly adults' understanding of illness causality. There were 30 participants in each of the following groups: 3-year-olds, 4-year-olds, 5-year-olds, college students and elderly people. Children were interviewed individually, adults wrote their answers by themselves. Two questions were asked: What may cause illness? and What can prevent illness?. Participants' responses to the causality question were coded into one of 6 coding categories: (1) Psychogenic, meaning they said that emotion might lead to illness; (2) Biological, meaning they talked about biological phenomena, mechanisms or functions; (3) Behavioral, meaning they mentioned not following a common behavioral rule as the cause of disease, such as not washing hands before eating; (4) Symptomatic, meaning they used symptoms to explain the cause of illness; (5) Environmental factors, meaning that they mentioned pollution or poison; (6) Other, meaning they gave no explanation at all or gave irrelevant explanations such as because the head is black. Results on the cause of illness question showed that children did not offer intentional or immanent justice explanations, but mainly gave behavioral explanations without moral implications. Young adults offered psychogenic and biological explanations more frequently than did children and elderly adults. Elderly adults paid almost equal attention to psychogenic, biological, behavioral, and environmental explanations for the cause of illness. Results on the prevention question showed that children most frequently mentioned concrete behavioral rules such as not eating dirty things, not eating cold food, not drinking cold water. Young adults most frequently mentioned regular life style, such as having a regular time to

work and a regular time to relax. Elderly people most frequently mentioned physical exercise, though they also thought proper food and nutrition might prevent illness. The paper discusses the reasons underlying these age differences.

Understanding Illness: Contagion and Immanent Justice in a Rural Indian Tribal Community
Peggy Froerer, Brunel University, United Kingdom

This paper is based on long term anthropological fieldwork in a rural Indian tribal community. In this community, adults routinely articulate the distinction between 'natural' and 'supernatural' illnesses. This paper first examines whether contagion and immanent justice are construed by adults as the mechanisms that differentiate between these two types of illness. It then examines how children construe the differences between them. Studies were carried out with a total of 137 participants (32 children aged 5-8, 29 children aged 8.5-10, 28 children aged 10.5-13, 24 adolescents aged 14-19, and 24 adults aged 20-65). Participants were presented with six vignettes involving two characters who have close physical contact. One of the characters becomes ill due to supernatural causes (ghost/deity), natural/contagious causes (rash/cough), and natural/non-contagious causes (poison/ bee sting). Participants were asked whether the second character would also become ill, and why. Results indicated that adults reason in terms of contagion with respect to natural illnesses, and in terms of immanent justice with respect to supernatural illnesses. Children, by contrast, use immanent justice to explain supernatural illnesses, but do not consistently reason in terms of contagion with respect to natural ones. They either deny that natural illnesses are transmitted through physical contact, or they explain such transmission through a variety of mechanisms (e.g., immanent justice, sympathetic association). It is only at around age 14 that children begin to differentiate between the mechanism of contagion for natural illnesses and the mechanism of immanent justice for supernatural ones. The paper places these findings in context of the wider ethnographic setting and situates the discussion in terms of the broader anthropological literature about illness and the psychological literature on contagion and immanent justice.

Folkbiology, Religion, and Immanent Justice explanations of illness in the US
Gregg Solomon, National Science Foundation, United States
Sarahn Wheeler, Harvard University, United States

Two studies explored the hypothesis that immanent justice, the notion that good

things happen to good people and bad things happen to bad people, might serve as a default form of reasoning for those children who have yet to construct biological understandings of illness. In Study 1, kindergartners (5- and 6-year-olds) and adults in the US took part in structured interviews investigating their reasoning about two biologically plausible causes of cancer: heritability and contagion. Results show that a minority of kindergartners demonstrated an understanding of biological inheritance. They were at chance in their judgments of whether the likelihood that a person would develop colds, cancer, or a scrapped knee was tied whether one's birth parents did. Most kindergartners knew the fact of contagion, but only in fairly shallow ways, judging scrapped knees or sunburns to be contagious. Consistent with the overall hypothesis, children were overwhelmingly more likely to give immanent justice explanations of cancer if they lacked general knowledge of the disease and if they did not show an adult-like biological understanding either of contagion or of heritability. Study 2 is exploring the relation of teleology and religiosity to immanent justice reasoning. Preliminary results indicate that in children the tendency to give immanent justice explanations is associated with the salience of teleological reasoning, but not with religiosity. Among adults, it is associated with religiosity and teleological reasoning, but such adults also give coherent biological explanations as well. These findings are discussed in light of recent work in cognitive development and anthropology on multiple levels of causality.

Folkbiology Meets Microbiology: A study of conceptual and behavioral change
Terry Kit-fong Au, University of Hong Kong, Hong Kong

Common childhood illnesses such as colds/flu offer a valuable context to explore Children's intuitive theories—in this case, folkbiology—and how such folk theories may affect behaviors (e.g., colds/flu prevention). Health education offers a vehicle to introduce the biomedical view that may challenge Children's folk beliefs about illness and health. It allows us to explore what happens when folkbiology meets microbiology, and what kinds of conceptual and behavioral change might emerge from health education. This investigation can have important applied as well as theoretical implications. Because of the real and perceived risks of misdiagnosing colds/flu as SARS, effective colds/flu prevention becomes more important than ever. Study 1 aimed at characterizing pre-existing beliefs about colds/flu causation/prevention in Chinese school-age children and older adults (as apprentices and experts, respectively, of folk beliefs in their culture) in Hong Kong, China. We interviewed 64 Chinese older adults (ages 60 to 92 years) and 40 8- to 9-year-olds individually about the causes and preventive measures of colds/flu. Study 2 con-

trasted a prevalent approach to health education, namely the Dos and Don'ts approach (e.g., Wash hands often; Don't touch your eyes), with a new approach—the Think Biology approach—to health education. Two 4th grade classrooms in Hong Kong were randomly assigned one each to these two approaches for their colds/flu education program. In Study 1, Cultural Consensus Model analyses uncovered robust folk beliefs about colds/flu causation and prevention among children as well as older adults. Nonetheless, in Study 2, the Think Biology approach outperformed the Dos and Don'ts approach in effecting both conceptual and behavioral changes that should help colds/flu prevention. Discussion on conceptual change will focus on the relation between folk beliefs and biomedical beliefs.

P 5   27 August 2005   08:30 - 10:30   Room E103

Symposium
Self regulation

ANALYZING (SELF-)MONITORING IN COMPUTER ASSISTED LEARNING

Chair: Joerg Zumbach, University of Heidelberg, Germany
                Maria Bannert, University of Chemnitz, Germany
Organiser: Joerg Zumbach, University of Heidelberg, Germany
                Maria Bannert, University of Chemnitz, Germany
Discussant: Peter Reimann, University of Sydney, Australia

Recent empirical research has emphasized the role of cognitive as well as metacognitive strategies in computer-assisted learning (CAL). Findings indicate that particularly the ability of (self-)monitoring is a major moderating variable in self-directed learning with technology. There still is a need for development and application of methods to analyze and improve monitoring in individual as well as collaborative CAL. This symposium addresses methods for analysis and enhancement of monitoring in individual and collaborative CAL showing foundational similarities as well as diversities in application. Two papers in this symposium contribute to the analysis and the fostering of individual CAL focussing on metacognition. The paper provided by Stahl et al. addresses the influence of epistemological beliefs on metacognitive calibration during hypermedia learning. In their studies, they examine the effect of different epistemological instructions and beliefs on metacognitive calibration and learning outcomes.

The contribution of Bannert and Heiss addresses the influence of metacognitive prompting on hypermedia learning. The authors found an effect of their prompting strategy on measures of transfer compared to a control group. Furthermore, they were able to show that self-perception of metacognitive activities and objective use of such strategies can differ largely. Leaving the individual level of CAL, three contributions are concerned with analysis and enhancement of collaborative learning. Johnson et al. present a methodology for analyzing and improving mental models. Their qualitative methodology aims at measuring and improving team-shared understanding a group's own processes and outcomes. Kirschner et al. present a scaffolding approach for coercing shared knowledge in computer-supported collaborative learning (CSCL). Their findings indicate benefits of fostering grounding by means of coercing negotiation. Zumbach et al. provide a methodology for monitoring collaborative behaviour. Events of collaboration are synchronously analyzed during CSCL and mirrored to collaborators. Results show benefits of this approach regarding to cooperative behaviour, and cognitive outcomes.

Effects of epistemological beliefs and task difficulty on processes of metacognitive calibration
Elmar Stahl, University of Muenster, Germany
Rainer Bromme, University of Muenster, Germany
Stepahnie Pieschl, University of Muenster, Germany

We present the theoretical background and first data of a comprehensive study on the impact of epistemological beliefs on self regulation during learning. There is growing empirical evidence that epistemological beliefs, i.e. learners' beliefs on the nature of knowledge and knowing affect their learning strategies and outcomes. Nevertheless it is still an open question how students' epistemological beliefs might affect their learning processes in detail. Starting from the COPES-model (Winne & Hadwin, 1998) we examine whether epistemological beliefs affect processes of metacognitive calibration, i.e. if they determine how flexible students' are able to adapt their learning processes to learning tasks with different levels of complexity. We run a series of three experiments. In all experiments students either plan or perform the learning tasks within a hypermedia information system about the topic 'genetic fingerprint'. In each experiment an experimental group reads an introduction that communicates an appropriate epistemological view about the topic. The control group reads an introduction without references to epistemological issues. We examine the effects of the instructions and of students preexisting epistemological beliefs on their learning process and on their learning outcomes. In the first

experiment we focus on students' planning activities. They receive a list with tasks of different complexity. For each task they complete a series of questions about their interpretation of the tasks, their goal setting and have to judge how useful certain learning strategies might be to complete each task. We assume that students with more sophisticated beliefs are better able to judge and adapt to the different affordances of the tasks. The results give an insight if epistemological beliefs affect planning activities even before the learning process starts. Results of the studies will be used to design interventions on basis of epistemological beliefs that might maintain appropriate metacognitive calibrations of students.

Effects of Reflection Prompts when Learning with Hypermedia
Maria Bannert, University of Chemnitz, Germany
Andrea Heiss, University of Koblenz-Landau, Germany

Recent research in the field of hypermedia-learning points out the crucial role of learners' strategic and metacognitive behaviour. Thus, successful hypermedia learning is not a matter of trial and error but rather a set and specific sequence of meta-cognitive activities which has to be performed and constantly monitored. Research reveals that many learners have difficulties in performing these metacognitive activities spontaneously which most probably results in lower learning outcomes. So, the key issue of the study is to develop effective metacognitive instructions. One promising instructional support seems to be the use of reflection prompts since they should focus learner's attention on their own thoughts and on understanding the activities they are engaged in during the course of learning. Hence it is assumed that prompting students to reflect upon their own way of learning will allow them to activate their repertoire of metacognitive knowledge and skills which will further enhance hypermedia learning and transfer. This assumption was tested by means of an experiment in which students of the experimental group were prompted at each navigation step in the hypermedia system to say the reasons why they chose this specific information node out loud whereas the students of the control group learned without reflection prompting. 46 university students were participating, counterbal-anced according to their prior knowledge, metacognitive knowledge and skills, and intelligence. The students' task was to learn the concepts of operant conditioning within 35 minutes. Students were completely free in navigation. Students' learning sessions were videotaped. Immediately afterwards learning outcome and transfer were obtained. As expected students learning with reflection prompts showed better transfer performance compared to the control group. However, prompting for re-flection did not increase metacognitive and strategic behaviour during hypermedia

learning. Thus, subjective ratings have to be supplementend by on-line methods in further research.

Measuring Team Shared Knowledge Using Analysis-Constructed Shared Mental Models Methods: Using Concept Maps for the Measurement of Shared Understanding in Teams
Tristan Johnson, Florida State University, United States
Debra O'Connor, Florida State University, United States
Miyoung Lee, Florida State University, United States
Mohammed Khalil, Florida State University, United States

Teams have become a critical and functional part of society, especially when dealing with difficult, complex, or ill-structured situations, problems, and tasks not easily addressed by a single individual (Cooke, Salas, Kiekel, & Bell, 2004). The benefit of using teams is that each team member contributes to overall team performance through their individual knowledge, background, skills, and particular roles/responsibilities for the specific team task. Although difficult to define in exact terms (McIntyre & Salas, 1995), successful team performance is characterized by cooperative collaboration rather than individual achievement. Collective cognitive properties and processes of a team have the potential to be more than just the sum of the individual properties and processes (Hinsz, Tindale, & Vollrath, 1997). To successfully work together, teams must perceive, encode, store, and retrieve information in similar ways. Shared mental model (SMM) research (Stout, Cannon-Bowers, & Salas, 1996) has shown a relationship among SMM, team processes, and team outcomes. The quality of team output depends on the nature of the team's shared mental model (Orasanu & Salas, 1993). Previous studies have focused on effectiveness of team performance but have ignored the task processes. There is little data to explicate the mechanism of how individual mental models get shared and improved (Kraiger & Wenzel, 1997). This contribution presents a qualitative methodology (analysis-constructed shared mental models—AC-SMM) that is used to measure and analyze team-shared understanding. The methodology focuses on measuring shared understanding as well as the change in shared understanding in slow-paced non-emergency decision-making teams. Resulting AC-SMMs were compared to determine the change in team mental model as a result of the team task process. The results from a study will present SMM measurements and the change of SMM during team activities.

Coercing Shared Knowledge in Collaborative Learning Environments
Paul Kirschner, Open University of the Netherlands, Netherlands
Pieter J. Beers, Open University of the Netherlands, Netherlands
 Henny P.A. Boshuizen, Open University of the Netherlands, Netherlands
Wim H. Gijselaers, Maastricht University, Netherlands

Multidisciplinary teams are used in industry, government and education for solving complex problems because they are their use allows for bringing different perspectives to bear on a problem. This, in turn, is expected to allow for rich problem analyses and solutions. Courtney (2001), for example, argues that organizations need to integrate different perspectives to ensure organizational sustainability, Hasan and Gould (2001) showed that ignoring certain perspectives could lead to unexpected adverse effects of the ultimate problem solution, and Vennix (1996) notes that, differences of viewpoint can be very productive (p. 1). However, multidisciplinarity does not always prove advantageous. Good team solutions require team members possessing a good degree of common ground. To address this, many researchers have chosen to implement ICT-tools that make use of formalisms or constraints to structure conversation and discourse among collaborators with the aim of guiding the exchange of knowledge and information. Such tools have attained good results on cognitive aspects of group learning by focusing on task aspects. However, they have not explicitly addressed the problem of common ground.

This contribution reports on the use of NegotiationTool (NTool) which, when implemented in a distributed team environment, coerces its users into exploring each other's perspectives to augment the negotiation of common ground. It aims at determining an optimal level of coercion to increase impact (high coercion) while keeping collaboration 'natural' (low coercion) since low levels of coercion are often only minimally effective, whereas high levels of coercion can disrupt collaboration so as to hamper collaboration. Three versions of the tool, differing in the extent to which users were coerced to adhere to embedded support principles were used. Coercion, as expected, was correlated with negotiation of common ground. The more coercion used, the more participants negotiated the meaning of contributions, and the more common ground they achieved.

Monitoring students' collaboration in computer-mediated collaborative problem-solving: An applied feedback approach

Joerg Zumbach, University of Heidelberg, Germany
Peter Reimann, University of Sydney, Australia
Jochen Schoenemann, University of Heidelberg, Germany

We describe here a methodology for combining design- and management-based scaffolding techniques for enhancing cooperative behavior. In particular, two mechanisms for fostering collaborative behavior are compared: a feedback-mechanism to scaffold collaborative behavior and the use of distributed learning resources. Based on recent research on what constitutes effective collaboration behavior, we developed a coding scheme to identify those parts of learner-learner interactions that can be considered collaborations. In a collaboration environment for learner dyads specifically implemented to test our hypotheses, a human observer identified, in parallel with students' interactions, instances of real collaboration and gave online feedback. We used this management-based scaffolding in order to generate and increase learners' monitoring of cooperative behavior while solving an ill-structured problem. We also varied the resources available to the partners in order to foster collaboration among learners, a design-based scaffold. The influence of these interventions on outcomes related to knowledge acquisition, problem-solving, group climate and collaborative behavior was tested. Results suggest slight advantages of the design-based scaffolding, but rather benefits of the interaction-based scaffolding by providing a feedback approach. The interventions led to an increased number of collaborative interactions with the highest amount of collaborative events in condition with distributed resources and collaboration feedback. Furthermore, increased collaboration awareness improved group climate. Participants in groups with collaboration feedback also produced significantly better problem solutions than those in groups without feedback. Taken together, results suggest that by distributing learning material, collaboration can be positively influenced but this will have no substantial effect on cognitive outcomes or group climate. In addition, monitoring students' interaction behavior and providing feedback on collaboration triggers further collaborative behavior, problem-solving processes as well as group climate.

Symposium
Motivation

CULTURAL PERSPECTIVES ON HELP-SEEKING AND MOTIVATION TO LEARN

Chair: Akane Zusho, Fordham University, United States
Organiser: Akane Zusho, Fordham University, United States
Discussant: Mary Ainley, University of Melbourne, Australia

Researchers within both the fields of education and psychology have increasingly begun to recognize the need to develop theories that not only embrace the complexity and multi-faceted nature of the learning process, but are also culturally grounded and allow for the possibility of examining variation across cultures. The five presentations in this symposium promise to provoke discussion and offer empirical evidence concerning a number of critical issues related to the study of culture and learning. For example, cutting across the presentations is the basic issue of whether our theoretical claims about learning (i.e., help-seeking) and motivation (i.e., achievement goal theory) are universal or specific to Western populations. Also being considered in this symposium is the central issue of how culture should be operationalized in psychological studies.

In short, this symposium brings together prominent researchers and programs of research from around the world to showcase their latest work focused on extending our understanding of culture, motivation, and learning. In general, the findings presented here should be of interest to students of cultural psychology, achievement goal theory, and help-seeking.

Intra- and Inter-Cultural Help Seeking in Multicultural College/University Classrooms
Simone Volet, Murdoch University, Australia
Stuart Karabenick, University of Michigan, United States

Help-seeking, in particular instrumental help seeking is widely recognised as an adaptive strategy and an important form of self-regulated learning. It is unique among learning strategies as it is inherently social. As a social-interactive process

help seeking is especially influenced by cultural attitudes and practices. Yet, to date little is known about how culture affects the ways that college and university students seek, and more importantly, avoid seeking help from peers perceived as being different than themselves. In the context of increasingly multicultural classrooms, and simultaneously greater importance given to social learning activities as an integral part of effective instruction, major social challenges have been identified (Volet, 1999a; 1999b; Volet & Ang, 1998). Overall, there is converging evidence in the literature that culture conceptualized in various ways, contributes to explaining variations in students' engagement in social-interactive learning activities. The paper will present findings from a transnational study that examined intra and intercultural help seeking in multicultural college/university classrooms. Overall this research provides evidence that intentions to seek needed help are not necessarily generalizable across culturally disparate sources of assistance but rather are moderated by students' own cultural background in relation to those sources. These findings are important for designing learning environments that are more inclusive of all students, and in the context of international education for promoting opportunities for intercultural learning, especially for students from monocultural, monolingual backgrounds.

Students' school motivation and aspiration over high school years. A cross-cultural study set in Hong Kong
Dennis McInerney, University of Western Sydney, Australia
Alexander Yeung, Hong Kong Institute of Education, Hong Kong

In achievement goal theory, goals are cognitive representations of the purposes students adopt for their learning in achievement situations. Thus, students' achievement goals answer the basic question: Why am I doing this (academic) task? In answering this question, students' achievement goals guide and direct students' cognition, behaviour and affect as they engage in academic tasks. Hence, achievement goals are presumed to be linked to achievement outcomes. Apart from academic achievement, important outcomes as a function of achievement goals may include education and career aspirations. During the years of high school, motivational goals develop together with experiences of success and failure in schoolwork. It is therefore important to examine whether there is a developmental trend in students' goal orientations and whether achievement-related orientations are associated with student aspirations for education and career. In this study, we focus on the academic aspects of goals and examine the differential influences of such goals on outcomes such as education and career aspirations. We also examine the potential trend of students'

development in their goal orientations and aspirations across grades 7, 9, and 11 in a Hong Kong high school. Findings are discussed in the context of the cultural and educational background of Chinese students in Hong Kong.

Asian Indian Hindu Adolescents' Motivational Goals and Experiences of Home/ School Dissonance: The Role of Parental Achievement Goals and Parenting Practices
Revathy Kumar, University of Toledo, United States

Asian Indians often immigrate to the United States to seek a better life, often bringing a cultural identity that means more after leaving India than it did before immigrating. For these immigrants, religion is a key symbol of cultural identity and difference from American society that represents their Indian heritage. Little research exists on the adaptation and achievement of Asian Indians in American schools, and the role of religious institutions in these processes is almost completely neglected. Thus, this study examines the effect of parents' motivational goals and parenting practices on the multiple motivational goals pursued and feelings of home/school dissonance experienced by Asian Indian Hindus (AIH)—an under-studied racial/religious minority group of first- and second-generation immigrant adolescents. This study will contribute significantly to an examination of how adolescents' perceptions of multiple parental motivational goals shape their motivational goals. Results suggest that AIH adolescents associate learning and improvement with higher grades and admission into prestigious colleges. The applicability of achievement goal theory for this immigrant group will also be discussed.

Womb, Language, and Forum: Metaphors of Culture and Motivation to Learn,
Avi Kaplan, Ben Gurion University of the Negev, Israel

Serpell's three metaphors of culture—as a Womb, a Language, and a Forum—represent respectively the roles of circumstances, human-made systems of meanings, and social negotiation, in the construction of shared values, beliefs, and orientations to action. I will employ these complementary and partially overlapping metaphors in order to portray, theoretically and empirically, the relations between cultural processes and students' academic motivation. I will suggest that those perspectives that focus on the comparison of dispositional motivational orientations across groups rely on views of culture either as a Womb that provides the environmental conditions for the development of dispositions, or as a Language that socializes people into adopting certain views of the world and of action. These perspectives highlight

the rather deterministic role of culture in individuals' dispositional motives. An alternative approach to conceptualizing the relations of culture and psychological processes, representing different perspectives in cultural psychology, relies on the Forum as a metaphor for culture, and highlights the dynamic and indeterminate processes of social negotiation by which meanings are constructed. I will argue that this approach is more practical for the field of education as it emphasizes the possible change in cultural meanings of academic engagement, and, moreover, that it can provide guidelines for introducing cultural change that could result in more adaptive motivational orientations among students. I will demonstrate this process through an analysis of structured conversations within two small groups of ethnically diverse college students who engaged in negotiating the meaning of engagement in one particular course.

P 7   27 August 2005   08:30 - 10:30   Room A107

Symposium
Comprehension of Text and Graphics

ASPECTS OF UNDERSTANDING AND USING GRAPHIC REPRESENTA- TIONS OF QUANTITATIVE INFORMATION

Chair: Torgny Ottosson, Kristianstad University, Sweden
Organiser: Lisbeth Aberg-Bengtsson, Gothenburg University, Sweden
              Torgny Ottosson, Kristianstad University, Sweden
Discussant: Roger Saljo, Gothenburg University, Sweden

Graphic representations of quantitative data, such as graphs, charts, and cartograms, although being cultural artifacts of relative late date, are increasing in popularity in modern society. They occur in abundance in students' textbooks, mass media, and web sites in more or less elaborate and gaudy guises, both as illustrations to written text and as sources of information per se. With respect to their frequent occurrence in both everyday and academic contexts, the handling of such graphics must be considered important. Some previous research shows that not only primary school pupils but also much older students sometimes have great difficulties with some essential aspects of statistical graphics. However, presumably due to the fact that many aspects of graphs, charts, and maps are self-evident to many people and that a picture may be worth a thousand words, students' problems in the handling of this type of information are relatively seldom noticed outside maths class. Thus study-

ing students' grappling with graphs, charts, cartograms and similar ways of presenting numeric information is often breaking new ground. The symposium aims at presenting and discussing, from a rather broad point of departure, ongoing research on factors that may be involved in students' making sense of graphic representations. Issues of discussion will also be related to the pedagogical use of such representations, and what it takes to handle information presented graphically, taking into consideration what aspects of the illustrations are used as resources, ignored, or overlooked.

Fostering Cross-Domain Transfer by Means of Linear Graphs
Elsbeth Stern, Max Planck Institute for Human Development, Germany

In formal content domains such as economics or science graphs and diagrams can bridge the gap between everyday knowledge based on verbal description and mathematical formulas which describe central laws of a content area. Moreover, when graphs and diagrams serve as thinking tools, they incorporate a potential for cross-content transfer. While analogous pictures and verbally represented information often only focus on specific aspects of the problem situation, diagrams and graphs are more broadly applicable and therefore may be used as tools for knowledge transfer. Based on this theoretical background one can conclude that analogical reasoning will be supported if the parallels between two domains are highlighted by graphs and diagrams. To test this claim, a study with 58 10th graders was run. In two independent groups transfer effects of learning with and without graphs was investigated. The source domain was the biological equilibrium: With the help of a computer animation of a pond with herrings and sharks, students were shown that even if the population of both species varies considerably in the short term, the number of herrings and sharks remains constant in the long run. For half of the students, a graph was added to the computer animation, demonstrating that the increase and decrease of the number of herrings and sharks followed the same sequence, only with a time lag. The other group only worked with the computer animation. The dependant variable was the achievement in an economics test (transfer test) addressing equilibrium price. Students had to understand that average price may remain constant even if supply and demand vary continuously. Results suggest that the participants who had acquired knowledge on the biological equilibrium with the help of graphs performed better in the economics test than those in the without-graph-condition. The findings clearly highlight the transfer potential of graphs.

New Computer-Based Representations Can Facilitate Problem Solving with Real-

istic Multivariate Data

Jim Ridgway, University of Durham, United Kingdom
Sean McCusker, University of Durham, United Kingdom

Students need to be able to work with and understand multivariate data. This paper begins with a review of the content of statistical education in the UK, and concludes that it is woefully inadequate for effective citizenship, or indeed for the understanding of non-trivial relationships in any curriculum subject. We report on data from the World Class Tests (WCT) designed to assess problem solving in science, mathematics and technology, via the computer. Here, several 15 minute tasks were designed which require students to explore multivariate data, and draw conclusions. We present 4 tasks, to illustrate the range of novel interfaces used. For each, we offer an analysis of the cognitive demands of the task, and show performance data on different task components. Students were often able to work effectively with 3 or more non-linearly related variables at age 9 and 13. In the UK curriculum, consideration of multiple variables would not be part of their experience until much later in some curriculum subjects, and never in statistics. We discuss the theoretical and practical implications, in terms both of the features of computer interface design that lead to enhanced student performance, and in terms of the implications for curriculum planning, in the context of radical curriculum reviews that are taking place, worldwide. As increased use is made of computers to create powerful learning environments, we need an extensive programme of research to explore and promote the effective use of multivariate data.

Students' Ways of Making Sense of Line Graphs and Scatter-plots using Open-ended Questions in a Graphicacy Test

Lisbeth Aberg-Bengtsson, Gothenburg University, Sweden
Torgny Ottosson, Kristianstad University, Sweden

Results presented in this paper are from the second analysis of a research project with the aim of creating a graphicacy test for compulsory school students as well as analysing, illuminating, and describing students' performance on the test from different points of view. Thus, qualitative as well as quantitative approaches were used. An 18 page 70 minutes graphicacy-test was constructed where each page had its own theme and its own graphic display at the top. This illustration was followed by two to eight questions with different formats. An account of a process or an explanation to a pattern was asked for in a small number of more open-ended questions. Data for 363 students, 16 years of age in their last year of compulsory

education, from five different schools in western Sweden were collected for the main study. In the current, second analysis of the data four open-ended questions were scrutinized and categorized in a qualitative analysis. For each of the four questions a number of different ways of referring to the graphics were identified and ordered into an outcome space very much in line with methods used in the so-called phenomenographic approach. The categories in the outcome spaces (which may be looked upon as possible ways of perceiving the graphics), the outcome spaces per se, and some cases of iconic interpretations will be presented and discussed in detail.

Theoretical Constructs and Concrete Work: Making Mechanics Visible in a Physics Lab
Oskar Lindwall, Gothenburg University, Sweden
Gustav Lymer, Gothenburg University, Sweden

In the paper we will discuss two students and a teacher's struggle with a messy graph and this graph's status as representing the relation between force and acceleration (as stated in Newton's second law). To phrase it somewhat differently, we will investigate the relation between concrete details of practice and transcendental subject matter. The students and the teacher take part in a lab session where they have used a certain laboratory set up, called probeware, to create a graph that is displayed on a computer screen. The use of probeware has received some attention in the science education community due to the stably positive results it has produced on different types of quantitative measures of conceptual understanding. This study, however, will not in an explicit way address the quantitative results or the technology. Instead, we will focus on how the teacher instructs the students by making visible the connection between the graph and Newtonian mechanics. We use interaction analysis, inspired by ethnomethodology and conversation analysis (CA), to document how the teacher deals with the problematic relation between the terminology of mechanics, on the one hand, and the material domains for their application, on the other. In making the students accountable for a competent seeing – a seeing expected of anyone knowledgeable in classical mechanics – the teacher installs a set of methods and practices. We describe these methods and discuss them in terms of how they make visible the competences needed to see a dependency in a messy graph. Coming to see a dependency in a graph is shown here as a work towards a whole – or a gestalt – of practice and reasoning, in which the material domain of scrutiny takes on a character of being seen in terms of the discursive practices of the discipline.

Symposium
Reasoning

SCIENTIFIC REASONING IN CHILDREN AND ADULTS – DEVELOP-MENTAL FINDINGS AND EDUCATIONAL IMPLICATIONS

Chair: Beate Sodian, University of Munich, Germany
Organiser: Beate Sodian, University of Munich, Germany
                Susanne Koerber, University of Munich, Germany
                Nicos Valanides, University of Cyprus, Cyprus
Discussant: Merry Bullock, American Psychological Association, United States

Scientific reasoning is an important topic in the developmental as well as in the educational literature. Formal aspects (e.g., hypothesis-evidence differentiation) and conceptual development in content domains (e.g., intuitive physics) are often studied separately. In the present symposium, we attempt to integrate findings from different research areas, with an emphasis on development from kindergarten age to adulthood. The development of the ability to coordinate theories and evidence is a central issue addressed in the papers of the symposium: Preschoolers' ability to interpret covariation data, primary school students' self-directed experimentation skills, and adults' (teacher students') evidence-based argumentation are examples for novel approaches to identifying competencies and shortcomings in laypersons' scientific thinking. Another important issue are errors and biases and ways to overcome these biases in development, as well as in educational settings. One example is Children's developing ability to distinguish between extensive and intensive quantities and methods to overcome their extensivity bias, another example is developmental change in the spontaneous use of a control-of-variables strategy. Finally, longitudinal data from a study covering a wide age range allow us to address the issue of individual differences and the prediction of scientific reasoning strategies from a variety of measures of cognitive development. Educational implications are addressed in each individual paper, and will be a focus of discussion.

Early competencies in scientific reasoning: Interpreting and using covariation data for forming hypotheses

Susanne Koerber, University of Munich, Germany
Ulrike Nett, University of Munich, Germany
Beate Sodian, University of Munich, Germany
Claudia Thoermer, Universitiy of Munich, Germany

The present studies investigated preschoolers' basic competencies of scientific reasoning, specifically their ability to interpret covaration data and to evaluate and revise prior hypotheses in the light of new evidence. Traditional resesarch suggested that only in elementary school years children begin to interpret patterns of covariation evidence and to understand how they bear on causal hypotheses. By building on a study of Ruffman, Perner, Olson, & Doherty (1993) who found competencies with reduced task demands and a different method already by 5-year-olds, we explored in Study 1 this understanding by directly comparing the different methods and across the preschool period. Moreover, we varied patterns of covariation data (perfect, imperfect and non-covariation) thus providing a more stringent test of Children's understanding of covariation evidence. Our data show that even 4-year-olds performed well when tested with the revision of prior belief method whereas the older children were almost perfect in both methods. We also found an effect of the pattern of covariation, indicating all age groups' good performance in perfect and imperfect covariation, however revealing difficulties in dealing with patterns of non-covariation. Study 2 aimed to tap onto 5-year-olds' difficulties with non-covariation data more thoroughly. We also varied the content such that children could be assumed to have a prior belief about cause-effect relation or not. We found an effect of the pattern of covariation with perfect covariation being interpreted best, replicating our results from Study 1. Additionally the children performed significantly better interpreting evidence in a neutral domain than when children had to revise their prior belief given data displaying counterevidence. This suggests that 5-year-olds do have an understanding of the hypothesis-evidence relation and that they acknowledge the role that evidence plays for forming and adjusting hypotheses, thus contributing to a revision of the image of the scientifically illiterate preschooler.

Sixth-grade students' scientific reasoning abilities
Nicos Valanides, University of Cyprus, Cyprus
Maria Papageorgiou, University of Cyprus, Cyprus

The study investigated primary school students' cognitive abilities and problem-solving strategies as these were exhibited when they attempted to solve a simulated scientific problem in a self-directed experimentation research. More particularly, the study investigated students' abilities to form and test hypotheses and to coordinate their hypotheses with evidence. Individual interviews were conducted with 40 sixth-grade students using a specially designed device. The device consisted of a wooden box with 8 small electric bulbs in a line and 5 switches in another line below the bulbs. The electric lambs and the switches were connected in a hidden circuit inside the box. When students came to the interview sessions they were presented with the device and were asked to form hypotheses about how the circuit worked. Subsequently, they were also asked to carry out experiments using the device in order to prove or disprove their initial hypotheses. They were also asked to proceed in a step-by-step fashion, to think aloud prior and after any experiment with the device and to keep a careful record of their observations. The record of their observations was used as a type of external memory system. The results have been analyzed both qualitatively and quantitatively. Important information about students' problem-solving strategies, cognitive abilities (i.e., control of variables, combinatorial reasoning) and patterns of reasoning has been identified. The results clearly suggest that the existing curricula and the dominant teaching practices are far from achieving the declared objectives of science teaching at the primary school. The findings would also guide further research for identifying patterns of children's cognitive development and design of teaching scenarios conducive to accelerating their cognitive growth and improving their reasoning abilities.

Reducing by adding: Children's learning to distinguish between extensive and intensive quantities.
Friedrich Wilkening, University of Zurich, Switzerland
Priska Schmid Haller, University of Zurich, Switzerland

Children in school age have serious problems in distinguishing between two kinds of quantities:extensive and intensive ones.The fundamental difference between the two becomes evident when mixing two quantities of either kind: For example, when adding 1l of water to 2l, volume being an extensive quantity, the result is the sum, 3l. In contrast, when adding 10° water to 20° water (with same volumes),

temperature being an intensive quantity, the result is not the sum but the average, 15°. Because the intensive quantities included in previous studies were relatively complex, we examined Children's difficulties by presenting the seemingly simplest case: colour intensity – a variable that is directly perceivable. In three experiments with more than 200 children between 6 and 12 years of age, different pairs of glasses with red liquids were presented, varying in colour intensity and/or volume, and for each pair the child had to predict the colour intensity or the volume of the mixture. Whereas no single child had fundamental problems with applying the adding rule for the extensive quantity (volume), the majority of children up to 8 years did not apply the normative averaging rule for the intensive quantity (colour) but instead predicted the mixture to become darker than the darkest of its component. This adding rule, indicating a strong extensitivity bias, was still employed by some of the older children. However, when confronted with their wrong prediction, which was made possible by a chemical trick, the older children recognized their error, while the adding rule proved to remain relatively stable at the younger ages. The best method to bring children to overcome their extensitivity bias turned out to be to complicate the problem – by presenting different volumes, thus requiring averaging with differential weighting. This contraintuitive finding has interesting implications for instruction.

Preservice primary teachers' argumentation: Analysis of a text-based online discourse
Charoula Angeli, University of Cyprus, Cyprus
Nicos Valanides, University of Cyprus, Cyprus

Forty-seven students were enrolled in a science education methods course and participated in 14 whole-class sessions and 14 lab sessions with 15-16 students. They were introduced to use hypothetico-predictive arguments in the context of testing hypotheses. In a lab meeting, students were asked to predict and discuss in teams of 2-3 students what would happen when a cylinder is inverted over a burning candle upright in a pan of water. They were then given the opportunity to repeatedly perform the experiment and report their ideas to the whole group, and be involved in a face-to-face discussion, but without providing them feedback regarding the correctness of their ideas. Students were then instructed to resolve their conflicting ideas through online discussion using the asynchronous discussion feature of WebCT. Students had two weeks to discuss and conduct further experimentation when they felt such a need. The online discussion was restricted to the students of the same laboratory section and was anonymous. After the two-week period, students were

asked to individually form a final answer based on the online discussion and email it to the instructor. Each researcher independently conducted analysis of students' replies and their online discourse and any differences were resolved. Students' alternative hypotheses and their tests provided rich argumentative data supporting or non-supporting each hypothesis. The frequency of sound (evidence-based) arguments was low and differed from one hypothesis to another. The presence of specific persistent alternative conceptions and lack of familiarity with the process of hypothesis testing or luck of the ability to clearly differentiate among hypotheses, predictions, results and conclusions seem to be the main obstacles for sound argumentation. These abilities lie however at the heart of scientific reasoning and consequently the present results send an alarming message.

The development of scientific reasoning from childhood to adulthood. Findings from a longitudinal study.
Beate Sodian, University of Munich, Germany
Merry Bullock, American Psychological Association, United States
Petra Barchfeld, University of Munich, Germany
Claudia Thoermer, University of Munich, Germany
Susanne Koerber, University of Munich, Germany

Research on the development of scientific reasoning has a long tradition in cognitive development. Beginning with Inhelder and Piaget's (1958) work on formal operational thought, numerous studies have documented developmental progress in hypothesis generation and testing, as well as evidence evaluation between about 12 and 16 years. Recently, early competencies have been demonstrated in elementary school children. On the other hand, deficits in evidence evaluation and experiment generation persist into adulthood. Surprisingly, very little longitudinal research has been done on the development of scientific reasoning. In the present paper, we report findings from a long-term longitudinal study (LOGIC, Weinert & Schneider, 1999) in which the development of scientific reasoning skills was studied from the age of 8 years to adulthood in a sample of about N=180 participants. A battery of tasks assessing (a) experiment production and understanding, (b) metatheoretical understanding of science, and (c) reasoning abilities was administered at the age of 8, 9, 10, 11, 12, 17 and 22. Results indicate that a basic understanding of the logic of experimentation develops in childhood. Elementary school children can judge a good experiment even if they do not generate it spontaneously. Consistent with the literature, major developmental progress was found in experiment production between the ages of 12 and 17 years. However, an inspection of individual dif-

ferences showed large variation in the age of acquisition of a control-of-variables strategy, covarying with educational level. Strategy acquisition could be predicted from operational level and metatheoretical understanding even when IQ was partialled out. Metatheoretical understanding of the construction of scientific knowledge developed slowly from childhood to adulthood. Findings indicate that both a metaconceptual understanding of features of experiments, and a metatheoretical understanding of theories or interpretive frameworks contribute to developmental progress in scientific reasoning abilities. Educational implications of these findings are discussed.

P 9   27 August 2005   08:30 - 10:30   Room A109

Symposium
Learning styles

ADAPTIVITY: INTERPRETING TASK APPROACHES IN WEAK AND STRONG LEARNERS IN VARIOUS DOMAINS OF LEARNING

Chair: Gert Rijlaarsdam, University of Amsterdam, Netherlands
Organiser: Gert Rijlaarsdam, University of Amsterdam, Netherlands
                Huub van den Bergh, Utrecht University, Netherlands
                Hein Broekkamp, University of Amsterdam, Netherlands
Discussant: Hein Broekkamp, University of Amsterdam, Netherlands

To discuss four empirical studies, representing various school subjects, different methodologies, about differences weak/strong learners show when within and between task behaviour is compared. Adaptivity is the frame of reference to interpret the results. Current learning theories stress adaptivity to optimize the quality of task execution. The four empirical studies represents four different academic domains: reading literary texts, economics, writing in mother tongue (L1) and writing in a foreign language (L2). The papers focus on task behaviour of good and weak learners. Attention will be paid to within and between task adaptations. The multi-method/multi-discipline/domain approach presented, provide details for the conceptual framework of task adaptivity and instructional devices to enhance task adaptivity. Insight in how weak and strong learners differ in within and between task approaches and instructional devices how to stimulate relevant adaptive learning behaviour.

Adaptivity of writing language and task
Eva Lindgren, Umea University, Sweden
Kirk Sullivan, Umea University, Sweden

Writers adapt their writing strategies to the genre (Severinson Eklundh, 1994), the writing medium (van Waes and Schellens, 2003) and to whether they are writing in their first (L1) or not (Silva, 1993; Thorson; 2000). To build a suitable discourse for the task at hand writers use pauses and revisions differently. In foreign language (FL) writing writers generally revise more and pause more frequently than in L1 writing, especially at discursively important locations (Spelman Miller, 2002). An important decision-making point in the writing process is when the system of a language is 'instantiated' as text (Halliday and Mathiesen, 2003: 26). Revisions at this location (pre-contextual revisions) often coincide with pauses, forming revision units. These are indicators of the writer's focus of attention and are useful items for understanding how writers create discourse in real time. In this study young writers' usage of pre-contextual revisions and revision units in different tasks types and languages has been examined. How general linguistic ability, assessed by a pre-test in English and Swedish, affects the level of adaptation to task and language has also been investigated. The writers wrote two task texts in Swedish and English in a computer key-stroke logging environment. The writing sessions were followed by a tape-recorded reflection session; the writers replayed their texts and discussed each texts' evolution. All pre-contextual revisions and revi-sion units were manually defined based the log-files; their function was defined based on post-writing discussions. Results indicate that writers adapt their use of pre-contextual form revision ac-cording to whether they are writing in their L1 or not, and that writers adapt their use of pre-contextual conceptual revision according to both task and whether they are writing in their L1 or not. General Linguistic ability was shown found to impact upon adaptivity.

Differences in adaptivity between good and weak literature readers
Martine Braaksma, University of California, United States
Tanja Janssen, University of Amsterdam, Netherlands
Gert Rijlaarsdam, University of Amsterdam, Netherlands

This study examined how good and weak students of literature interpret short liter-ary stories. We focused on differences in students' cognitive and affective reading activities (e.g., retelling the story, drawing inferences, making associations, eval-uat-ing). In particular, we examined the extent to which good and weak readers

adapt their activities to different parts of the story (differences within stories) and to dif-ferent stories (differences between stories) they were reading. In the study, a so-called 'known groups design' was used. 19 Dutch tenth-grade students from eight classes participated in the study, of whom ten were known to be good students of literature and nine were known as weak literature students. Each student read five short literary stories under think aloud conditions. The stories were presented segment by segment on a computer screen. Nondirective prompts were used to stimulate students to verbalize their thoughts and emotional responses during reading. Students' responses were transcribed, segmented and coded. Analysis of variance was applied to the data to test the differences between good and weak stu-dents. Results indicated that the weaker students had a more stable pattern of respond-ing to the stories than their better peers. The weak students appeared to be less adaptive in their processing activities, both within stories and across different stories. Good students, on the other hand, tended to adapt their processing activities to the story they were reading. Especially the amount of the good students' emotional responses and problem detecting activities tended to change, depending on the story and the part of the story they were reading.

Adaptivity. Transferring writing processes between tasks (in l1) and between languages (from l1 to fl)
Daphne Van Weijen, Utrecht University, Netherlands
Huub van den Bergh, Utrecht University, Netherlands
Gert Rijlaarsdam, University of Amsterdam, Netherlands
Ted Sanders, Utrecht University, Netherlands

This study focuses on how writers approach writing tasks. Earlier research has shown that the temporal distribution of the sub processes of the writing process such as planning, formulating, structuring and revising varies between writers. However this research has restricted itself to L1 and to an analysis of the individual sub proc-esses that are involved. The interaction between these sub processes has not been examined in great detail so far. We have developed and applied a new method of analysis, to compare how writ-ers approach writing tasks both in their mother tongue and in a foreign language (FL). The method involves cutting the writing process (represented by a think-aloud protocol) into blocks, larger units of analysis than have been used in earlier studies. These blocks each contain multiple occurrences of several sub processes. By analyz-ing the dominant processes in each block, we can gain insight into the approach a writer uses when writing in L1 or FL. The data we analyzed were collected from 9 subjects (15 year- olds), who each

wrote four texts, two in their L1 (Dutch) and two in a foreign language (English). This enabled us to compare what they did in L1 and FL, both within and between writers. With this method we attempted to show how writers approach writing tasks in L1 and what their approach predicts for their approach to writing in FL. With this knowledge, we attempt to answer the question of why some writers are able to pro-duce good quality texts in both their L1 and FL, whereas others, who are good writ-ers in L1, produce much poorer texts in FL

Enhancing adaptivity in learning economics. Conceptual learning in relation to near and far transfer in school economics

Lenie Kneppers, University of Amsterdam, Netherlands
Marianne Elshout-Mohr, University of Amsterdam, Netherlands
Bernadette van Hout-Wolters, University of Amsterdam, Netherlands
Gert Rijlaarsdam, University of Amsterdam, Netherlands

One aim of teaching is the development of (domain) concepts. In the school-sub-ject economics most concepts are complex. Even when students have acquired the con-cepts in school, their conceptual framework is far from perfect. We discern two kinds of 'lacks' in the knowledge of concepts: (1) lacks in the concept knowledge as such, and (2) lacks in the use of concepts in a context. Both kinds of lacks results in low transfer-value of the knowledge and hinder students' adaptivity to new tasks. In this study the effects of two instructional interventions, each directed to one of the assumed lacks, are compared.

To reach transfer students have to construct a rich base of domain knowledge. They also should be able to contextualize this domain knowledge. 32 high school students (± 17 years old) in economics participated, randomly as-signed to conditions. Four tests were administered: (1) a pre-test; (2) a concept test, and (3) a context test, which is a 'near transfer test' for one condition and a 'far transfer test' for the other, and (4) an elaboration test, which is a 'far-transfer test' for both conditions. Stu-dents test results were twice scored, each method reflecting one of the two 'lacks'. The main conclusion is that students in one of the conditions have increased their adaptivity. This intervention challenged students to connect concept and context.

Symposium
Learning and Instructional Technology

LEARNING OBJECTS IN THE CLASSROOM: A EUROPEAN PERSPEC-TIVE

Chair: Robert McCormick, Open University, United Kingdom
Organiser: Robert McCormick, Open University, United Kingdom
Discussant: Wouter van Joolingen, University of Amsterdam, Netherlands

Most studies on reusable digital learning materials, Learning Objects (LOs), relate to their use LOs in universities, arguing that LOs can increase the effectiveness of teaching and learning, and the reduce cost and effort of producing superior learning materials. Few empirical studies exist to explore the impact of LOs on pedagogy, especially in schools. This symposium provides evidence from an evaluation of the use of LOs in schools, contrasted with a university setting. The school studies are from a EU-funded project Context e-Learning with Broadband Technologies, involving 500 schools in six countries across Europe, in a pilot to examine the impact of LOs on pedagogy. It brought together producers and users to try out technically and pedagogically sound ways of producing, making available through a portal, and using LOs. This symposium will report data from both quantitative and qualitative studies conducted during 2004, including: online surveys (of all the teachers involved); routine data from the portal; semi-structured interviews in 40 schools in all six countries; 13 classroom observation studies in selected schools in four countries; and three experimental studies in Finland. This evaluation will be contrasted with one involving student-led LOs in a university with an online environment, where the pedagogic and contextual issues are quite different. The discussant will draw out the issues on pedagogic strategies in use of digital learning materials in classrooms and electronic environments.
1. Investigating the useage of LOs in context (Liisa Ilomaki, Minna Lakkala and Sami Paavola, University of Helsinki, Finland)
2. Exploring the basics of electricity – can online electricity simulation enhande learning? (Tomi Jaakkola and Sami Nurmi, University of Turku, Finland)
3. An Evaluation of LOs in use: an overview of the CELEBRATE evaluation findings (Robert McCormick & Nai Li, Open University, UK)
4. LOs in student-led situations (Guus Wijngaards, INHOLLAND, Netherlands)

Investigating the usage of learning objects in context
Liisa Ilomaki, University of Helsinki, Finland
Minna Lakkala, University of Helsinki, Finland
Sami Paavola, University of Helsinki, Finland

The purpose of the study was to investigate the role and characteristics of learning objects (LOs) in pedagogical settings in four Finnish classroom cases. Three of the four participating teachers were accustomed to using ICT in their teaching, and two of them were well above average teachers in their ICT-skills and usage. The pedagogical settings supported student-centredness, process orientation, authentic knowledge and activities, and collaborative inquiry, but also more traditional teacher-centered knowledge acquisition. Through the case studies, it was possible to investigate the use of LOs in authentic teaching and learning sequences. The goals of the study were to 1) examine the interrelatedness of the pedagogical practices and the characteristics of LOs; 2) better understand how LOs can support the development of the learning culture in schools; and 3) produce ideas and recommendations for developing virtual learning materials. The data of the case studies were qualitative, including the participating teachers' 'agendas' before and after the observed lessons, and observation notes and video recordings during the classroom activities. The results indicated that LOs were used as an important part of the teaching and learning sequence in all cases. The teacher's role in organizing, structuring and guiding the process was crucial. Two cases revealed that a well designed LO could be used in various learning settings, especially if the affordances of the LO, support a student-centered exploration, and offer possibilities for a variety of pedagogical activities. One problem in some cases was the narrowness of some LOs, which promoted the usage of fact-oriented knowledge processing tasks. There is apparently a need for more empirical research that could provide teachers models and scenarios for designing the efficient usage of digital learning material in their teaching.

Exploring the basics of electricity – can online electricity simulation enhance learning?
Tomi Jaakkola, University of Turku, Finland
Sami Nurmi, University of Turku, Finland

Electricity is an important and challenging science topic at all school levels. Learners often have many difficulties in learning electricity. Previous attempts to overcome these difficulties have been less effective. This experimental study examined if 1) an online simulation or 2) a simulation-laboratory-combination environment

can enhance elementary school students' understanding of simple DC-circuits compared to 3) a traditional hands-on laboratory environment. As a result, compared to traditional laboratory work, both the simulation and the simulation-laboratory combination environments were statistically more effective in terms of overall pretest–post-test development. More detailed content analysis showed that the both simulation environments helped the students to change their conceptions of current flow from incorrect model to scientifically accepted model, but in the laboratory environment there was no statistically significant change. Between the pre-test and the post-test, only the simulation-laboratory group's comprehension of current division in a DC-circuit advanced statistically significantly from the incorrect model to the correct model. Obtained results indicate that simulation can help students to better understand the theoretical principles of electricity by revealing the behaviour of DC circuit and visualizing the current flow and division in the circuit. Analysis of the videotaped observation data also showed that working with the real circuits was more intentional among the students in the simulation-laboratory environment since, after understanding the basics of electricity on a theoretical level, it was easier for them to transfer acquired knowledge into the hands-on exercises with real circuits. As a consequence this combination method supported the development of more coherent and holistic comprehension of the topic. Thus the combination of laboratory and simulation work can bridge the gap between theory and reality.

An evaluation of los in use: an overview of the celebrate evaluation findings
Robert McCormick, Open University, United Kingdom
Nai Li, Open University, United Kingdom

This paper gives an overview of the findings drawing on all the data collected in the CELEBRATE project evaluation, including questionnaires, interview studies, classroom observations and experimental studies. Some data collected by local pilot coordinators across six countries will also be reported upon. It will look at how teachers used and envisaged the Portal through which they could obtain CELEBRATE Learning Objects (LOs), and their overall views on these LOs. These will be examined in relation to their general views of usefulness of LOs to teaching and learning, and the impact upon the learning process in schools. From this the paper will to draw out some of the issues; e.g. the relationship of pedagogy in within and without LOs; the way characteristics of LO, such as granularity, interoperability, reusability, and inclusion of pedagogy relate to their use. It will also discuss important implications of the results in the CELEBRATE project, particularly for future developments in this area of work. From here the paper moves on to consider

recommendations that arise from both these issues and the discussions, and indeed from other data sources that the paper has examined. A set of recommendations with particular audiences in mind are made for variety ranges of stakeholders. Finally the design of the evaluation framework and instruments are discussed. It then makes some methodological reflections about the evaluation process, for the benefit of those who may undertake such evaluations in the future.

Learning objects in student-led situations
Guus Wijngaards, INHOLLAND, Netherlands

The research project Learning objects in student led situations of the INHOLLAND eLearning Institute focuses on the use and reuse of LOs in learning situations in which the contribution of the student to the learning process is significant. The Institute eLearning (Lectoraat eLearning) is part of the INHOLLAND University for Higher Professional Education. INHOLLAND University for Higher Professional Education is the largest in The Netherlands: 40000 students and 3500 teaching staff, 16 locations all over Holland (e.g. in cities like Rotterdam, Amsterdam, Den Haag, Delft, Haarlem, Alkmaar). This paper will give an account of the phases of this project. In the first phase (October 2004-September 2005) the first step is to compile a list of LO currently in use within INHOLLAND and in the same time to study the already existing theory regarding the use and reuse of LO using this as a basis for analysis of the LOs. The second step is to formulate research questions that would help the organisation in adding value and effectiveness of the application of LO. This will result in: the establishment of an INHOLLAND LO database of analysed LOs; knowledge concerning the preparation of LO; knowledge concerning their reuse. Practical experience in the making of LOs, in situations in which the contribution of the student to the learning process, is a significant factor. The third step will be to organise practical pilots in several of the INHOLLAND Schools, following a simple, but powerful model of a multi-step collaborative learning approach. This research project will clearly describe and analyse the different practical pilots, the different degrees of self steering, the final LOs and their reusability.

Symposium
Motivational, Social and Affective Processes

SUPPORTING CHILDREN'S AUTONOMY: WHAT DOES IT MEAN? HOW CAN WE DO IT IN DIFFERENT CULTURES?

Chair: Avi Assor, Ben Gurion University, Israel
               Hallgeir   Halvari, Buskerud University College, Norway, Norway
Organiser: Avi Assor, Ben Gurion University, Israel
               Johnmarshall Reeve, University of Iowa, United States
Discussant: Avi Assor, Ben Gurion University, Israel

The proposed symposium focuses on three central questions. The first question concerns the nature of the need for autonomy: What do we mean when we talk about students' and children's need for autonomy? How is this need different from other basic needs, as well as from the construct of intrinsic motivation? The various presenters and the discussant would address this issue based on their findings and the theoretical approach in which their research is grounded. The second question focuses on different practices that teachers and parents may use to promote sense of autonomy in students and children. As different presenters would focus on different practices, we would have a chance to examine if there are some practices that are particularly effective in enhancing autonomy, learning and well being. The third question concerns the extent to which various autonomy supportive practices are beneficial and important in different cultures or for members of different social groups. This is a highly controversial issue, given recent critiques that autonomy concerns are much more important in western countries and even there, they are predominant only for middle- or upper- class males. The various presenters would describe findings bearing on this issue that were obtained in different cultures as well as among male and female students. Those findings would allow us to address the question of the universality of the need for autonomy. In addition, we may be able to start identifying aspects of autonomy that are particularly meaningful and important in different cultures.

Promoting Autonomy in the Classroom: A Decade of Learning of How U. S. High-School Teachers Can Promote Students' Autonomy During Instruction
Johnmarshall Reeve, University of Iowa, United States

I frame this presentation by first asking and then offering data-based answers to four fundamental questions underlying teachers' efforts to help promote their students' autonomy in the high-school classroom. The four questions are as follows: What is autonomy support? How can teachers support students' autonomy during classroom instruction—what can they say, what can they do? Why do students benefit when teachers support their autonomy (rather than control their behavior)? Can teachers learn to be more autonomy supportive toward students? Before presenting my data on these questions, I address the conceptual and operational definition of the following three concepts: autonomy, self-concordance, and engagement. In addition, I identify two supplemental questions to stimulate symposium discussion (and further research) on the nature and practice of autonomy support in the schools: Is autonomy support only a Western (U.S.) notion, or is it a more cross-culturally universal aspect of a constructive motivating style? What is the role of teacher-provided structure in the implementation of an autonomy-supportive style during classroom instruction? Overall, the presentation asks conceptual, practical, and fundamental questions and seeks to provide both theorists and practitioners with concrete, yet sophisticated, answers.

Temperament Accommodation as a Fundamental Aspect of the Need for Autonomy: A Cross Cultural Study
Weiguo Pang, East China Normal university, Shanghai,, China, Peoples Republic of
Avi Assor, Ben Gurion University, Israel
Idit Katz, Ben Gurion University, Israel
Shoshana Pariente, Ben Gurion University, Israel
Yaniv Kanat Maymon, Ben Gurion University, Israel

Cross cultural critiques of the notion that autonomy is a universal need treat autonomy as synonymous with behavioral choice. The purpose of this study is to demonstrate the importance of one aspect of the need for autonomy that was hardly examined in empirical research: The striving for temperament Accommodation. We assume that, while choice may not be universally important, temperament accommodation is universally important. The term Temperament Accommodation refers to the striving to act in ways that fit, or at least do not strongly contradict, one's

temperament based dispositions. This notion is rooted in views of autonomy as authenticity, emphasizing autonomy as the realization of integrated inborn dispositions. We hypothesized that students in both hierarchical (China) and egalitarian (Jewish-Israel) societies would report lower intrinsic motivation to participate in temperament-frustrating than in temperament-supporting modes of class work. Participants were 250 Israeli Jewish 10th graders and 390 Chinese 8th graders. Participants completed questionnaires assessing the traits of sociability, activity level, excitement seeking, shyness and impulsivity. Then, in a second session, each participant was assigned to a class whose work mode either supported the temperament disposition she/he was high on, or to a class that frustrated that disposition. Then, students' intrinsic motivation for participating in the class was assessed via a self report questionnaire. Factor analyses yielded the expected five factor temperament structures in both Jewish Israeli and Chinese children. ANOVAs showed that for all five temperament dispositions, and in both countries, students were significantly more intrinsically motivated to participate in a class whose work mode supported their temperament than in a class whose work mode frustrated their temperament. The results support the view that the striving for temperament accommodation is a universal propensity, which even in a hierarchical culture that values studying, cannot be suppressed without significant motivational costs.

Three Instructional Strategies Teachers Can Use to Support Students' Autonomy
Hyungshim Jang, University of Wisconsin-Milwaukee, United States

Asking students to engage themselves in important but uninteresting lessons presents a special challenge for teachers who seek to support their students' autonomy. I introduce my program of research by summarizing a series of three studies. In each study, I tested the viability of a different autonomy-enhancing and engagement-fostering instructional strategy as students try to learn an uninteresting lesson. The three instructional strategies were to (1) offer a rationale to explain why the lesson is worth students' attention and effort; (2) encourage students to set their own learning goals during the lesson; and (3) encourage students to generate an interest-enhancing strategy. In each study, the teacher-provided instructional strategy helped students generate the autonomous motivation they need to engage themselves in the relatively uninteresting endeavor. I began this program of research to help teachers replace their compliance-generating but autonomy-depleting controlling instructional strategies during uninteresting lessons (e.g., directives, assignments, rewards, compliance requests, teacher-assigned goals). Teacher need instructional strategies capable of enhancing students' autonomy, engagement, and learning, and

this is what all three instructional strategies listed above have in common. Because they enhance autonomy, I find that each strategy produces a relatively high-quality learning profile for students, at least relative to students who work on these same uninteresting lessons but without the pre-lesson instructional strategies of teacher-provided rationales, autonomous self-set goals, or interest-enhancing strategies.

A Cross Cultural Study of the Correlates of Conditional Regard in Students
Martin Lynch, University of South Florida, United States

Conditional regard (CR) is the experience that one is worthy of another person's attention and affection only when one is or acts in accordance with the other person's expectations or desires. Previous theory and research suggest that CR is associated with negative affective consequences (Assor, Roth, & Deci, 2004). In addition to its impact upon well-being, however, CR may be associated with other phenomena, including intrapersonal processes such as identity inconsistency, or variation in manifest personality traits across social contexts, and interpersonal processes such as emotional reliance, or the readiness to turn to others to share an emotionally important experience (Miller, 1981; Rogers, 1951). The present study seeks to replicate previous findings on the relation of CR to well-being within three diverse cultural samples (China, Russia, United States), and to extend this work by investigating the relations of CR to both identity inconsistency and emotional reliance. Specifically, the study tests the following hypotheses: (1) the experience of CR in one's relationships (past and present) will be negatively associated with well-being; (2) CR will be positively associated with identity inconsistency across relationships; (3) CR will be negatively associated with emotional reliance within relationships; (4) these relations will not be moderated by cultural self-construals (independence versus interdependence).

Effects of Autonomy Enhancing and Suppressing Teacher Behaviors on Motivation and Achievement of Boys and Girls: A longitudinal Study.
Haya Kaplan, Ben Gurion University, Israel
Guy Roth, Ben Gurion Umiversity, Israel
Karen Tal, Ben Gurion University, Israel

Despite recent advances, there are still a number of gaps in the evidence demonstrating the importance of teachers' support for students' need for autonomy. This study provides data bearing on the following three gaps:
1) The uniqueness issue: Do teacher behaviors that are assumed to support or sup-

press students' need for autonomy have unique effects on students that cannot be fully explained by other need satisfaction experiences? 2) The causality issue: Do autonomy-affecting teacher behaviors have unique effects on students' functioning, which cannot be explained by student's autonomous motivation at the beginning of the school year? 3) The gender issue: Do autonomy-affecting teacher behaviors influence girls and boys in similar ways? Studies have indicated that girls are socialized to respond in a more accommodative way to adults' directives. Therefore, one might claim that autonomy suppression is not so harmful for girls. These questions were examined via a longitudinal design employing four waves of data collection. At the beginning of the school year, 712 Israeli students (grades 5-6 and 10-1) completed questionnaires assessing autonomous motivation for learning. In November, students completed measures assessing autonomy- support and suppression by teacher. In January, students completed measures of perceived academic competence, sense of relatedness, autonomous motivation and positive emotions concerning learning. Later in the year students' grades were obtained. Regression Analyses indicated that autonomy- supporting and suppressing teacher behaviors had unique effects on grades and on autonomous motivation for both boys and girls, and those effects emerged also when perceived competence, relatedness, and autonomous motivation at the beginning of the year were controlled for. The results suggest that the experience of autonomy was as important to girls as it was for boys. This finding is consistent with the view that the need for autonomy is a universal human propensity.

P 12   27 August 2005   08:30 - 10:30   Room A112

Symposium
Comparative Evaluations

MULTIPLE PERSPECTIVES ON PISA (PROGRAMME FOR INTERNATIONAL STUDENT ASSESSMENT)

Chair: Manfred Prenzel, Leibniz-Institute for Science Education (IPN),
                Germany
Organiser: Barbara Drechsel, Leibniz-Institute for Science Education (IPN),
                Germany
                Martin Senkbeil, Institute for Science Education (IPN), Germany
                Timo Ehmke, Institute for Science Education (IPN), Germany
Discussant: Christian Monseur, Facult? de Psychologie et des sciences de l
                Educat, Belgium

The OECD study Programme for International Student Assessment provides an international comparison of the reading, mathematical and scientific literacy of fifteen year old students. The large scale study compares the student competencies and motivational orientations on the background of a variety of social and cultural variables and a number of school system variables. After PISA 2000, PISA 2003 is the second assessment in a 3-year-cycle. The tests are linked by a number of common items and therefore the results between PISA 2000 und 2003 can be compared. PISA provides a rich basis of information about the countries' school systems. In this symposium we want to present PISA results from a number of countries. Each presentation covers the national perspective of one participating country. The structure of each presentation intends to describe important findings for each country, including data on changes and continuities between PISA 2000 and PISA 2003, where possible. The country specific presentations make an attempt to explain the results from a national perspective in three steps: with recourse
(1) to data from the PISA study,
(2) to additional research carried out in the country which is independent of PISA but the results of which can be linked to PISA findings and
(3) to other hypotheses or assumptions which are still to be proved by further research.
These different country specific views provide multi-perspectives on the conditions of changing student competencies within different countries and educational

systems. Please note: The PISA data are under an embargo by the OECD until 7 December 04. Therefore no data or results can be displayed neither in the summaries nor the abstracts.

Changes from PISA 2000 to PISA 2003 from a German perspective
Barbara Drechsel, Institute for Science Education (IPN), Germany
Timo Ehmke, Institute for Science Education (IPN), Germany
Martin Senkbeil, Institute for Science Education (IPN), Germany

The OECD study Programme for International Student Assessment compares the reading, mathematical and scientific literacy of fifteen year old students. In PISA 2003 41 countries (30 OECD-countries and 11 partner countries) took part with a total of about 250000 students participating. In Germany 216 schools with 4660 students were tested. The presentation provides a description of the main international findings of PISA 2003 from a German point of view. The tests in PISA 2000 and PISA 2003 are linked by a number of common items and therefore the perfomance can be compared. The results are presented focusing on differences and continuities between PISA 2000 and PISA 2003 in Germany. It further summarizes important findings from the additional national test and questionnaire components. The disappointing results from PISA 2000 have triggered a considerable discussion in Germany about reasons for Germany's ranking positions in the lower third of the OECD-countries, about ways to improve student achievement, and about the German education system in general. The political authorities have identified a number of measures to improve the situation and many researchers have started or continued their work in the field of educational research. Therefore, in the contribution we report in more detail about the additional research carried out in Germany that is independent of PISA but the results of which can be linked to PISA findings and about other hypotheses or assumptions which have to be proved by further research.

Mathematics and Science in PISA 2003 from a Swedish Perspective
Karl Goran Karlsson, Mid Sweden University, Campus Harnosand, Sweden
Astrid Pettersson, Stockholm Institute of Education, Sweden

This contribution discusses the Swedish results for mathematics and science in PISA 2003. The situation in Sweden is quite interesting since material for three large assessments were collected almost simultaneously. Besides PISA data was collected for TIMSS and for a national assessment (NU 2003). Mathematics and science are studied in all the three investigations. Moreover, the three assessments

were, at least partly, concerned with almost the same age group – 15-year olds and/ or the final grade of compulsory school. Thus, similarities between the different assessments are quite obvious. There are, however, also differences. While PISA aims at assessing mathematical and scientific literacy in a rather wide sense, TIMSS and NU 2003 are more specifically connected to the national curriculum. The time-bases also differ – for PISA it is only three years, while the other assessments were last performed about a decade ago. The three independent assessments give opportunities for comparisons between the results from each of them and for informed discussions about students' abilities with respect to different aspects of content. All the investigations also give the opportunity to discuss results in relation to a number of background factors like gender, socio-economic standard and ethnicity. Since data for both PISA and TIMSS are embargoed until December, only results from NU 2003 can be presented at the time of writing.

Can reading abilities explain differences in math performances and if so, in what ways?
Astrid Roe, University of Oslo, Norway
Karin Taube, Mid Sweden University, Campus Harnosand, Sweden

Mathematical thinking is expressed in words, sentences and symbols where the language often is very precise and where all short words have to be interpreted correctly in order not to distort the meaning. Students who looses small words, transpose words in sentences or have a low ability to decode word correct and efficiently find it hard to understand the logic in texts. Many frequent words in the students? math books might be difficult to understand for a great number of students. Besides problems with mathematical concepts and words, the sentence structure might cause difficulties. The aim of this study is to examine to what extent and in what ways reading abilities may explain differences in math performances. We have used the results from PISA 2003 in reading and mathematics literacy in Norway and Sweden. A correlation between the overall reading score and mathematics score, item by item will indicate to what extent achievement in mathematics is dependent upon reading ability. We have found that the correlation coefficient between the reading score and the score for some mathematics items is close to 0, whereas the correlation with reading is larger than 0,4 for some items. We have also detected that the correlation between mathematics and reading is somewhat bigger for boys than for girls, and also for high achieving students more than for low achieving students. We will do a text linguistic analyse of the mathematics items that either show very low or very high correlation with reading to see whether high or low correlation can

be explained by words, syntax and symbols in the text. The results of our analyses may give useful information to teachers, writers of text books in mathematics and parents.

Mathematical literacy in PISA from the Netherlands' point of view
Monica Wijers, The Freudenthal Institute, Utrecht, Netherlands

In the Netherlands 60% of the students are in pre-vocational education. This is a very differentiated type of education. For most students in pre-vocational education being mathematically literate is more important than mastering formal mathematics. The Pisa 2003 results on mathematical literacy of students in pre-vocational education is the focus of a research project carried out by the Freudenthal Institute together with the Cito-groep. The study aims to provide a better and deeper insight in the mathematical competencies of different groups of students in pre-vocational education, both in relation to other Dutch students as well as in relation to comparable students in neighbouring countries. Findings may also give more insight into the desired course for innovations in pre-vocational education with respect to the mathematics curriculum and to mathematical literacy in relation to the practical vocational subjects. The results of this study, in connection with the overall Dutch Pisa 2003 results on Mathematical literacy, will be presented in this symposium.

| P 13 | 27 August 2005 | 08:30 - 10:30 | Room A110 |

Symposium
Teacher Education

TEACHER EDUCATION AND LEARNING IN THE INFORMATION AGE

Chair: Hans Fischer, University Duisburg-Essen, Germany
Organiser: Paul Conway, National University of Ireland, Cork, Ireland
                    Steve Wheeler, University of Plymouth, United Kingdom
Discussant: Hans Fischer, University Duisburg-Essen, Germany

The Information Age promises to radically change the face of teacher education, and challenge current pedagogical practices. The proliferation of technologies within schools has prompted a re-evaluation of the practices of teaching and learning, and this is reflected in new curricula for initial teacher education and the continuing professional development (CPD) of teachers across all sectors. This symposium fo-

cuses on the use of information and communication technologies (ICTs) in teacher education, and will feature papers that engage with pedagogical, social, psychological and technical issues. Papers may be empirically based, position pieces, or case studies featuring success or failure of learning in the implementation of ICT in a teacher education context. The use of online learning and web based training, mobile and personal technologies, and the use of visual technologies such as video-conferencing may be included. It is anticipated that best practice in the planning, implementation and evaluation of educational ICTs will be shared and discussed. It is anticipated that the papers presented will have points of commonality which will constitute a thematic focus. The general aims of this symposium are:

• to raise awareness and general interest in the use of ICTs in teacher education;

• to provide a forum for the promotion of critical dialogue about contemporary and future use of educational technology in the context of evolving ICT policies internationally.

• Examine the significance of ICTs in teacher learning from the perspective of technology as a cultural artifact

Learning from Teachers' Representations of Learning: Enhancing Professional Development for Writing Instruction in the Information Age
Mary Sheard, Universty of Nottingham, United Kingdom
Colin Harrison, Universty of Nottingham, United Kingdom

In the context of networked learning and increasing opportunities for visual representations of classroom teaching as virtual sites for teacher learning, teachers' knowledge about effective writing instruction may become more overt, accessible and shared. In particular, the facilities of digital video and interactive interfaces make this increasingly possible. However, little is known about how teachers learn from visualisations of teaching, or how teachers represent their own practice-effecting learning. The research question, is 'What do teachers' representations of their learning reveal about the relative potential for enhancing teacher learning for writing instruction using transcripts, digital video, and computer-mediated interfaces?' As a theoretical backdrop, the paper considers the interconnectedness of 3 perspectives on learning (Spiro et al, 1991; Hiebert et al, 2002; and Simon et al, 2000), which indicate the complexities and tensions in developing, representing, sharing and applying teacher learning about writing instruction in the information age. The paper reports on an empirical study of professional learning for writing instruction with 12 primary teachers in England. The design was based on semi-structured and unstructured interviews, and task observations as the participating

teachers engaged with and responded to digital video, transcripts and a recently developed interactive interface, Interactive Classroom Explorer (ICE)(Harrison and Pead, 2003). Representations of learning resulting from each condition are analysed and compared using theories of representations of learning (de Jong et al, 1999) and of eliciting knowledge from the expert practitioner (Hoffman et al, 1999) as analytical lenses. In addition, reference is made to cognitive load theory. Early findings suggest a greater complexity in teachers' representations of learning in response to the affordances of digital interface than either video or transcript alone. In discussing the findings, the paper derives a set of proposals for enhancing professional development in networked learning contexts for teachers' learning about writing instruction.

Teacher educators go teaching on-line
Sarah Shimoni, Levinsky School of Education tel Aviv, Israel
Irit   Kupferberg, Levinsky School of Education tel Aviv, Israel
Gila Zimet, Levinsky School of Education tel Aviv, Israel

This interpretive, phenomenological study was aimed at understanding what teacher educators who did the transition from teaching their students, face to face, in the classroom, to teaching them from distance, through an internet site, believe, feel and think about this change in their practices, how do they go about teaching in the virtual learning environment. During 2002-2004, 30 new courses in distance learning were opened in our school of education. When teaching via Internet, the teacher is no longer the Sage on stage. The easy access to numerous, on-line, sources of information, requires the teacher, to re-define his role and become a partner, A guide on the side, to his students … (Based on Hoover, In: Mor, 2001). Teachers who teach with high technologies, need, on top of mastering their use, to know how to mediate, guide, assess and criticize (Based on Miodoser, Nahamias and Forkush-Baruch, 2000). The various differences between the real and the virtual learning environments are due to foster some change in teaching perceptions and practices. Data sources were- taped and transcribed in-depth semi-structured interviews, with 21 out of the 30, on line teacher educators, 5 hours of taped and transcribed focus group discussions among the whole group of on line TE and site-seeing, guided tours, by 12 of the teachers, in their courses' internet sites. Teacher -educators showed, different degrees of an epistemological change, which influenced their educational beliefs and practices. As their ideas of representing, owning/disowning, communicating, mediating and assessing knowledge, were becoming more complex and elaborated, they had to reorganize their relationships with their students

and the new learning-teaching environments in which these relationships occur, in accordance with their new insights.

Integrating mobile learning technologies in classrooms: contradictions and challenges for teacher learning in the information age
Paul Conway, National University of Ireland, Cork, Ireland
Tom Daly, National University of Ireland, Cork, Ireland

Adopting an activity theory lens (Engestrom, et al, 1999), this paper discusses the implications of integrating mobile learning technologies for teacher learning in the context of a laptop initiative for s5tudents with reading and writing difficulties. Like other developed countries the second wave of ICT planning in Ireland has had a greater emphasis on the integration of technology into the day-to-day curriculum in schools than the first wave of planning (Conway & Zhao, 2003). Thirty-one post-primary schools were involved in the Laptop Initiative. Data collection was undertaken at a number of levels. First, project team at a national level were interviewed and document analysis was undertaken. Second, all teachers involved as project coordinators were surveyed and interviewed in focus groups. Third, case studies were undertaken in four schools. A central feature of initiatives to integrate ICTs (either desktop or mobile) in classrooms has been the role of teacher beliefs in mediating such ICT integration initiatives. In this paper, we make a case for the value of an activity theory (Engestrom, et al, 1999) perspectives in framing the contradictions of such efforts in the context of a laptop initiative for students with dyslexia and other reading and writing difficulties. For example, despite the mobile potential of laptops, most teachers consigned them to desktop-like deployment. In terms of developing effective learning environments - for both students and teachers – a number of issues emerged as critical. The findings of this study are important in the context of promoting social inclusion, in the emerging knowledge society (Hargreaves, 2003).

Tracking Changes in Professional Identity and Practice Style in Online Learning Environments
Steve Wheeler, University of Plymouth, United Kingdom
Peter Kelly, University of Plymouth, United Kingdom
Ken Gale, University of Plymouth, United Kingdom

This paper describes research currently being carried out into the changing professional identities and practice styles of a group of student teachers during their par-

ticipation in an online teaching and learning programme. The programme involves the students in a range of distributed Problem Based Learning (dPBL) activities. The research is structured around a longitudinal mapping exercise across a variety of professional contexts in which possible changes in their professional identity and practice styles will be recorded and critically examined. The research will focus upon individual and group identities, and will involve an investigation, firstly into the way in which online cultures can play a part in shaping the development of individual minds and, secondly, how the thoughts and activities of individuals can be seen to influence the cultural milieu. The research will be grounded in spatio-temporal contexts. In the first instance this will involve a mapping of possible changes across a variety of practice situations and in the second through a given time, allowing for cross cultural and historical perspectives to be taken within the process of the research. The ongoing research practice will involve the collection and analysis of data drawn from individual and group reflective practices, professional biography and self-assessment, transcripts from online participative activity and peer assessments and through the use of videoconferencing, practice journals and interviews.

P 14   27 August 2005   08:30 - 10:30   Room A007

Symposium
Teacher Education

TEACHERS' EDUCATIONAL BELIEFS AND UNDERSTANDINGS

Chair: Carmen Vizcarro, Universidad Autonoma of Madrid, Spain
Organiser: Carmen Vizcarro, Universidad Autonoma of Madrid, Spain
Discussant: Zemira Meravech, Bar-Ilan University, Israel

The starting point of the collection of papers included in this symposium is the belief that behind teachers' practices lie different ways of thinking about relevant issues related to education, learning and teaching: what is the nature of knowledge and how is it acquired and expanded, how is it influenced by personal attitudes towards it and, as a result of these, how can knowledge acquisition be supported in best ways. This would entail the two facets described by Hofer (2002) as personal epistemologies (concerned with the origin, nature, limits, methods and justification of human knowledge) and epistemic cognition (related to knowledge more generally, and to the conditions for acquiring it). Again following this author, from

a psychological and educational perspective, the focus of concern among those studying personal epistemology or apistemic cognition is how the individual develops conceptions of knowledge and knowing and utilizes them in developing understanding of the world. This includes beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs (Hofer, 2002, p.4). These issues need to be dealt with if we want to fully understand teachers' practices, and very importantly, if they need to be improved so teachers can help students learn better and in better ways, more adapted to the demands our society and culture require. The papers included in this symposium deal with personal epistemologies of teachers (Pecharrom?n & Pozo), their understanding of how learning (both their own and their students) occurs (Pintor & Vizcarro) and how beliefs about their own efficacy to deal with knowledge influence learning (Oobekkink-Marchant, Briel & Verloop).

Teachers' understanding of learning
M Pintor, Universidad Autonoma of Madrid, Spain
Carmen Vizcarro, Universidad Autonoma of Madrid, Spain

In this paper a research is reported in which we tried to grasp teachers' understanding of the nature of knowledge and how learning takes place, both their own and their students. These understandings were also related to classical learning theories, in an attempt to obtain information on the coherence of these epistemological theories and the way they relate to some core educational concepts such as the nature of knowledge and its acquisition (learning), transfer, motivation and the tasks which help learning to occur (teaching). We were interested in finding out what these theories are, in which way they relate to classical theories of learning and what is their relationship to core concepts in learning and teaching practice. Then, these understandings were related to teachers' practice, as reported by teachers themselves. We believe knowing teachers' theories and understandings on these core educational concepts and their relationship is a basic knowledge for their educational development, so that it is based and constructs on their perceptions. Fifty four teachers (male and female, secondary and university, working in different disciplines) were interviewed and the content was analyzed following a process based on grounded theory (Strauss & Corbin, 1990).Then, these understandings were subject to different statistical tests to describe in which ways they differed and they clustered in consistent ways. The results show three different clusters that were labelled empiricist/behavioral, cognitive and multiperspectivist, representing 24, 46 and 30% of the sample. These understandings were, as expected, related to other core concepts

and to different teaching practices. The limitations and implications of these findings are discussed.

Intuitive epistemologies in secondary education teachers
I. Pecharroman, Universidad Autonoma of Madrid, Portugal
I Pozo, Universidad Autonoma of Madrid, Spain

The relationship between teachers' and students' intuitive epistemologies with different variables related to instruction is more evident everyday. Students' epistemological conceptions affect their cognitive and motivational processes. On the other hand, teachers' epistemologies influence their educational goals, methods and assessment procedures. And it all significantly influences learning and epistemological education of their students. Related to this topic, we report on a study with secondary education teachers of different academic subjects. The goal was to estimate, through scales and open questioning their beliefs over the nature of knowledge (certainty and criteria), as well as on the acquisition and distribution of this knowledge. Results show quite sophisticated epistemological positions, with a predominance of constructivist conceptions as opposed to more objectivist approaches and a clear rejection of relativism. They also show a disagreement with conceptions which view knowledge acquisition as a quick and simple process. These beliefs are clearly different from those held by their students as well as by adults more generally. These latter groups hold positions closer to objectivism and relativism and a simpler view of knowledge acquisition. Differences among teachers are also found related to the knowledge domain in which they are explored and according to the field in which they work (Natural, Social Sciences, Moral knowledge). We doubt that these conceptions translate into practice as theories in action. Moreover, the presence in a significant number of teachers of objectivist positions, specially in Natural Sciences and Moral knowledge makes us raise the need to give more attention to the epistemological education these teachers receive.

University teachers' perspectives on self-regulated learning
Helma Oolbekkink-Marchand, Leiden University, Netherlands
Jan Van Driel, ICLON, Leiden University, Netherlands
Nico Verloop, Leiden University, Netherlands

Students need a supportive environment to help them regulate their learning process. One of the important sources of support is the teacher. A teacher can provide feedback on the learning process of the student and model how to approach a learn-

ing task. Besides the necessary skills a teacher needs to help students, we know from the literature the way a teacher thinks about a phenomenon, in our study self-regulated learning, is important (Pajares, 1992). We assume that teachers' perspectives consist of intentions and beliefs and that perspectives influence behavior in teaching practice. The main goal of this study is to describe teachers' perspectives on self-regulated learning and compare perspectives from teachers teaching in different disciplines. Two studies are described here using two different instruments. In the first study, 20 university teachers were interviewed to explore the variety of perspectives on self-regulated learning. The analysis of the interviews resulted in four perspectives: (1) meaning oriented / loose regulation, (2) meaning oriented / shared regulation, (3) knowledge oriented / shared regulation and (4) knowledge oriented / strong regulation. In the second study a questionnaire was constructed based on the interview results. A pilot study was done in a group of 39 university teachers to test the questionnaire. The questionnaire was sent to all 1605 teachers of one university in the Netherlands. The useful response was 343 (21,4%). Factor analyses and discriminant analyses were conducted to see if the perspectives found in the interviews could also be identified in the questionnaire. The results were investigated further to explore differences between teachers teaching in different disciplines. Final results of the study will be presented during the conference.

P 15   27 August 2005   08:30 - 10:30   Room A018

SIG Invited Symposium
Learning and Professional Development

EXPERTISE DEVELOPMENT ACROSS PROFESSIONAL DOMAINS; A CRITICAL VIEW ON THEORETICAL ASSUMPTIONS

Chair: Hans Gruber, Universitat Regensburg, Germany
Organiser: Els Boshuizen, Educational technology expertise centre, Nether
                   lands
                   Hans Gruber, Universitat Regensburg, Germany
                   Michael Eraut, Sussex School of Education, United Kingdom
Discussant: Franz Lehner, Universitat Passau, Germany

The study of expert performance and expertise development is slowly expanding its horizons, moving from chess and medicine to management and law. In this symposium we will take a critical view on the outcomes so far. All researchers in this sym-

posium have built on a theory of expertise development as proposed by Schmidt, Norman and Boshuizen (1992). In this theory knowledge encapsulation and script formation play a central role. The theory holds strong claims about the mechanisms underlying this process, but neglects the conditions that are required. Furthermore, the theory assumes that the reasoning strategy is not problematic for students, and hence assumes that difficulties in problem solving are solely due to incompleteness, and lack of structure and coherence of the knowledge base.Over time additions and alterations have been made to this theory when applied in new domains. So far, however, findings from these different domains have never been brought together with the aim of a critical analysis of processes, preconditions, and boundary conditions. The studies presented in this symposium are from domains differing in similarity to the 'original' medical domain in several ways: e.g., different ontologies allow different kinds of reasoning (causal, stochastic, logical); professionals operate in a changing environment, but the time frames of these changes are different; the way work is organised may or may not let professionals build up broad experience with problem types; and quality of feedback on action varies.

In this symposium we want to approach the concept of 'encapsulation' and 'script formation' from different angles and domains, hoping to get more insight into the factors that influence the macro and micro processes leading to expert performance.

Development of professional competence in management consulting
Franz Lehner, Universitat Passau, Germany
Klaus Bredl, Universitat Regensburg, Germany
Hans Gruber, Universitat Regensburg, Germany
Josef Strasser, Universitat Regensburg, Germany

To become a good management consultant requires the acquisition of a great deal of knowledge. It is necessary for this knowledge to be acquired and organised in a way that it can quickly be accessed and applied in different consulting situations. It is plausible to assume that there are different learning processes that eventually lead to consulting competence based on more or less applicable knowledge structures. Unfortunately learning processes in the professional development of counsellors have rarely been described or thoroughly been analysed. The research reported in this paper investigates the role of declarative knowledge, procedural knowledge, and encapsulated experience-based knowledge in consultants of three different levels of expertise when working on domain-specific cases. The purpose of the research is to explore the scope on the encapsulation theory. It is analysed to which extent the

assumptions of this theory, which mainly is based on research in medical domains, can be transferred into the domain of management consulting.

Management consulting is regarded as an ill-structured or complex domain. The domain of management consulting aims at the consultancy of complex organisations and groups focussing on improving business and business aims. In contrast to medicine, management consulting does have little canonical knowledge. Thus, it is difficult to identify declarative knowledge that experts unanimously agree upon. Our empirical evidence suggests that the acquisition of experience-based knowledge thus might be different than in medicine. For an understanding of professional learning and development, it is important to identify conditions under which theories (like knowledge encapsulation) can be applied more adequately. It is argued that the nature of domain constraints form such a group of conditions.

The role of knowledge development and ontological change in the development of expertise in legal reasoning; toward a domain model

Fleurie Nievelstein, Educational technology expertise centre Netherlands
Jan van Bruggen, Educational technology expertise centre Netherlands
Frans Prins, Educational technology expertise centre Netherlands
Henny Boshuizen, Educational technology expertise centre Netherlands

Law as a professional field and as an academic profession deviates largely from the health related fields. It is a domain that does not have an underlying, explanatory theory. Its formal knowledge consists of rules that have to be consistent and are rooted in a historical corpus. Legal reasoning does not require causal reasoning, but a careful consideration of the applicability of (several, competing) legal rules. Although legal reasoning is a very verbal affair, non-legal, social and ethical considerations must also be taken into account. Economic and social changes affect these considerations. Some domains in law are very hard to learn. Findings in expert-intermediate-novice studies in other domains suggest that the underlying reasons might be the required knowledge structure and its ontological qualities that are intricately linked to domain general reasoning skills. In this paper we investigate the applicability of an expertise development theory that has been developed in other professional domains. This is done by means of interviews with experts, reanalysis of existing material, triangulating it with the outcomes of two other studies that have been done so far in the domain of law. Outcomes suggest close parallels with previously investigated domains, but also remarkable differences regarding knowledge structure, which requires script negotiation instead of the usual activation and

instantiation, and regarding type of reasoning, which is adversarial in nature. This analysis requires further empirical validation also to find out the relative importance and interdependence of the hypothesised processes.

Micro-processes of knowledge encapsulation: Effects of diagnostic reasoning through a set of related clinical cases

Henny Boshuizen, Educational technology expertise centre, Netherlands
Margje van de Wiel, Maastricht University

The process of knowledge encapsulation is supposed to play a major role in medical experts' effective case processing and clinical reasoning. It is assumed to take place as a result of repeated reasoning through detailed, integrated networks of clinical and biomedical knowledge. This conclusion is however based on cross-section clinical-reasoning studies in samples markedly differing in level of expertise. These groups differed both in terms of diagnostic accuracy, processing time, level of detail in reasoning and the use of encapsulating concepts. The study to be reported here was meant to investigate the claim that knowledge encapsulation is the result of the repeated application of detailed basic-science knowledge on similar cases. In an experimental setting, students of one expertise level diagnosed varied sets of cases each representing one class of disease processes while thinking aloud. Sets were presented in different orders and cases from one set were mixed with cases from other sets. Only the correct diagnosis was given as feedback. It was hypothesised that later cases would be processed faster, that chains of reasoning would become briefer and that encapsulations would emerge. Analyses of all protocols indeed showed that case processing becomes faster and that reasoning chains become briefer. Although, diagnoses did not get better with cases reasoned through, detailed analyses of a subset of the cases showed that encapsulating concepts played a central role in students' diagnostic reasoning. Mostly an encapsulating concept was explained in biomedical terms when it emerged the first time, and not in later cases. The explanations were rather superficial. However, explanations of relevant encapsulating concepts afterwards showed that students performed at least similar and often better than their peers. So, students do learn from diagnosing cases even with minimal feedback. Suggestions for enhancing experiential learning will be discussed.

Paper Presentation
Assessment of Competence

METHODOLOGICAL ASPECTS

Chair: Dai Hounsell, University of Edinburgh, United Kingdom

Berlin Instrument for Evaluation of Students' Competences
Edith Braun, Free University of Berlin, Germany
Burkhard Gusy, Free University of Berlin, Germany
Bettina Hannover, Free Univerisity of Berlin, Germany

In many European countries the universities have to implement new programs (Bachelor and Master Programs). One of the new aspects of teaching will be the imparting of different competences within the courses. This consideration points out there is a demand of a new evaluation instrument, which measures students' competences. In our opinion there are four aspects which may be promoted at the university: knowledge and methodology and social skills (meaning communication skills and capacity for teamwork) and personal skills (meaning the motivation). The aim of this research is to develop an evaluation instrument measuring the competence students gained. First we define the competencies and then couch them in items. In June 2004 a pre-test was organized. For this propose we took a sample of 118 courses at he Free University Berlin. The questioning was planned as an Online Evaluation. The answers of these 341 students were used to test the structure of the competence aspects and the internal stability of theoretical scales. The confirmatory factoring verified the theoretical areas we described before. The RMSEA and the Goodness of Fit are good. The empirical testing verifies five areas of competencies: knowledge, methodology, communication skills, cooperation, and motivation. The selectivity of every item in the five scales is above .5. Cronbach's alphas of the five scales are between .76 and .86. The empirical results show good results of the construct of the scales and their reliability. In further researches we will control other aspects of validity. It may be possible to focus the output of a university course with help of this instrument.

The role of the assessor-student interaction in individual dynamic assessment with low and high achievers
Kristine Lund, CNRS, University Lyon 2, Yale PACE Center, France

Evaluating a student's ability to learn rather than what he or she has already learned is at the heart of the dynamic testing concept. Dynamic testing has revealed developing expertise in students that static conventional testing has not. However, low achieving students tend to benefit more from dynamic testing than high achieving students. In other words, the former show more gains from pre to post-tests than the latter when using a dynamic testing paradigm. Although it may seem obvious that poorer students need more help than stronger ones and therefore have more potential to benefit from it, it is less obvious to know what types of assessor-student interactions actually allow poorer students to progress. We propose to look more closely at the assessor-student interaction during prompted individual assessment within a 4th grade math curriculum based on analytical, practical and creative skills and that uses dynamic instruction and assessment. In particular, we propose to qualitatively analyze 24 assessor-student interactions with both low and high achieving students across three mathematical units: measurement, geometry and equivalent fractions. Low and high achievers will be selected based on previous test scores where low achievers had lower test scores than high achievers. Through an analysis of the nature of assessor-student interactions, we hope to shed light on how poorer students demonstrate their capacity for developing expertise. Secondly, we hope to show how the prompted individual assessment may be improved for this particular math curriculum. In particular, as the practical and creative thinking components of the instruction and assessment will generally not be as familiar to teachers and students as the analytical components, the qualitative analysis of assessor-student interaction should reveal ways to improve them.

Students self-assessment on their competencies in mathematics – Development of a questionnaire (COMA)
Holger Gaertner, Free University Berlin, Germany
Bettina Hannover, Free University Berlin, Germany

The goal of this paper is to show the construction of the questionnaire COMA (COmpetencies in MAthematics). COMA measures student's self-assessment of their math related competencies. In contrast to common instruments that measure different aspects of students learning environment, this questionnaire offers the chance to measure the self-assessment regarding the competencies of the students.

These specific competencies refer to new curricula in Germany that were implemented responding to PISA. These new curricula do not only aim to subject-specific competencies, but also to methodical, personal (self-), and social competencies. This study wants to examine, weather COMA measures the different domains of competence and if this questionnaire could be a diagnostic tool for teachers. Method: The four competencies were operationalized as follows: The methodical competencies comprise the aspects work-organization and self-assessment ability. The social competencies include the aspects cooperation and communication as well as the ability to handle criticism. The personal (self-) competencies include the aspects mathematics-specific interest, self concept and self-efficacy. The subject-specific competencies were measured with items that mirror the educational standards of the new curriculum for Berlin schools. Results: 22 classes (grade 5-8) participated in this study (N=469). The reliabilities for the different scales were between .63 and .87. The confirmatory factor analysis (CFA) confirmed that the questionnaire measures the four domains of competence (for the elementary school sample: chi²/df=85/29;RMSEA=.08;CFI=.96;GFI=.94). The CFA showed high intercorrelations between the four domains of competence (.70 < r < .89). While elementary school students seem not to differentiate between the competence domains, secondary school students judged their subject competence as more independent from the other competencies. Discussion: The CFA shows that COMA actually measures the four different areas of mathematics-specific competencies. Causes for the different correlational patterns are discussed, as well as the possibility of using this instrument as diagnostic assistance for teachers.

The interchangeability of theory-based and video-based assessment in the context of physical education
Iasonas Lamprianou, University of Manchester, United Kingdom
Gemma van Vuuren Cassar, University of Malta, Malta

This paper describes a study that investigated the interchangeability of two different assessment methods in Physical Education. The two assessment methods compared were a traditional paper-and-pencil written paper (WP) and a video-based paper (VP). Both assessment methods were administered to the students twice, employing a 'pre-test/teaching/post-test' experimental design. Three different experimental teaching units (ETUs) intervened between the pre-test and the post-test representing three teaching environments; 1-practice (n=12), 2-practice and handouts (n=25), 3-class sessions (n=12). The aim was to investigate if the interchangeability of the two assessment methods was affected by the different teaching environments.

Correlations were examined and Generalizability analysis was used. The results indicate that the two assessment methods are interchangeable to the degree that correlations in the area of 0.6 to 0.80 is an accepted criterion for interchangeability. Slighlty different results were obtained when the items were grouped by content (rules, planning tactics and techniques) compared to the results when items were grouped using cognitive criteria (knowledge, application and evaluation). In addition, order effects (between the pre- and post- administrations of the tests) were found. The teaching environment had a significant impact on the interchangeability of the two assessment methods. The findings of the study suggest that interchangeability of tests cannot exist in a vacuum and the influence of the learning experience of the test-takers is significant.

Q 2   27 August 2005   11:00 - 12:20   Room E111

Paper Presentation

CONCEPTUAL CHANGE

Chair: Marjatta Kangassalo, University of Tampere, Finland

Teacher's perspectives about enhancement of learning through using multi-modal representations of concepts
Vaughan Prain, La Trobe University, Australia
Bruce Waldrip, University of Southern Queensland, Australia

This paper reports a project that aims to devise, trial, and evaluate teaching and learning strategies to improve students' learning of science in the middle years in schools in regional Australia through a focus on multiple and multi-modal representations of science concepts. 'Multiple' representations refers to the capacity of science discourse to represent the same concepts and processes in different modes, including verbal, graphic and numerical forms. 'Multi-modal' refers to students' knowledge of how to integrate these different modes to represent scientific reasoning and findings. These modes include, but are not restricted to, models, written and verbal accounts, illustrations, graphs, equations, and concept maps. We are interested in how students make sense of science concepts and methods across different modes, and how this translation work can be utilized to enhance student learning of science. The project follows a mixed methods approach. Initially, 20 teachers were surveyed about their planning and usage of different representational modes. The

findings from the initial survey of teachers' practices and beliefs indicated that the teachers tended to focus on resources and students' learning styles rather than on different representational modes, sometimes confusing modes and resources. Few teachers expected students to be able to represent the same concept in different modes as part of understanding science. The interviewed teachers saw how they scaffold the learning process, had important implications as to how students learnt. The participant teachers perceived that a framework that emphasized representational diversity provided a more systematic way to focus on (a) target concepts to be learnt, and (b) the development of a richer learning context that promotes more learner engagement. While the focus of this paper concerns the classroom teacher, the question of whether these new representations also constrained interpretation by limiting the learner focus on key conceptual features was less clear.

Conceptual change and reasoning: Cognitive presuppositions towards a coherent model of a concept
Dimitris Pnevmatikos, University of Western Macedonia, Greece
Nikos Koutsoupias, University of Western Macedonia, Greece
Nikos Makris, Democritus University of Thrace, Greece

This paper aims to contribute to the literature on conceptual change by engaging in direct empirical comparison of contrasting views. We take up the question of whether Children's conceptions and/or misconceptions about a given concept are related to different dimensions of human cognition, such those described in Demetriou's theory. Participants were chosen, on the basis of their performance, from a larger sample of 444 children who were tested with tasks addressing categorical, quantitative and causal reasoning. This study involved 120 participants, composed of roughly equal numbers of 8-, 10-, 12-, and 14-year olds. Participants were tested individually in a semi-structured interview consisting of questions relating to the concept of God. The Correspondence Analysis method, a variation of Factor Analysis, was applied to the data. Two factorial axes from the Correspondence Analysis output were utilised. On the left of the horizontal axis were participants holding na?ve ideas about God and on the right-hand side were the group of participants with theologically/scientifically accepted ideas. Along the vertical axis are placed participants who partially revised their intuitive assumptions about the ontology of the deity and whose ideas are characterised as misconceptions. 'Ascending Hierarchical Classification' revealed five subgroups of participants with a high hermeneutical value. The first cluster represents the idea of a God as human being living on the Earth, while the fifth cluster represents the idea of God as an ontological entity

different from humans. The other three clusters represent a synthesis of the human cluster and the transcendental cluster. Comparing the performance of the participants in categorical, quantitative and causal reasoning, we found a high degree of dependence between causal reasoning and whether the participants had been found to construct a coherent model representing a transcendental God. Findings are discussed on the basis of their theoretical and educational implications.

(Conceptual) Change in the Domain of Literature
Ilana Elkad-Lehman, Levinsky College of Education, Israel
Hava Greensfeld, Michlalah Jerusalem College, Israel

This study seeks to understand the reasons underlying changes in the way teacher educators in literature (L-1) perceive their thinking about their discipline, their manner of instruction, or both. We used quantitative methods to examine the extent of teacher educators' awareness of the processes of change in their thinking. This paper brings the stories of two teacher educators, who participated in a wide-scale research. Their narratives demonstrate two different, even diametrically opposed, attitudes toward literature and the instruction of literature. Our findings indicate conceptual changes regarding literature and the instruction of literature, based not only upon changes in knowledge, as would seem from the perspective of cognitive psychology and science instruction, but primarily on changes in conceptions and beliefs – the domain of social psychology. The changes described in this paper focus on issues of aesthetics, and are closely related to questions of literature instruction. Most teacher educators whose narratives we heard brought up the issue of knowledge and perceptions unique to teacher educators. Our interviews focused us on an issue worthy of contemplation and further study, especially as regards teacher education: are literature and literature instruction two separate domains, as are science and science instruction, or should they been seen as one?

Helping learners to construct conceptual understanding of a complex knowledge domain
Nick Broers, Maastricht University, Netherlands
Tjaart Imbos, Maastricht University, Netherlands

Mathematics and statistics represent complex knowledge domains that require the learner to develop a large amount of both procedural knowledge and conceptual understanding. For the latter to occur, the learner must succeed in perceiving a rich

network of relationships between elementary concepts. In order for such a complex knowledge network to develop, the learner has to undergo a gradual process of maturation in which he or she learns to discard or transform previously held conceptions at the same time as expanding the knowledge network with new concepts and ideas. For such a constructive process of learning to occur, it is important that the learner self-explains the lesson material to him- or herself. In this paper we report on a new instructional method which aims not only to stimulate students to self-explain, but which is also meant to direct the focus of students on particular relationships between concepts. The method consists of two steps. In the first step the student is required to chart all the relevant propositions (elementary statements on concepts and principles) pertaining to the topic of interest. In the second step the student is provided with a number of true-false statements, where each individual statement is coupled to a subset of the propositions that were charted in the first step. For each statement, the student has to use the accompanying propositions to construct an argument showing the statement to be definitely true or false. This way the student is directed to reflect on the interrelationships between the propositions provided. In the paper we will discuss some experimental evidence for the efficacy of the method and look more closely at qualitative aspects of the work that the students in the experiments produced.

Q 3   27 August 2005   11:00 - 12:20   Room A009

Paper Presentation
Multiculturalism in Education

SCHOOLS AND CULTURAL DIVERSITY

Chair: Miranda Christou, University of Cyprus, Cyprus

Teachers' self-reported and observed interpersonal behaviour in multicultural classrooms
Perry J. den Brok, Utrecht University, Netherlands
Theo Wubbels, Utrecht University, Netherlands
Ietje Veldman, Leiden University, Netherlands
Jan van Tartwijk, Leiden University, Netherlands

In the Netherlands, as in many European countries, classrooms become more and more cultural diverse. Teacher education institutes do not have sufficient empiri-

cally supported data on the competencies teachers need in these classroom to build their programs on. This paper reports on a qualitative study of fifteen teachers from four multicultural classroom. We use this study to answer the question what teacher interpersonal behaviour strategies these teachers use in their classroom, and to what degree these are generic or more specific for multicultural classes. We also investigate to what degree teachers self-reported strategies can be observed from video-taped lessons. The first results indicate that strategies used in different situations all focus on establishing positive contact with students as well as on creating a learning atmosphere. Most strategies can be considered as generic strategies, although some strategies emerge more frequently and seem of greater importance in multicultural classes. While considerable differences can be found between the number and types of interpersonal strategies reported by individual teachers, overall a similar range of reported and observed behaviours has been found.

Impact of teacher-guided feedback during a cooperative learning curriculum at multicultural elementary schools.
Michiel Oortwijn, Leiden University, Netherlands
Paul Vedder, Leiden University, Netherlands

Grouping students together does not automatically lead to productive cooperative learning (CL). A number of essential conditions have to be satisfied to guarantee successful CL. One of these conditions is the level of teacher guidance. Despite its acknowledged importance, controversy exists regarding the way in which it influences CL (e.g. Cohen, 1994). Evidence suggests that, generally speaking, a higher level of teacher-guidance results in higher learning gains than a lower level of teacher-guidance, especially regarding learners with a learning disadvantage (Gillies and Ashman, 2000). The present study was conducted in multicultural elementary schools among linguistically deprived 10-11 year-olds, to clarify the role of scaffolding during a CL-curriculum in math. For this purpose, two conditions were created. In condition 1, children received low-level CL-feedback, and in condition 2 children received high-level CL-feedback from the teacher. It was expected that the average math scores in condition 2 would be higher than math scores in condition 1. Also, the effect of ethnical background and linguistic proficiency on math scores was investigated. The results supported our hypothesis that children in condition 2 had significantly higher math scores than children in condition 1.

Policies and practices in dealing with diversity in Greece: The case of Schools of Intercultural Education
Evie Trouki, Institute for the Greek Diaspora Education and Int, Greece

During the last 10 years Greece is becoming the final destination of a constantly increasing number of immigrants and repatriated. In order to address the subsequent increasing cultural and ethnic diversity within schools as well as to meet the educational needs of both immigrants and repatriated students, the Greek State established in 1996 the Schools of Intercultural Education (SIE). Since the establishment of SIE has been strongly criticized, the present study attempts to explore the role of SIE in informing further decisions concerning multicultural education. Towards this aim an open-ended questionnaire and semi-structured interviews served as a means to encourage SIE principals to reflect on their experience and make comments and suggestions on a) the curriculum, b) the Reception classes, c) the educational material and d) the teacher training. The data we provide suggest that SIE instead of promoting a melting pot approach and focusing on assimilation, challenge the monocultural orientation of the existing Greek educational system. All the participants share the view that beside the usefulness and the effectiveness of the reception classes in helping immigrant students to join the Greek educational system, it is equally important to teaching them their mother tongue also. Furthermore, the consensus of opinions amongst the participants towards enriching the existing curriculum and the educational material with references to different ethnic and cultural backgrounds indicates that they view intercultural education as a new pedagogy that has to address native students also. Implications towards educational policy are also discussed.

Multicultural View of the Good Teacher in Israel
Sara Arnon, Tel-hai Academic College, Israel
Nirit Reichel, Ohalo College, Israel
Nirit Reichel, Ohalo College, Israel

The research question deals with the portrayal of the good teacher as viewed by the different cultures in the Israeli society, varying in their gender, religion, origin and ethnic composition. They also differed in their social-demographic background. A telephone pole was conducted among an Israeli representative sample (N=582). It included an open-ended question: in your opinion, what is the most important characteristic of the desired good teacher? The answers were written down verbatim, reflecting the authentic and spontaneous views of the interviewees. Content analy-

sis revealed basic and primary categories. Preliminary findings suggest that the Israeli public mostly values the general humane characteristics of the good teacher, as well as demonstrating care towards his pupils, and less his didactic or disciplinary knowledge. Characteristics - such as teacher's educational and social view or a teacher endeavoring achievement - were missing. Interviewees were also asked to express their opinion (0 to10 scale) about the importance of 11 statements describing the good teacher' characteristics (closed questions). T-tests and One-way ANOVA analysis revealed that the good teacher's characteristics were differently valued by the various groups: those who belonged to more traditional cultural groups – such as religious and orthodox Jews, eastern Jews and Arabs – generally related more importance to all the good teacher's characteristics, especially to his knowledge, achievements, discipline and the education, and valued less his humane and ethical characteristics. This trend was also true for older people, women, parents, people with lower education and lower income. Understanding the values and perceptions of different ethnic, religious and social cultures regarding the important qualities of the good teacher will contribute to the cultivation and enrichment of a leading trend in multiculturalism and pluralism in teacher's training process and in education.

Q 4   27 August 2005   11:00 - 12:20   Room A108

Paper Presentation
Mathematics Education

LEARNING IN MATHEMATICS

Chair: Athanasios Gagatsis, University of Cyprus, Cyprus

The relationship between posing and solving realistic mathematical problems in elementary schools in China
Limin Chen, Tianjin Normal University, China, Peoples Republic of
Lieven Verschaffel, University of Leuven, Belgium
Qi Chen, Beijing Normal University , China, Peoples Republic of

Several studies (Cai & Hwang, 2002; Ellerton, 1986) have demonstrated a close relationship between problem posing and problem solving. However, these studies investigated the relationship between problem posing and problem solving only for context-lean word problem situations. Stated differently, little research investigated this relationship as far as authentic or realistic problem situations were concerned.

Therefore, the present study investigated Chinese fourth-grade students' abilities in posing and solving (more) realistic problems, thereby focusing on the relationship between their performance on posing and solving such problems. One pair of three realistic problem posing (PP) and three related problem solving (PS) tasks was administered to 151 Chinese fourth-grade pupils, using a counter-balanced design. In the PP tasks, students were asked to generate three stories that corresponded, respectively, with the following three symbolic expressions: $100/8=13$, $100/8=12$ and $100/8=12.5$. In the PS tasks, students were asked to solve three realistic word problems that were similar to the three PP tasks. The responses to the PP tasks were coded using a classification scheme based on the one used by De Corte and Verschaffel (1996). Each response was coded as a realistic problem, a contextually inappropriate problem, a mathematically inappropriate problem, and no problem. The responses to the PS tasks were coded using a classification scheme adapted from Verschaffel and De Corte (1997). Each response was coded as a realistic answer, a contextually inappropriate answer, a mathematically inappropriate answer, and no answer. The results revealed that, like their European peers, these Chinese students held rather strong non-realistic perspectives, which were reflected both in their problem posing and problem solving behavior. Moreover, there was a significant positive relation between students' success in posing realistic problems and in solving problems realistically.

Toward a model of the acquisition of algebraic competence
Judi Humberstone, University of Melbourne, Australia
Robert Reeve, University of Melbourne, Australia

The research was designed to identify factors thought to account for the acquisition of algebraic reasoning. Previously, researchers have used variations in mathematical word problems to explore algebraic reasoning abilities; however, such methods may be insensitive to the requisite arithmetic and/or algebraic competencies associated with algebraic problem solving. To address this issue, a more fine-grained analysis of arithmetic and algebraic competence was conducted. Seventy-two Year 7 students participated in a three-phase study designed to measure both success and error patterns in early algebraic problem-solving. In the first phase students completed a standardised test of mathematical ability and several pre-algebra tests. The latter assessed students' abilities to (1) solve simple symbolic equations (2) understand the bi-directional relationship between symbolic and verbal forms of problems, (3) to recall and write down word-problems after a delay, and (4) to classify a set of symbolic equations into conceptually-related groups. Students then com-

pleted a second phase in which they attempted to solve, with assistance, mathematical word-problems. The assistance comprised a sequence of problem-solving hints, the purpose of which was to determine the students' understanding of, and ability to solve word-problems. The hints reflected the steps involved in mapping symbolic equations onto word problems. In the third phase, students completed symbolic equation and mathematical word-problem solving tests involving both familiar and novel problems. Regression analyses showed that success in solving both familiar and novel problems was differentially predicted by the types of hints required to solve problems in Phase 2. Classification techniques revealed different patterns of problem-solving success and of strategy-use sophistication. Cross-classification of the profiles of problem-solving success and strategy sophistication showed a well-ordered developmental model of the acquisition of algebraic competence. One of the pedagogical implications of this model is that it is possible to diagnose the nature of students' algebraic understanding.

Providing teaching tools for supporting pupils' proportional reasoning: The need for both quantitative and qualitative research methods
Christina Misailidou, University of Manchester, United Kingdom

In this paper the results from a study that used a combination of qualitative and quantitative research methods are reported. The aim of the study was to research and develop teaching tools for facilitating proportional reasoning, suitable for both primary and secondary pupils. It was decided that the most effective way to address this issue was to combine various approaches. First, a quantitative approach was adopted which involved testing and measurement using a Rasch methodology and which was complemented with qualitative information from individual interviews. This part of the study resulted in the construction of a 'proportional reasoning diagnostic test'. Then a qualitative approach was used which involved 'small group collective argumentation' and data analysis drawing on discourse analysis and sociocultural theories of learning. This second part of the study resulted in cultural devices that are proposed to help pupils to reason proportionally. The combination of the qualitative and quantitative parts of the study suggests that effective teaching tools which can aid pupils in thinking proportionally are: diagnostic instruments that can reveal their initial conceptions and cultural devices which can aid in modifying those conceptions if needed. These devices should be utilized in discussion based teaching sessions focused on significant problems. The proposed tools have been positively evaluated by teachers and have already been used in their classroom practice. This fact gives reasons to believe that academic research activity which

is carried out by combining diverse (and even traditionally conflicting) research approaches can provide robust results that may have the potential to effectively support practice.

Metacognitive networks of mathematical problem solving in CSCL
Tarja-Riitta Hurme, University of Oulu, Finland
Tuire Palonen, University of Turku, Finland
Sanna Jarvela, University of Oulu, Finland

The purpose of this study was to examine whether 13-year-old secondary school students (N=16) participate each other's mathematical problem solving at metacognitive level in computer supported collaborative learning (CSCL). Knowledge Forum (KF) learning environment was used to support networked discussion and the eight student pairs produced 95 computer notes in geometry. To establish whether the students engaged themselves to each other's problem solving process at metacognitive level social network analysis method, multidimensional scaling technique and correspondence analysis were performed. First, the analysis of egocentric networks was used to clarify the each student pairs' position in the interaction network when participating in the discussion. Secondly, the participation structure of all the students was examined by multidimensional scaling (MDS) technique. Further, posted computer notes were analysed by correspondence analysis to establish and visualize which of the participants were working at metacognitive level. The correspondence analysis was based on the qualitative content analysis of the posted computer notes in which the metacognitive activity was characterized as metacognitive knowledge, metacognitive judgments and monitoring and left out notes. Many student pairs performed either metacognitive judgements and monitoring or their posted computer notes did not indicate metacognitive activity. The results of the egocentric networks addressed student pairs' social relations and patterns of interaction. There were for example, two student pairs who participated in many on-going discussion topics and joined together those student pairs who were connected each other indirectly. The mds-map of the student pairs' participation structure showed that there were student pairs that commented each other's computer notes and were engaged in shared problem solving process. To sum up the results it seems that the participants' networks were different in metacognitive nature and there was some metacognitive activity that could be considered as socially constructed metacognition.

Paper Presentation
Science Education

ATTITUDES, CULTURE AND INQUIRY IN THE SCIENCE CLASSROOM

Chair: Constantinos Korfiatis, University of Cyprus, Cyprus

New technologies for embedded assessment in science teaching and learning
Eleni A. Kyza, University of Cyprus, Cyprus

Calls to reform science education emphasize inquiry teaching and learning but also acknowledge that inquiry is challenging for learners and for teachers. The literature reports that many teachers need to learn how to teach using inquiry, and especially how to shift roles from transmitting information to facilitating students' construction of their own understanding. A challenging facet of inquiry-based teaching is how to assess where students are, especially when the students are working in groups and are engaged in open-ended inquiry projects. Recently, in an effort to move away from narrow measures of assessment such as standardized testing, emphasis is placed on alternative ways of assessing students' understanding, towards more systematic and continuous indicators of students' progress. This type of assessment can help teachers support student learning as needed, and is often called embedded assessment. The question of how teachers can best practice embedded assessment methods is a complex one. This paper examines the role of a computer-based tool, the Progress Portfolio (PP), in facilitating teachers' embedded assessment. I present findings from the interactions of three middle-school teachers with their students and the PP tool, while enacting an extended and complex inquiry unit in science. Findings suggest that having visual representations of the students' work-in-progress has the potential of enhancing embedded assessment and, furthermore, specific design features can facilitate assessment at different points of the students' inquiry. However, there was also variation in the extent to which each teacher used the PP for embedded assessment purposes, which appears to be connected to their familiarity with the software and their expertise in inquiry science teaching. These findings have implications for the design of learning environments to support the new roles teachers are asked to play in inquiry learning, as well as for educational theory and practice.

Culture in science curriculum: an international perspective
Panagiotis Kokkotas, University of Athens, Greece
Dimitris Lathouris, University of Athens, Greece

Scientific literacy is a request by modern societies. Educators take it into account to form curriculum development. In order to do that, they should consider students' prior knowledge and their cultural background. By this rationale, we studied science Curriculums of four countries: Greece, USA, UK and Australia and tried to explore how culture is taken into account in these Curriculums. To achieve it, we selected to construct an instrument to accomplish a content analysis of these Curriculums. The first data analysis has shown similarities among the science Curriculums of USA, UK and Australia. Greek science Curriculum differs considerably from the other Curriculums.

Students' conception of learning and perceived goals on acquiring competence in doing scientific inquirements
Serge Hubers, University of Antwerp, Belgium
Ruurd Taconis, Eindhoven University of Technology, Netherlands

There is consensus in the Netherlands about the idea that science learning should be about learning relevant skills and improving one's self-regulation and not just about acquiring knowledge on science concepts. This idea has led to major changes in secondary education, one of them being the introduction of inquiry based learning environments in secondary education. In everyday practice students however, a number of students don't seem capable of selfregulation and don't spend enough time and effort on planning and evaluation when performing an open inquiry. It is expected that students' learning behaviour will be dependent on the students' conception of learning (Vermunt, 1996), their learning environment (Entwistle, 1991), and on their goal orientation, i.e. the educational goals they adopt (Ng & Bereiter, 1991). This study therefore focuses on the role of students' learning conceptions and students' goal orientation and their impact on performing and learning scientific inquiry. We conducted two studies using questionnaires based on the work done by Vermunt (1996), Schommer (1994) and Ng & Bereiter (1991). Two additional studies were conducted: students from two contrasting groups (labeled competence oriented vs task oriented) were observed while performing an open scientific inquiry and were asked to reflect on this task. Their notes (including conclusions and explanations) were also analyzed. The results of this study were compared with the results of a second additional study, in which 12 students filled out a retrospective

questionnaire that focused on their self-reported learning behaviour while performing scientific inquiry. We can conclude that in spite of recent reforms in Dutch secondary education, there is still a group of students with a preference for strong guidance within the domain of scientific inquiry. This may be a result of (a combination of) their personal characteristics and their prior learning experiences in the domain of scientific inquiry.

Attitudes to Science in United Kingdom Secondary Schools: Implications for Continued Participation and Achievement in Science
Peter Daly, Queen's University of Belfast, United Kingdom
Neil Defty, University of Durham, United Kingdom

The large scale abandonment of advanced science courses after students reach the statutory school leaving age of 16 years is widely seen as having disturbing implications for the UK economy and for the professional development of many senior school students. This paper examines the attitudes and achievements of 15-16 year old students in relation to the school science curriculum, prior to entering the final two year stage of secondary schooling. Girls were less positive about science than boys, on average, amounting to a difference of more than one third of a standard deviation. Achievement differences were small, however, slightly favouring girls. The less positive attitudinal stance of the girls was not reflected in performance differences. Socio-economic background differences were found in the expected directions but they were small in relation to attitudes to science at less than 0.05 s.d. units or less and at 0.17 s.d. units or less for achievement.

Q 6   27 August 2005   11:00 - 12:20   Room A110

Paper Presentation
Learning styles

PERSONALITY, LEARNING STYLES AND EDUCATION

Chair: Eric De Corte, Katholieke Universiteit Leuven, Belgium

The relationship between personality traits and learning style components
Vincent Donche, University of Antwerp, Belgium
Alexia Deneire, University of Antwerp, Belgium
Peter Van Petegem, University of Antwerp, Belgium

Based upon the learning style model of Vermunt (1998), Slaats (1999) has carried out research into exploring the relevance of this model in secondary vocational education in the Netherlands. By means of a constructed questionnaire 'Learning styles for Senior Secondary Vocational Education' (ILS-MBO,1997), Slaats found significant relations between personality traits and learning style components (processing strategies, regulation strategies, learning orientations, conceptions of learning). Recent developments into research into personality traits has been directed to investigate personality traits of children and adolescents using the underlying model of 'the Big-Five' (e.g. Costa & McCrae,1992). Research carried out by Mervielde & De Fruyt (1999) indicated that the Hierarchical Personality Inventory for Children (HIPIC) is a reliable instrument to measure five personality traits (emotional stability, extraversion, conscientiousness, benevolence and imagination) of specifically children and adolescents. There has been no research so far using the HIPIC inventory in learning style research in vocational education. As a means to contribute to more understanding of learning style differences in vocational education (Slaats, 1999), personality traits of children and adolescents (Mervielde & De Fruyt, 1999) and possible relationships between learning style components and personality traits (Slaats, 1999; Busato et al., 1999; Vermetten et al.,2001), a survey-research in which 209 pupils participated, took place in a vocational education school in Belgium (ISCED 3B). The research was mainly directed to investigate whether differentiation in learning style components can be explained by means of personality traits. The inventories (ILS-MBO & HIPIC) were found reliable for research. Constructive and reproductive learning style components were found to correlate significantly on personality traits concerning 'emotional stability' and 'openness'. In this study it was found that personality traits are no strong predictors of learning style components. The paper discusses the relevancy of this research for both theory and practice.

Relationships between the arts and science streams with levels of progression of self-rated multiple intelligences profiles at the terminal secondary grade level (grade 12) in an established secondary school in Macao
Kwok Cheung Cheung, Faculty of Education, University of Macau, China, Peoples Republic of

This research addresses a very pragmatic issue, namely whether current practice of academic streaming respects students' profiles of multiple intelligences. In Macao, grade 10 students when entering senior secondary education are streamed mainly into science and arts streams according to their own choices. Unfortunately, stu-

dents' knowledge of their own intellectual potentials is often not clear. It is customary that science is their first priority since it is very much valued in modern Chinese society. Quota limitation and inferior academic results often result in placing students who opt for the science stream in the arts stream. As a result, the arts stream may compose of students of a diverse spectrum of intellectual potentials, whereas because of higher academic results those students in the science stream would perceive their intellectual potentials relatively more favorable than those in the arts stream. This scenario is especially prominent when the school is a key school in the community, and whose students are praised for their success in entering science and technology faculties in universities in China and abroad. This research examines the relationships between existing streaming practices with students' self-rated multiple intelligences profiles in an established secondary school in Macao and the findings confirm the speculation that those students who end up in the arts stream do not regard themselves highly on all of the eight multiple intelligences. Instead, they have a tendency to regard themselves highly only at the second best level of progression of some intelligences such as naturalist, bodily-kinesthetic and interpersonal intelligence. These results inspire the principal to modify policy of streaming practice by taking intellectual potentials into account as early as grade 10, the time when students enter senior secondary education.

Can cognitive style predict scholastic performance? A study of 13-year old maltese students
Adrian Gellel, University of Malta, Malta

Recent literature has pointed to the significant effect cognitive style has on scholastic performance (for instance Sternberg and Grigorenko 1997; Riding et al. 2003). This paper reports the outcome of an empirical research amongst 13-year-old secondary school students in Malta aimed at finding the predictive value of Cognitive style on Scholastic performance. A total of 731 students were tested on Riding's Cognitive Style Analysis (Riding 1991), to determine their positions on the two fundamental cognitive styles, indicated by two ratios: the Wholist-Analytic ratio and the Verbal-Imagery ratio. The data was then compared with annual results on six major subjects, English Language, Maltese Language, Mathematics, General Science, Religious Education and Information Technology. A factor analysis representing overall ability was tested against the individual's style. Results indicate that the style dimensions were not always significantly related with the overall scholastic attainment or the annual result of individual subjects. As expected, style dimensions interact differently with different subjects. Verbalisers were constantly

advantaged in English, Maltese, Mathematics and Science, whilst Analytics were advantaged in Mathematics and Science only. The results were discussed in terms of how instructional designer and teachers could improve learning in individual subjects by adapting the content and methodology to individual requirements of students.

Induced vs instinctive learning preferences of malaysian primary school learners
Marohaini Yusoff, University of Malaya, Malaysia

This study investigated the teaching and learning culture, mainly the teaching methods and learning styles of Standard Four primary students. The research was conducted over a period of one year using the survey method and qualitative measure such as observation, interview and document analysis. A sample of 1,500 primary students and teachers were chosen from urban and rural schools to obtain the quantitative data. Based on the quantitative findings, six teachers and 36 students from urban and rural schools were involved. Quantitative research findings indicated that students were more comfortable with verbal explanations as this is usually also preferred by the teachers compared to more visually based forms of teaching. However qualitative findings seem to indicate otherwise, that is learners prefer more visual and kinesthetic forms of teaching and learning. Most educationist advocate visual learning as an effective style of learning especially when the objective is to assist students to become creative and critical thinkers. However, the examination based mindset of teachers as well as students may pose as a hindrance to this change.

Q 7   27 August 2005   11:00 - 12:20   Room A111

Paper Presentation
Motivational, Social and Affective Processes

GOAL ORIENTATION AND LEARNING ENGAGEMENT

Chair: Efthymia Syngollitou, Aristotle University of Thessaloniki, Greece

Goal Orientation, Learning Strategies, and Academic Achievement in High-School Students: The Role of Perceived School and Parent Goal Orientation
Svjetlana Kolic-Vehovec, University of Rijeka, Croatia
Barbara Roncevic, University of Rijeka, Croatia
Igor Bajsanski, University of Rijeka, Croatia

Three goal orientations are usually distinguished: learning or mastery, performance and task-avoidance orientations. These goal-orientations could be developed in the context of the family, as well as in the context of classroom. Learning goal orientation leads to the use of deep processing strategies and positively affects school achievement. Performance goal orientation leads to the use of surface processing strategies and self-handicapping behaviour, which result in lower achievement. Pintrich (2000) suggested that the identification of multiple goals may be a better approach to the issue of goal orientation, because students may at the same time want to master knowledge material but outperform all others in the classroom. The aim of the present study was to examine relations between students' goal orientation, perceived goal orientation of classroom, teachers and parents, reading and learning strategies, and school achievement. Participants were high school students from two gymnasiums (16- to 18-years old). They responded to a self-report questionnaire, which included four scales from PALS (Midgley et al., 2000) and five subscales from CSRL inventory (Niemivirta, 1998), as well as The Strategic reading questionnaire (Koli?-Vehovec & Baj?anski, 2001). Regression analyses showed that parents and classroom goal orientations were better predictors for all three personal goal orientations than teacher goal orientation. Cluster analysis extracted three clusters of students according to their goal orientation: Cluster 1 named work-avoidance orientation (high work-avoidance, low learning and performance); Cluster 2 named performance orientation (average learning, high performance and work-avoidance); and Cluster 3 named learning orientation (high learning, average performance, low work-avoidance). One-way ANOVAs showed that students with learning goal orientation use reading strategies more often and self-handicapping strategies less often than other two groups and they also have better school achievement. Students with work-avoidance orientation use deep processing strategies and reading strategies less often than other two groups.

Analysing the dynamics of university students' general level achievement goals and their contextual goal construction
Hanna Salovaara, University of Oulu, Finland
Sanna Jarvela, University of Oulu, Finland

It is assumed that students' achievement goals are partly defined by their general motivational tendencies such as goal orientation and partly by their interpretations of a particular learning situation. In the previous studies on achievement goals the emphasis has mainly been in analyzing general level goal orientations. Following the current contextual perspective on motivation, there is a need to construct

more dynamic and contextual explanations of learners' motivational goals and get empirical evidence of students' goals in various learning situations. The first aim of this study is to analyse on the dynamics of students' general level achievement goals and their contextual goals. The second aim is to analyse the factors that are involved in the goal construction process. In this study quantitative self-reports and a qualitative on-line method for capturing students' contextual interpretations of their motivational goals in immediate contexts of learning are applied. The study is participated by university students (N=100) in teacher education. The analysis will involve quantitative analysis of the self-reports as well as qualitative content analysis of the data on contextual goals. The two different types of data will be brought together to compare the general goal orientations with the context specific goal interpretations. The previous studies have indicated lack of congruence between students' general level self-reported achievement goals and contextual goal interpretations. In this study, more attention has been paid to the comparability of the two methods. Thus, it is expected that students' general level and context specific goal interpretations are congruent to some extent. At the same time, it is assumed that contextual qualitative data will provide explanations of how students interpret learning contexts and, thus, communicate their general level achievement goals into multidimensional contextual goals.

The role of interpersonal relationships in students' learning engagement and achievement
Katja Kosir, Department of Psychology, University of Ljubljana, Slovenia
Sonja Pecjak, Department of Psychology, University of Ljubljana, Slovenia

The purpose of the research is to investigate the nature of the relationship between the relations students form with their peers and teachers and their academic engagement and achievement. The results of some studies show that the social factors are important predictors of students' academic achievement, but the nature of that relationship is not clear. Moreover, in the existing research the impact of different kinds of interpersonal relationships was not examined simultaneously. The purpose of the research is to establish the predictive value of the relationships with peers and relationships with teachers for academic achievement in different periods of schooling. It is hypothesized that the variables that mediate the influence of students' relations with peers and with teachers on the achievement are the emotions that students experience in school and students' academic motivation. It is also assumed that the predictive value of both examined kinds of social relations is changing during different periods of schooling. Elementary school students (fourth and eight grade)

and secondary school students (second grade) participate in the study (N = 1000). All variables included in the model are assessed on the basis of two kinds of information: students' self-report and teacher report. All variables will be assessed at the beginning and at the end of the school year. The first part of the research was performed in October 2004. The second part will be going on in May 2005. Therefore, it is not possible to report about the outcomes yet. Nevertheless, the results of the first part of the research indicate that the predictive value of relationships with teachers for students' achievement decreases with growing age. Also, during the transition from late childhood to adolescence, the relationship between social and academic variables is getting weaker.

Perfectionism, Coping with School Failure and Learning Strategies in High-School Students
Majda Rijavec, University of Zagreb, Croatia
Ingrid Brdar, University of Rijeka, Croatia
Svjetlana Kolic-Vehovec, University of Rijeka, Croatia

The adaptive dimension of perfectionism refers to high personal standards and tendency to be highly organised, while maladaptive neurotic dimension refers to concern about mistakes and doubts about one's action in the situation. Both aspects of perfectionism are assumed to generate or instigate stress for themselves by engaging in stringent self-evaluation and focusing on negative aspects of events (Hewitt & Flett, 1993). However, in persons with adaptive dimension of perfectionism, the negative impact of this characteristic might be offset by their tendency to engage in active problem-focused coping. In contrast, persons with maladaptive perfectionism are assumed to respond with avoidance of threatening stimuli. In high-school students active problem-focused coping with school failure includes deep processing of learning materials and avoidant coping includes self-handicapping. The aim of this study was to explore the relations between dimensions of perfectionism, coping with school failure, the use of learning strategies and school achievement in high-school students. The sample consisted of 227 high school students (15 to 16 years, 60 male and 167 female). The students responded to three self-report questionnaires: Multidimensional Perfectionism Scale (Frost et al., 1990), School Failure Coping Scale (Brdar & Rijavec, 1997, 2002), and Learning Strategy Scale (Niemivirta, 1998). Path analysis indicated that the adaptive perfectionism dimensions predict school achievement (GPA) indirectly, through problem-focused coping and use of deep processing learning strategies. The maladaptive perfectionism dimensions also predict school achievement indirectly, but this relation is medi-

ated by emotion-focused coping and by self-handicapping behaviour. The neurotic perfectionism has strong direct effect (0.50) on emotion-focused coping, and both direct and indirect effects on self-handicapping. Generally, adaptive perfectionism, problem-oriented coping with school failure and deep processing as learning strategy were linked to better school achievement. On the other hand, maladaptive perfectionism, emotion-oriented coping with school failure and self-handicapping were related to lower school achievement.

Q 8   27 August 2005   11:00 - 12:20   Room A112

Paper Presentation

PEER INTERACTION

Chair: Margarida Cesar, Universidade de Lisboa, Portugal

Peer-assessment and peer-feedback: Quality and effects on learning
Sarah Gielen, University of Leuven, Belgium
Tinne Van Camp, KHLeuven, Belgium
Filip Dochy, University of Leuven, Belgium

Recent literature suggests that the power of formative assessment may be strengthened if students participate in the assessment process actively. The present study in a first-year teacher training examines the potential of peer-assessment and peer-feedback to foster deep learning approaches and raise performance (from draft- to end-versions and between control and experimental groups). Furthermore, the quality of student's feedback and marks is assessed, and its relationship with outcomes. Finally, possible interactions with students' overall competency in the subject is addressed. Grades for draft- en end-versions of the task and for the overall course are gathered, questionnaires on learning approach and perceptions of peer-feedback are administered and scores for marking- and feedback-agreement are calculated. Results show that students who gave and received peer-feedback on an authentic task performed better in this task than a control group without peer-feedback, and this effect is linked to a more elaborative and self-regulating learning approach. Moreover, better students gained more between draft- and end-versions than others. Students also perceived peer-feedback (both receiving and giving feedback) as supportive for their learning (task performance and more general skills), but perceptions of positive effects and of high feedback-quality did not directly relate

to higher grades on the task. Marking- and feedback-agreement scores revealed only moderate agreement between peers and teachers. This problem is however not related to students' overall competency in the subject. This study proves that peer-assessment and –feedback are perceived as a strong tool for learning by students, in spite of the sometimes low agreement between peer- and teacher-feedback. Positive effects on learning approach and learning outcomes seem plausible, although some relationships need to be clarified more in-depth. Results will be connected to each other and related to other research findings. Unexpected results will be analysed in search for an explanation.

Peer Support: Benefits for All
Luise Ellis, Australian Council for Educational Research, Australia
Herbert Marsh, University of Western Sydney, Australia
Rhonda Craven, University of Western Sydney, Australia

The early adolescent years are marked by a confluence of change, including biological, psychological and social developments, as well as the move from primary to secondary school. Research suggests that this transitional period can be challenging and potentially disruptive to adolescent functioning, placing those who are unable to successfully negotiate the changes into a downward spiral that can eventuate in declining self-concepts, school failure, premature school dropout and maladaptive psychological functioning. Awareness of the problems facing adolescents has led to the promotion of school-based intervention strategies to help students maintain positive self-concepts and overcome their adjustment difficulties. However, large-scale studies on the effectiveness of peer support programs are currently lacking. The current investigation sought to examine the effects of a widely-used secondary school peer support program on both Year 7 students and their peer support leaders (Year 10/11 students). Participants in the study were 930 Year 7 students and 858 Year 10/11 students from three secondary schools in Sydney. The program consisted of 12 fifty minute sessions. Study participants in the experimental and control groups completed an extensive self-report questionnaire on 3 occasions (near the beginning of the year, 12 weeks later, and towards the end of the year). The results provided evidence that the program was largely successful in achieving its aims of enhancing Year 7 students' school self-concept, school citizenship, sense of self, connectedness, resourcefulness and sense of possibility for the future. Furthermore, the program led to a variety of benefits for the peer support leaders, including enhancements in leadership ability, school citizenship and peer relations. The findings of this study provide solid evidence that peer support programs have the potential to

make a significant contribution to schools' efforts to orchestrate positive outcomes, not only for early adolescents, but also for older students who implement the program.

Peer – Peer Interaction and Effective Learning: A European Comparative Study
Peter Kutnick, University of Brighton, United Kingdom
Sofia Avgitidou, University of Western Macedonia, Greece

Pre-schooling experience and cognitive outcomes have been closely related in recent studies concerning early childhood education for children across Europe. However, when we think about early childhood education we spontaneously link it with Children's experience of social relationships and play rather than learning. This paper will discuss young Children's peer interactions and relate it to their learning potential. Therefore, the questions we ask are «What is the range and quality of peer – peer interactions and what is their learning potential?». Further, «what is the role of the teacher in organising/supporting or excluding these interactions?». The significance of the previous questions draws upon the results of recent studies that show that although the emphasis for the construction of Children's learning experiences has been given in teacher-child pedagogies, children spend a majority of their time with peers in early childhood settings. The research questions written above have formed a basis for a European (England, Greece, Italy, Spain, Sweden and Finland) comparative study of peer-peer interaction (4-5 years) in early childhood settings, held under a Socrates programme. The paper presentation will involve a) a short description of the various methodological instruments (observations, interviews, sociometrics, mappings), b) methodological concerns for doing research on the same theme but in different places and contexts, c) an analysis of the research results discussing if effective social relational and social inclusion opportunities are being offered in a range of European early childhood settings and d) tentative proposals for the value and implementation process of a social relational approach for effective learning.

Peer facilitated mentoring - mediating a powerful social process in a complex context
Shaheeda Essack, University of Durban-Westville, South Africa

Institutions of higher learning are facing some of their most difficult challenges yet. Unprecedented changes in higher education have led to a range of outcomes – one of the most significant being increasing diversity in the student body versus

the institution's ability to meet the needs of such students. Embedded in the notion of diversity are issues of access and equity. A high student drop-out and failure rate has forced the politically difficult but necessary questions regarding the issues of access and equity. In feedback received from a group of senior peer mentors it became evident that the notion of access is contentious, ambiguous and contradictory. While institutions play to the political game of social redress, large numbers of students are unable to access the very knowledge they have come to seek. Many students continue to struggle. This research is based on the assumption that the world of academia is largely inaccessible to students and that the peer mentor serves as a mediator between the institution and the student thereby facilitating a powerful social process that leads to much academic engagement with the intended outcome of bringing together and realigning institutional imperatives and student needs. The research questions that have guided this study are the following: 1. What are the challenges facing first year students at university? 2. Describe the factors that determine the kinds of choices students make as to whether to remain within the higher education system? 3. Describe the factors that lead to the success of peer facilitated mentoring? The discussion is located within the theoretical framework of Uri Bronfrenbrenner's ecological model on development. The method used to gather information is the focus group interview, the results of which will be discussed in interpretative themes.

Q 9   27 August 2005   11:00 - 12:20   Room E002

Paper Presentation
Special Education

SPEECH, LANGUAGE AND WRITING DIFFICULTIES

Chair: Ernest van Lieshout, Vrije Universiteit Amsterdam, Netherlands

Resilience to behavioural, emotional and social difficulties in children with specific speech and language difficulties
Geoff Lindsay, Cedar, University of Warwick, United Kingdom
Julie Dockrell, Institute of Education, University of London, United Kingdom

A sample of 69 children with specific speech and language difficulties (SSLD) had enhanced levels of behavioural, emotional and social difficulties (BESD) at age 8 as rated by both parents and teachers. Their language and educational development

was reassessed at ages 10 and 15 years, confirming thei continuing language and educational difficulties. Their BESD were reassessed at age 10 and 12 years and the stability of these difficulties across time and contexts (home and school) and their relationship with language ability at age 8 and 10 were examined. Further analyses will be undertaken when the data form the current assessments of these young people, now aged 15 years, have been analysed during Spring 2005 The findings will explore the concept of resilience in children with SSLD, with particular reference to a model of compensatory interaction. This 3-dimensional model takes into account within-child factors (e.g. language), environmental factors (e.g. support from home v school) and the interaction of these factors with time. The implications for inclusive education and the development of theory regarding SSLD will be explored.

Teacher Attitudes, Knowledge and Practices of Writing in the Context of Instruction for Students with Special Needs in Inclusive Classrooms
Christina van Kraayenoord, University of Queensland, Australia
Karen Moni, University of Queensland, Australia
Anne Jobling, University of Queensland, Australia
David Koppenhaver, Appalachian State University, United States
John Elkins, University of Queensland, Australia

This paper reports on one aspect of a larger study, the WriteIdeas project, which is concerned with teachers and their middle school students who have developmental disabilities or learning difficulties and who are taught full-time in inclusive classrooms. The study describes the findings of a survey of teachers' attitudes, knowledge and practices related to the teaching of writing for two cohorts of teachers—one group living in a metropolitan area and another in a remote, rural location in Queensland Australia. Changes in individual teachers' attitudes, knowledge and practices across time will also be reported. The results will be interpreted with respect to implications for pre-service teacher education and professional development which focuses on supporting students with special needs in inclusive classrooms and on writing pedagogy.

Mental verbs and memory function in school-aged children with Specific Language Impairment and Typically Developing Children
George Spanoudis, University of Cyprus, Cyprus
Demetrios Natsopoulos, University of Cyprus, Cyprus

Children with Specific Language Impairment (SLI) exhibit a significant deficit in

language ability, although they do not show clear evidence of other type of problems (sensory, neurological, emotional or social) that might contribute to their language difficulties. Current research shows children with SLI present deficits in various aspects of receptive and/or expressive language, such as phonology, morphology, syntax, semantics and pragmatics. In the present study 50 children with SLI were compared with 50 Typically Developing Children (TDC) and 48 young adults with regard to comprehension and production of mental verbs and their memory ability. The children with SLI differed from the TDC in verbal intelligence while nonverbal intelligence and chronological age were controlled. A test battery of ten tasks was used in the three groups to measure memory ability (five tasks) and comprehension and production of a number of mental verbs (five tasks). The results have shown that children with SLI performed significantly lower compared with TDC on both memory and mental verb tasks. Especially, the findings suggest that skills of phonological and long-term memory of children with SLI are impaired. Also, comprehension of semantics and production of mental verbs lagged behind performance by TDC. It is also noted that measures concerning working memory and long-term memory ability were the best markers discriminating children with SLI comparing with TDC, according to Logistic Regressions and Discriminant Analyses. Overall, the data have indicated that the developmental trajectory of the SLI group of children in memory ability and mental verb acquisition is distinctively different from that of TDC; the latter group develops in a way that is similar to the pattern displayed by the group of young adults. Despite these differences, use of structural equation modeling demonstrated that the differences mentioned are of a quantitative rather than of a qualitative nature.

Compensated adults with dyslexia have still phonological problems
Ulrika Wolff, Department of Education, Gothenburg University, Sweden

Many adults with dyslexia have reached an acceptable level of word reading and can cope with the literacy demands even at a university level. However, it is not clear whether they also have compensated for the phonological problems associated with dyslexia. It might be reasonable to expect that adults, even those with dyslexia, have been sufficiently exposed to written language to overcome their initial phonological deficiencies. In the present study three groups matched on word reading ability are included: A group of adult university students with dyslexia, a group of non-dyslexic university students and a younger group of reading level matched students from compulsory school. A matching procedure resulted in three groups where triplets of 10 subjects were almost perfectly matched on word read-

ing scores. Each triplet consisted of one university student without dyslexia, one university student with dyslexia, and one young normal reader. A battery of tasks aimed at a deeper assessment of typical dyslexic traits was developed including a large number of tasks capturing various aspects of phonological functions, such as non-word reading, non-word spelling, spoonerism, reversed spoonerism and phonological choice. Accuracy as well as reaction times has been recorded to arrive at estimates of efficiency. A MANOVA indicated that the group of university students with dyslexia performed significantly worse compared to the two other groups on all phonological variables except for non-word reading accuracy where the only significant difference was observed between the group of dyslexic university students and the group of non-dyslexic university students. Although three groups performed at almost exactly the same level on word reading, only the dyslexics were phonologically impaired. This rules out the possibility that poor word reading is the cause of phonological deficits. The results support the phonological deficit hypothesis of dyslexia.

Q 10   27 August 2005   11:00 - 12:20   Room E010

Paper Presentation
Teacher Education

RESEARCH AND PRACTICE

Chair: Csaba Csikos, University of Szeged, Hungary

Multiple perspectives in the evaluation of teacher education
Hermann J. Abs, German Institute for International Edu. Research, Germany
Eckhard Klieme, German Institute for International Edu. Research, Germany
Peter Doebrich, German Institute for International Edu. Research, Germany

This paper reports on a large scale evaluation project for teacher education in Germany. Given that research on teacher education suffers a lack of well established theoretical models and empirical instruments, especially with regard to the second (in-school) phase, it was deemed necessary first to develop evaluation instruments which cover output standards as well as input and process aspects of teacher education. The presentation starts from a comprehensive model of competence development. Also, the evaluation instruments are described and several empirical results are presented. Emphasis is placed on the analysis of self-efficacy. It is shown

how the factor structure of the self-efficacy scale changed with different parties involved. While self-efficacy of teacher students is a one-dimensional construct, it is perceived as a three-dimensional construct by teacher trainers. Different ways of explaining this result both empirically and theoretically are presented. Then the question is raised how far output variables, which are measured by self-assessment are determined by other factors than instructional processes. While instructional processes should systematically influence the output of teacher training other variables like gender, school subject, and school track could lead to unintentional bias, if not considered in evaluation projects. Different ways of how to deal with the influence of such variables in evaluation projects are discussed.

Restructuring Reforms in Turkish Teacher Education: Modernization and Development in a Dynamic Environment
Gary Grossman, Arizona State University, United States
Pinar Onkol, Middle East Technical University, Turkey

Since its founding eight decades ago, Turkey has emphasized education as a key to economic, social and political development. For fully half of that time, it has aspired to membership in the European community. Development in education, therefore, has been seen as one of the means through which Turkey both enhances its progress towards its social goals as well as prepares itself for potential European Union membership. In this context, Turkey has made a major effort to upgrade and modernize the Turkish educational system, introducing a multi-phased comprehensive reform of the education sector through the 1990s. One of those reforms, perhaps the one most crucial to the long-term effectiveness of many of the other efforts in education, has been an attempted transformation of the nation's approach to training teachers. It has now been five years since the completion of both the World Bank-funded National Education Development Project (NEDP) and its parallel reform in restructuring faculties of education. In 2003-2004, a major study of the effects of the reforms of Turkish teacher education was conducted under the sponsorship of the Fulbright Commission for Educational Exchange between the United States and Turkey, one portion of which included an evaluation of the restructuring effort from the perspectives of Turkish teacher education faculty. This paper examines the effectiveness of this recent effort in teacher education reform in Turkey, specifically efforts to restructure academic programs in faculties of education across the nation, from the teacher educator point-of-view. It also discusses educational reform efforts in the Turkish educational system with specific reference to Turkey's EU aspirations. Further, it examines the theoretical implications for the modernization of

teacher education in an institutional context. Finally, it addresses issues that should be considered for other nations with similar developmental goals.

Partnership in Initial Teacher Education in England: ten years on
Anne Campbell, Liverpool Hope University College, United Kingdom
John Furlong, University of Oxford, United Kingdom
John Howson, Education Data Surveys, United Kingdom
Olwen McNamara, University of Manchester, United Kingdom
Sarah Lewis, University of Manchester, United Kingdom

The move to a more centrally school-based 'partnership' model of Initial Teacher Education in England in the early 1990s was prescribed by government and resulted in many new practices and processes. In general most higher education training providers, many already having well established partnerships with schools, supported the development of this training model; but they viewed some aspects of the government's policy interventions as having potentially alarming consequences in terms of funding and accountability. This concern was not appeased by the creation in the mid 1990s of the Teacher Training Agency, established by the government to manage and control the supply of teachers, distribution of training places and funding allocation. Radical change meant that almost every aspect of teacher education had been transformed and it was now clear that it was under the direct control of the Teacher Training Agency. Changes in teacher education are not unique to England; educationalists in both the USA and Australia report enormous changes in recent years to teacher education in their countries. What is surprising, however, is that despite ten years of almost constant revolution with wave upon wave of reform, there has been comparatively little debate in England. In the late 1990s, however, there were indications that reforms were putting partnerships under strain, and causing cracks to appear that divided schools and higher education institutions, rather than bringing them together. In response, in 2001, the Teacher Training Agency embarked upon an ambitious five year innovative development programme, the National Partnership Project, designed to reflect national concerns regarding the development of high quality, robust partnerships for Initial Teacher Training. Drawing on data from a two year long evaluation of the project this paper will explore the current state of partnership and professionalism in initial teacher education.

Teacher Educators and the Practice Alibi
Gracinda Hamido, University of Lisbon - Educational Research Center, Portugal
Margarida Cesar, University of Lisbon - Educational Research Center, Portugal

This work intends to describe and to discuss some results of a research whose main aim was to analyse and interpret an ongoing process of reconstruction of a teacher education curricular project (1st to the 4th grade teaching) as well as its bases. We used several theoretical frameworks that formed three dimensions of analysis: (1) curricular; (2) organisational; and (3) personal / interpersonal. Using an ethnographic approach and a case-study methodology, we intended to uncover teacher educators' ways of framing the change process and eventually solving the dilemmas it implied, both through their accounts of their experience, and through the observation of some of their classes and meetings with other colleagues. We discuss some of the teacher educators' arguments around the 'theory/practice articulating' issue. We develop an interpretation of those arguments by building on the work of several authors who in the last decades have been studying teachers' professional identity, knowledge and development, within an epistemology of practice framework (Clandinin & Connelly, 1998; Schon, 1987; Zeichner, 1996). We also mobilize an historical-cultural framework (Grossen & Py, 1997; Schubauer-Leoni & Perrett-Clermont, 1997; Vygotsky, 1978) as the construction of professional knowledge is embedded in semiotically mediated social interactions between the agents involved. The nature of the teaching profession itself (both from the teacher educators' point of view, and from the prospective teachers' point of view) seemed to be one of the core influential elements in the conception and implementation of the curricular 'architecture' and dynamics, as well as in the ways teacher educators experienced their role in those processes.

Paper Presentation

COLLABORATIVE LEARNING

Chair: Jan Elen, Katholieke Universiteit Leuven, Belgium

Implementing cooperative learning in primary schools: Results on teachers' instructional behaviors and perceptions of cooperative learning
Karen Krol, University of Amsterdam, Netherlands
Simon Veenman, Radboud University Nijmegen, Netherlands
Rinus Voeten, Radboud University Nijmegen, Netherlands
Peter Sleegers, University of Amsterdam, Netherlands

This paper summarizes the results of the level of the teacher of a school improvement program that was aimed at long-term implementation of CL in four primary schools in the Netherlands. The school improvement program consisted of two treatments, a CL staff development program aimed at changing teacher behavior and perceptions, and a program for the school leadership aimed at the development of leadership practices that are assumed necessary to support the teachers during the process of implementation. We expected the school improvement program to have a positive effect on teachers' instructional behaviors concerning CL in the classroom, and on teacher perceptions of CL. Teachers' CL instructional behaviors were determined by systematic classroom observations, and teacher perceptions were determined by use of a teacher questionnaire on CL. In this study, the effects on teachers instructional behaviours and perceptions of CL were evaluated using a pretest-posttest control group design. The observational data showed the trained teachers to be able to conduct cooperative lessons in an appropriate manner, applying the basic elements of CL (positive interdependence, individual accountability, face-to-face promotive interaction, attending to social skills, and group processing). The questionnaire data showed the trained teachers to report a statistically significant higher frequency of application of six out of nine CL-related behaviors than the control teachers: application of positive interdependence, individual accountability, face-to-face promotive interaction, attending to social skills, evaluation of the group process, and monitoring group work. In addition, the trained teachers showed a significant increase in scores from the start to the end of the program regarding the perceived cognitive and social benefits of CL for their students as

compared with the control teachers.

Making the uncertainty visible: The use of representational tools in collaborative knowledge building
Maria Larsson, Lund University Cognitive Science, Sweden
Mats G. E. Svensson, Lund University Centre for Sustainability Science, Sweden

By analysing video and computer screen recordings of students collaboratively constructing models we aim to illuminate the knowledge building process of how the students develop their understanding of concepts and theories connected to system dynamics modelling. The process is facilitated by use of non-technical as well as technical artifacts. Our question is how knowledge building is manifested in the students' discussions and actions and what role the artifacts play. In our study, students discuss and negotiate their conceptual models and visualize them by using representations. We found that there were qualitative differences in students' reasoning with regard to what tool was used and we also found that technology play an important role in helping the students determine what knowledge is needed in the various modelling stages. The tools elicit situations that need a certain decision and input and such situations are explicitly showing the students that their conceptual models are incompatible or incomplete. In this way students' uncertainty becomes visible to the group and this moment is often a turning point in the collaborative knowledge building process.

Learning to collaborate: The role of intercontextuality in the joint construction of meaning
Judith Kleine Staarman, The Open University, United Kingdom

This paper will focus on the analysis of the dynamic process of the joint construction of meaning in a primary school literacy practice with ICT. Drawing upon sociocultural and dialogic perspectives on learning and, this paper considers learning not just as an individual cognitive process, but as a process that is located between individuals and their sociocultural context. Using the notion of intertextuality, an account is given of how children refer to past texts (oral or written) and practices (ways of being with, and constructing text), in order to construct present texts and/or to implicate future ones. Results show that children were not just juxtaposing other linguistic resources, but prior contexts themselves. These contexts were invoked in interaction and thus became a resource for the children to draw on. The paper exemplifies how prior contexts can shape the present context and implicate

future ones and how this relates to the process of creating collaborative awareness in the classroom and to Children's perceptions of collaborative work. Based on the results of the analysis, I will argue for an extension of the notion of intertextuality towards a notion of intercontextuality, which describes not only the linguistic processes but also the social and cultural processes that are involved when people interact with each other. In this view, intertextuality is not limited to implicit or explicit references to other (literary) texts, but it can occur at various levels (from words to genre types and situational contexts) and in many ways (for example by mixing genres or contexts).

A Narrative View on Children's Creative and Collaborative Activity
Marjaana Juujarvi, The University of Lapland, Finland
Annakaisa Kultima, The University of Lapland, Finland
Heli Ruokamo, The University of Lapland, Finland

The aim of the paper is to examine Children's design processes of their playing environment from the viewpoints of narrative and narrative thinking. When the children created their ideal playing environments, a large number of stories came up in the process. In this study we are interested in how these stories were constructed in the creative processes and what the meaning of narrative thought is for the process. The research material consists of 15 playful creation sessions, during which the children (N = 49) expressed their thoughts by drawing and telling stories. A session involved a group of from 2 to 5 children that consisted of all boys, all girls or was mixed. Our starting point is the pivotal nature of narrative thinking in creative activities and we also aim at a closer theoretical examination of this phenomenon. Observations based on the material indicate that the children structured their experiences and the products of their imagination into entities, through which the created environments assumed a meaning. The collaborative design processes were unique, yet there was also congruence in the formation of narratives in the groups. We realized that in situations, where the entire group was emotionally committed to build a story and functioned in a reciprocal manner refining ideas together, there was collective thinking, which in this context can be regarded equal to shared narrative thinking. Stories based upon a strong feeling of togetherness were often initiated through either imitation or humour. The children were also enchanted by exceptional ideas: they seemed to inspire the children to create even more incredible play worlds than before. The results will be utilised in the Let's Play project [www.smartus.fi], which develops learning environments based on play and games.

Paper Presentation

INSTRUCTIONAL STRATEGIES

Chair: Leena Laurinen, University of Jyvaskyla, Finland

Investigating the meaning of positive high correlations: Teachers ranking with students actual standardized test scores
Annapurna Ganesh, University of Houston, United States
David Berliner, Arizona State University, United States

In America, nationally standardized tests are being used to meet accountability requirements. Such tests are used even in the early primary grades. Primary grade teachers typically engage in periodic assessments throughout the school year to make instructional decisions. What teachers have not used, until recently, are nationally standardized tests. Second and third grade teachers in a primary school were asked to rank order their students on how they perceived their students would perform on a nationally standardized test imposed upon them in the interests of accountability. Teacher's rankings were correlated with the students' actual test scores. The correlation coefficients were positive and quite high. This study examined the meaning of these positive high correlations in the context of testing of young children.

Does Socratic Dialogue enslave students?: Defining a dialogic pedagogy
Eugene Matusov, University of Delaware, United States
Darryl Powe, University of Delaware, United States
Mark Smith, University of Delaware, United States

Socratic dialogues have traditionally been praised for promoting critical thinking, renewing interest in subject matters, provoking students' thinking, facilitating construction of meaning and discovery learning. Socrates himself provided the ideology of his teaching as testing the truth, discovering his own ignorance, pursuing truth about fundamental questions. In this paper, however, we treat Socratic dialogic presented by Plato as educational ethnography, specifically by making a conversational analysis of the Meno dialogue. We discovered that the Socrates dialogue with free people is radically different with the slave and all these dialogues are different

from Socrates' declaration about his own method. In all the dialogues, we did not find any evidence of Socrates' seeking truth and learning something new himself from participation in these dialogues. Rather, he tried to bring other participants to something that he already knew. Dialogues with the slave is radically different than with the free citizens. The inquiry with the slave came from Socrates himself, while the inquiry with free people arose from the free people themselves. Dialogue with free people was highly ontological, dramatic, improvisational, truth-seeking, challenged Socrates himself, and was unsafe for Socrates' public reputation. Meanwhile the dialogue with the slave was decontextualized, hierarchical, contrived, rigidly pre-designed, pleasing Socrates, non-challenging for Socrates, and safe for Socrates' public reputation. We reviewed modern educational literature on Socratic dialogues in the classroom. Our preliminary findings show that the use of Socratic dialogue in the classroom is highly variant, on a continuum from Socrates' dialogue with a slave to a dialogue with free citizens. There are rare exceptions when Socratic dialogue is true to Socrates' claims about his own method. Our analysis helps to define dialogic pedagogy stemming from Socratic method.

Stimulation of creativity by teaching instructions
Luisa Sans de Acedo Lizarranga, Public University of Navarre, Spain
Maria Cardelle Elawar, Arizona State University, United States

The chief aim of this research was to determine whether creative teaching instructions improve creative behavior and academic achievement in language—both comprehensive and productive—and in plastic arts, because it seems that instructions prepare the student's mind to perform tasks with greater levels of depth, imagination, and motivation. The sample was made up of 50 children of both sexes, ages ranging from 9 to 11 years old, from the 3th course of Primary Education, at a public center. A quasi-experimental design was applied, with two measurements: pretest and posttest. The independent experimental variable was the teaching instructions and the dependent variable, the responses to the Imaginative Creative Test (ICT, in Spanish the Prueba de Imaginaci?n Creativa or PIC). The procedure consisted of three stages: pretest or prior assessment, intervention or administration of creative instructions during six months of the academic course, and posttest or final assessment. The results show that teaching instructions are effective to stimulate creativity and imagination in verbal and graphic tasks and that students with high creative imagination, as opposed to medium- and low-scoring students, produced more responses in less time, perceived the task from various perspectives, and surprised us with their valuable responses. The conclusions and suggestions that emerge from

the study are relevant, both for the research level and for education.

Alternative Ways of Teaching Literature Using Critical Literary Theories and Technology: A Model for training Freshman Literature Students and it's findings
Sara Hauptman, Achva College, Israel
Melodie Rosenfeld, Achva College of Eduction, Israel

This research focused on the evaluation of a model for training freshman Literature students. The students were trained to design two different and alternative literature lessons for a poem or a story they intended to teach by (1) referring to different Critical Literary Theories and (2) using different teaching-strategies, including technology applications, related to the chosen Critical Literary Theory. The findings of our study point to a strong contribution of the model to our 16 university graduate students: (a) Statistically significant progress was observed in the final product, when two different lessons which were suggested for an unseen poem, pointed at a better clarification of the learning tasks and a better usage of theoretical terms in each lesson-plan; (b) Presentations of the usage of technology applications for two different lessons, suggested for teaching a poem or a story chosen by each student, pointed to a high degree of creative and original usage of technology, well related to Critical Literary Theories . These findings can be correlated to (c) Statistically significant progress was observed in the contribution of the model to students' pedagogical confidence and to literature teaching proficiency as mentioned in students' interviews. Students also mentionend various benefits of using technology applications in literature lessons. Those findings are less correlated to (d) the monthly reports, which point to many practical problems and difficulties as well as conceptual conflicts in using technology applications in literature lessons . Here a step-by-step change in the students' attitudes towards using technology applications was observed during the second semester. The study of the model and its findings can serve both as a diagnostic and a teaching tool.

Paper Presentation
Academic Learning

MEDICAL AND NURSING EDUCATION

Chair: Xenia Hadjioannou, University of Cyprus, Cyprus

Pedagogical Awareness of Teaching and Learning of Internationalization in Higher Education: The Swedisch nurse education as an 'contextual example'
Monne Wihlborg, Dep of Education, Lund University, Sweden

This paper presents results from empirical studies; qualitative interviews with students, a survey and an interview study with teachers in the context of the Swedish nurse education. The aim has been to study students' and teachers' understandings and experiences of internationalisation against the backdrop of the strong concern for internationalisation expressed in different policy documents in Higher Education. The results are seen in the context of globalisation, constraints to educational change, and cultural perspectives, and in relation to the existence and need of a curriculum theory. The students mostly viewed internationalisation from the perspective of their personal experiences. In their personal experiences the teachers united the global, national and local through personal experiences of other countries and cultures as a basis for their interest in, and choice of, content in their teaching considered representing internationalisation of the education. The teachers were interpreting internationalisation in line with their understanding of nursing without making any clear distinction of what specifically was internationalisation. Teachers understanding and approach did not represent a shared culture and there was no shared curriculum including a distinct understanding of internationalisation. The conclusions drawn from the results of all the studies imply, a need for a theoretical awareness emphasising a deep approach on learning involving a student focus, acknowledge variations in meaning when teaching about internationalisation. This would imply a shift in the way of understanding internationalisation in higher education as in the nurse education in Sweden based on the assumption that teachers understanding of internationalisation do not represent a shared culture, and there is no shared curriculum including a distinct understanding of internationalisation, and therefore, the fundamental basis when interpret intentions of internationalisation in higher education should be anchored through a pedagogical theoretical awareness.

This is seen as a challenge to both policy makers and teachers.

The effects of a competency-oriented learning environment on the reflection skills of nursing students

Marieke Smits, Open University of the Netherlands, Netherlands
Dominique Sluijsmans, Open University of the Netherlands, Netherlands
Wim Jochems, Open University of the Netherlands, Netherlands

This study investigates the effects of a competency-oriented course on the reflection skills of students in higher nursing education. Giving constructive feedback by trained teachers was a specific important element in this course. 31 first-year nursing students were randomly assigned to a control group (n=17) and an experimental group (n=14). All students first enrolled in a conventional course, based on lectures and assignments with a traditional test. Subsequently, they enrolled in a competency-oriented course, which included more performance-oriented tasks based on competencies and a performance assessment. In both courses, students from the experimental group received feedback on their assignments and activities from teachers who were trained in feedback skills, while the control group received feedback from non-trained teachers. After each of the courses, all students wrote a reflection report. A rating form was developed to investigate the quality of the reflection reports of both courses. Analyses of data derived from the reflection reports showed that the reflection reports that students wrote after the competency-oriented course were of a higher quality than the reflection reports that were written after the conventional course. In the reflection reports written after the competency-oriented course, students reflected more on their learning experiences and learning goals. Reverse significant differences were found between the quality of the reflection reports of the students of the control group and the quality of the reflection reports of the students of the experimental group. Possible explanations for this may be that the training period in feedback skills was too short, or that the teachers who were not trained were already competent in giving feedback due to longer teaching experience. The study makes apparent that a competency-oriented design of courses may enhance the reflection skills of nursing students and that feedback training for teachers can be improved.

Assessing styles and quality of peer feedback reports of General Practioners in training (GPiTs)
Frans Prins, Open University of the Netherlands, Netherlands
Dominique Sluijsmans, Open University of the Netherlands, Netherlands
Marie-Louise Schreurs, Maastricht University, Netherlands
Paul Kirschner, Open University of the Netherlands, Netherlands

Feedback skills are crucial for the professional development of General Practioners. Intensive training is required for the acquisition of these feedback skills, but in medical education explicit training programs for structured feedback sessions are rare. In order to provide General Practitioners in Training (GPiTs) with tailor made instruction aimed at feedback skills, one needs to examine the style and quality of their feedback. This is the focus of the present paper. Forty-six GpiTs, (25 first-year and 21 third-year), were asked to write a feedback report based on their observation of a video-registrated consult of a peer. It was decided that three variables were important to determine the style and quality of the peer feedback report: 1) the use of criteria, 2) feedback form, and 3) writing style. Two instruments were developed: a rating form to assess the feedback style and a scoring rubric to determine the quality of the feedback. Examples of style indicators were: the number of used criteria, positive remarks, negative remarks, reflective questions and suggestions for improvement. Quality indicators were the use of criteria (i.e., quality of content and explanations, representing 50 % of the score), feedback form (i.e., remarks, posed questions, repertoire and advice, representing 35 % of the score) and writing style (i.e., structure, formulation and style, representing 15 % of the score). It was found that the feedback style of GPiTs can be characterized as descriptive, unstructured, a limited amount of explanations, limited descriptions of specific behavior, hardly any reflective questions and hardly any suggestions for improvement. Consequently, the quality of the feedback reports was rated as low. Moreover, no differences between first and third-year GPiTs for style and quality were found, which suggests that the development of feedback skills during the curriculum of GPiTs is rather limited.

Evaluating predictors of the learning outcome in the online course of Medical Informatics
Anne Nevgi, University of Helsinki, Finland
Kalle Romanov, University of Helsinki, Finland

The aim of the paper is to explore the learning outcomes achieved in the different Web-based learning environments. The participants (N = 93) are third year medical

students who studied in the Medical informatics online course. The students were randomly divided into two groups. The students in WWW group (N = 46) had access only to the course material through Web-based environment for the self-study. However, they could post emails to the instructor for the help and have feedback to their questions. The students in the WebCT group (N = 39) had similar access to the course materials, but they were also able to participate in discussion groups with peers and have special discussions about lectures, quizzes and students' own notes. The eight students dropped out from the course. The material for the study was collected by two questionnaires which measured (1) the meaningfulness of using information technology in learning and (2) the learning experiences in online course, from the WebCT log information, and from the postings to the discussion forums. The learning outcome measured as a course grade was significantly higher in WebCT group than in the WWW group. In the WebCT group the activity of the participation in the discussion explained the better learning outcome. The significant gender differences in learning outcomes were found in the WEbCT group. The females benefited more on the discussion forums than males. The results confirm the previous findings that special learning tools intensify the learning process in an online course, and that the students activity in learning predicts better learning outcomes. The implications for the developing online courses are presented.

Q 14   27 August 2005   11:00 - 12:20   Room E113

Paper Presentation
Teacher Professional Development

HIGHER EDUCATION TEACHERS

Chair: Jean McNiff, University of Limerick/St Mary's University Colleg, Israel

Educating the Educators- Creating a community of learning for teacher educators
Yael Poyas, Oranim Academic College of Education, Israel
Kari Smith, Oranim Academic College of Education, Israel

Professionalism of teacher educators has recently become the focus of a number of studies. Less is known, however, about how teacher educators develop professionally. The current study examines the extent of satisfaction with an institutional in-service programme and unique needs of instructors of didactic courses. The study took place in a large college of education in Israel, which offers a number of aca-

demic teacher education programs. The instructors teach mainly subject matter di-dactics and constitute a special group in the college teaching staff. They have unique characteristics and professional needs. Most of them are expert school teachers with advanced academic degrees. These instructors are frequently recruited to the col-lege due to their excellent reputation as teachers. There is no professional program for preparing those teacher-educators for their unique task. Therefore, in 2003 the college initiated a special professional development course in order to encourage instructors of didactics to create their own working and learning community. A number of data-collecting were used: quantitative feedback questionnaire after each meeting, selected interviews of four of the course participants and the course leaders, and observation by an external observer. Preliminary findings indicate there is high agreement in the data collected by the various instruments. The main tendencies found are a high appreciation of peer-learning and the importance of not working in isolation, but within a learning community. Furthermore, they expressed a strong wish for hands-on-experience with theoretically presented material and ample time to discuss how to apply the theory in their various contexts. Diversity was found to be an advantage. Finally, the instructors did not appreciate a pre-decided course content, they want to be involved in deciding topics in light of their needs.

The significance of the study lies in examining affective issues related to profes-sional development of teacher educators.

Effects of a blended learning system for university teachers training
Bernadette Charlier, University of Fribourg, Switzerland
Platteaux Herve, University of Fribourg, Switzerland

In this contribution we evaluate the learning effects of a blended learning environ-ment designed according to the principles described by Entwistle (2003). Having briefly described the context (teacher training in higher education), the teaching and learning environment (objectives, resources and actors), we will analyze learn-ing outcomes and processes taking into account both the students' experiences of learning and the teachers' evaluation of learning outcomes. Do the students adopt a deep approach? Do they develop teaching professional competencies? Into which conditions are these effects observed?

University teachers' perspectives on self-regulated learning
Helma Oolbekkink-Marchand, Leiden University, Netherlands
Jan Van Driel, Leiden University, Netherlands
Nico Verloop, Leiden University, Netherlands

Students need a supportive environment to help them regulate their learning process. One of the important sources of support is the teacher. A teacher can provide feedback on the learning process of the student and model how to approach a learning task. Besides the necessary skills a teacher needs to help students, we know from the literature the way a teacher thinks about a phenomenon, in our study self-regulated learning, is important (Pajares, 1992). We assume that teachers' perspectives consist of intentions and beliefs and that perspectives influence behavior in teaching practice. The main goal of this study is to describe teachers' perspectives on self-regulated learning and compare perspectives from teachers teaching in different disciplines. Two studies are described here using two different instruments. In the first study, 20 university teachers were interviewed to explore the variety of perspectives on self-regulated learning. The analysis of the interviews resulted in four perspectives: (1) meaning oriented / loose regulation, (2) meaning oriented / shared regulation, (3) knowledge oriented / shared regulation and (4) knowledge oriented / strong regulation. In the second study a questionnaire was constructed based on the interview results. A pilot study was done in a group of 39 university teachers to test the questionnaire. The questionnaire was sent to all 1507 teachers of one university in the Netherlands. The useful response was 343 (23%). Factor analyses and discriminant analyses were conducted to see if the perspectives found in the interviews could also be identified in the questionnaire. The results were investigated further to explore differences between teachers teaching in different disciplines. Final results of the study will be presented during the conference.

Limitations on Development as a University Teacher
Gerlese Sachse Akerlind, Australian National University, Australia

This study undertook a phenomenographic analysis of academics' ways of approaching their growth and development as a university teacher. The focus of the study is on the meanings and intentions underlying different ways of going about developing as a teacher, and how this relates to the ways in which academics understand the nature of teaching development and being a university teacher. Five different approaches to developing as a university teacher emerged, varying from a focus on building up a better knowledge of one's content area, in order to become more familiar with what to teach, to continually increasing one's understanding of what works and doesn't work for students, in order to become more effective in facilitating student learning. Each approach can be described in terms of a direct and indirect object of teaching development, intertwined with an act. The approaches experienced by academics, and the meanings and intentions associated with them,

are seen as constituting constraints on their potential for developing as a teacher. Implications for academic development are discussed.

Q 15   27 August 2005   11:00 - 12:20   Room E102

Paper Presentation

COMPREHENSION OF TEXT AND GRAPHICS

Chair: Andrea Karpati, Eotvos University, Hungary

Supporting Concept Mapping for Learning from Text
Sabine Hauser, University of Freiburg, Psychological Institute, Germany
Matthias Nueckles, University of Freiburg, Psychological Institute, Germany
Alexander Renkl, University of Freiburg, Psychological Institute, Germany

This study examines concept mapping as an individual learning strategy for learning from texts. Concept maps are hierarchical, graphical representations of complex domain contents in which concepts are represented as nodes, and connected by labelled links. Concept mapping puts high processing demands on learners: They have to extract important concepts, organize them hierarchically as well as draw and label the links. In accordance with these subtasks we examined different ways of instructional support for concept mapping. Students in the unsupported map-generation condition had to construct a concept map on their own, students in the spatially-arrange condition started from an alphabetically ordered list of concepts, and students in the draw-and-label-links condition just drew and labelled links between pre-arranged concepts. We further implemented a worked-out map condition and a control condition (no concept mapping). In the worked-out condition, participants studied and self-explained a worked-out map. Since research has shown that learning from examples is very effective, we hypothesized that students in this condition would perform best. One-hundred students of the University of Freiburg took part in this study. Factual knowledge, comprehension and the ability to reproduce arguments were measured. As expected, presenting students with a worked-out map and asking them to self-explain was most effective. Students in this condition scored highest on all three measures. However, constructing a map without any support was about equally effective. No significant differences between the unsupported condition and the worked-out map condition could be found. In contrast, students in the half-structured conditions did not perform better than the control group. We

conclude that both studying worked-out maps and generating maps allowed learners to devote attention to all important parts of the learning contents whereas half-structured mapping narrowed attention to specific aspects in a dysfunctional way.

Strategic processing of multiple texts among readers with naive and sophisticated epistemological beliefs

Helge Stromso, University of Oslo, Norway
Ivar Braten, University of Oslo, Norway

We examined differences in text-processing strategies between students with naive and sophisticated epistemological beliefs reading to comprehend multiple texts. The participants were 19 first-year student teachers, with one group of 10 students having naive epistemological beliefs and one group of 9 students having sophisticated beliefs. In each group, the participants read seven texts about Attention Deficit Hyperactivity Disorder, representing partly conflicting views on the topic. Immediately after reading, they reported on the strategies they had been using while reading by means of a self-report questionnaire, focusing on memorization, elaboration, and monitoring. Finally, the participants were given a sentence verification task to assess their surface understanding and an inference verification task to assess their deeper understanding of the materials. The results showed that the students holding sophisticated epistemological beliefs outperformed the students holding naive beliefs on both comprehension measures, thus displaying better text comprehension at the level of the text base as well as with respect to the situation model. Further analyses revealed that there was no difference between the groups with respect to memorization. However, consistent with our predictions, students holding sophisticated epistemological beliefs reportedly used elaboration, and to a certain extent also monitoring, more than students holding naive beliefs. Finally, we took a closer look at the strategic processing of individual students, finding strong individual variations in how students approached the task. This study demonstrates that students with sophisticated epistemological beliefs are better readers than students with naive beliefs when the task demands the melding of information from different perspectives. The results are also consistent with the notion that students having sophisticated epistemological beliefs attain this advantage by engaging in more active use of deep-level strategies such as elaboration and monitoring.

Group discussions as learning environments for promoting high-level comprehension of texts

Ian A.G. Wilkinson, The Ohio State University, United States
P. Karen Murphy, Pennsylvania State University, United States
Anna O. Soter, The Ohio State University, United States

This paper examines the use of group discussions to promote students' high-level comprehension of text in elementary as well as high-school settings. We identify 9 approaches to conducting discussions that have consistency of application and an established place in educational research or practice. Our presentation describes results from a 3-year project designed to investigate the merits of these approaches, funded by the U.S. Institute of Education Sciences under the Program of Research on Reading Comprehension. First, we present a conceptual framework for understanding the approaches to conducting discussions. This framework describes the similarities and differences among the approaches in terms of various parameters of group discussion. Second, we present results of a meta-analysis of quantitative studies, examining evidence of the effects on measures of teacher-student discourse as well as on individual comprehension and learning outcomes. Third, we present results of an intensive analysis of the discourse arising from the discussion to provide a richer understanding of the nature of students' thinking in each of the approaches. Taken together, our results provide converging evidence on the use of group discussions as learning environments to promote high-level comprehension of texts. They advance our understanding of how teachers can use discussions in ways that are sensitive to instructional goals and to the contexts in which they work.

Individual styles of text representation: Antecedents and consequences

Ellen Schaffner, university of Bielefeld, Germany
Ulrich Schiefele, university of Bielefeld, Germany

Current research shows that readers construct multiple cognitive representations while reading and understanding text. According to Kintsch (1998), a verbatim, a propositional, and a situational text representation have to be distinguished. The verbatim representation entails the exact wording of a text, the propositional representation includes explicit textual meaning, and the situational representation refers to the situations and facts described in a text. These three components of text representation have been assessed in a sample of 1493 9th-graders who participated in the German extension of the PISA-study. The present analysis examines whether learners construct characteristic combinations of weak, moderate, or strong verba-

tim, propositional, or situational representations and if so, how these are related to cognitive and motivational antecedents (e.g., intelligence, prior knowledge) as well as to consequences, such as reading literacy. By means of a cluster analysis four distinct types of students were identified: (1) the situational type, (2) the no representation type, (3) the verbatim/situational type, and (4) the propositional/situational type. The affiliation of students to the four clusters depended largely on intelligence and prior knowledge, and to a minor degree on metacognitive strategy knowledge and intrinsic reading motivation. It was revealed that students' cluster affiliation was highly predictive of reading literacy and that these effects proved to be largely independent of cluster differences in intelligence. Our results allow conclusions about typical combinations of representational components (e.g., low situational representations are always accompanied by low verbatim and low propositional representations). Furthermore, they help to clarify which representational styles or types underlie high levels of reading literacy.

Q 16   27 August 2005   11:00 - 12:20   Room A008

Paper Presentation

READING

Chair: Tommy Dreyfus, Tel Aviv University, Israel

The influence of bigrapheme frequency and consonantal sonority on first grade reading performance
Gwendolyn E. Wolters, University Leiden, Netherlands
Wim Van den Broeck, University Leiden, Netherlands
Wied Ruijssenaars, University Groningen, Netherlands

The results of previous experiments indicated that bigrapheme frequency influences reading performance in Dutch first graders, but was not found for all reading levels distinguished. It seems that the lower level readers tend to retain to using GPC-rules, as taught explicitly in first grade reading instruction. In general, bigrapheme frequency appears to have more influence on reading performance with increasing reading level. Moreover, learning to read appears to develop from letter-by-letter reading to more fluent reading. However, effects found for bigrapheme frequency may have been mediated by phonological characteristics of the consonants used in the item sets. Previous studies using phonemic segmentation tasks found that CV's

and VC's with an obstruent consonant were easier to segment than CV's and VC's with a sonorant consonant (Yavas & Gogate, 1999). The effects found for phonological characteristics in such segmentation tasks closely related to reading, may have an effect on reading performance as well. It can be hypothesized that children reading letter by letter may find facilitation in obstruent consonants (i.e. /b/, /k/), as these are easy to segment. Another hypothesis would be that sonorant consonants (i.e. /l/, /m/) are facilitative in reading, because of the ease with which these consonants can be lengthened and 'glued' together with vowels. Hence, it seems worthwhile to study the interacting effects of consonantal sonority and bigrapheme frequency as these may provide an additional explanation for the developmental pattern in beginning reading. A first experiment indicated that consonantal sonority does have an additional influence on first grade reading performance besides bigrapheme frequency. More specifically, it was found that as long as beginning readers depend on GPC-rule application in reading pseudowords, they find facilitation from sonorant consonants to adequately synthesize the analyzed letters to read the pseudoword.

The role of early morphological awareness development in emergent reading skills

George Manolitsis, University of Crete, Greece
Maria Kouroupaki, University of Crete, Greece

The relationship between morphological awareness and reading acquisition has been explored by a number of studies as a function of the general interest on the role of metalinguistic skills in reading development. However, the association between morphological awareness and early reading acquisition has been examined by few studies which showed a vague association between young Children's morphological awareness and their early reading skills. The aim of this study was to examine the Greek-speaking kindergartners' sensitivity to morphological structure of words in relation to their emergent reading skills. Based on the existing evidence we hypothesized that the development of morphological awareness in Greek-speaking kindergartners will be associated with their emergent reading skills. We assessed the morphological, phonological and syntactic awareness, three emergent reading skills and the intelligence of 93 Greek-speaking kindergartners by a cross-sectional study. The findings showed that morphological awareness development had a small contribution to the emergent reading skills of kindergartners, but this contribution was not independent from their phonological awareness. These findings underline the importance of including activities in kindergarten literacy curricula with which

young children will be trained on morphological sensitivity in accordance with their phonological awareness skills.

The vocabulary depth of secondary school students
Tibor Vidakovich, University of Szeged, Hungary
Erzsebet Cs. Czachesz, University of Szeged, Hungary

The depth of vocabulary is the qualitative characteristic of the vocabulary of an individual, referring to the words the meaning of a word is connected to. Initially children have less differentiated meanings for words, then with age fine distinctions and enrichments take place. This study reports on the vocabulary depth of secondary school students (15-19-year-olds). The analysis focuses on (1) words (meanings) that secondary students associate to a given word; (2) similarities and differences between bilingual and non-bilingual school students in this respect; (3) the main tendencies of development in the age period 15-19; and (4) correlations between vocabulary depth and text comprehension, and between vocabulary and socio-cultural background. 1214 secondary school students and 18 adults participated in the survey. Secondary school students were 9th-13th graders, 643 of them from bilingual schools. Adults were graduate students of linguistics and university staff members. Students were administered a test of vocabulary depth and a test for the assessment of text comprehension. Frequencies of the answer patterns in the vocabulary depth tasks were identified, and frequency distributions were compared between bilingual and not bilingual schools, and between secondary school students and adults. A vocabulary depth index was calculated for each task and the whole test. Correlations were calculated between vocabulary depth and text comprehension, and between vocabulary depth and socio-cultural background. The vocabulary depth of secondary students showed great diversity. Students associate different attributes to the same words and in some tasks attributes related to functions seem to be dominant rather than those necessary for an exact definition. The number of answer patterns, i.e. the diversity of meanings decreased with age, but in most tasks differences were not significant. The correlations between vocabulary depth, text comprehension and parents' education are significant, the latter showing the effects of the selection mechanism in secondary education.

Development and Evaluation of a Reading Competence and Reading Motivation Training Program for Secondary School Students
Lilian Streblow, University of Bielefeld, Germany
Manfred Holodynski, University of Bielefeld, Germany
Ulrich Schiefele, University of Bielefeld, Germany

In response to the results of the PISA Study and based on previous research on text comprehension, we developed a reading comprehension training program for students and subjected it to two preliminary evaluations. The program is called LEKOLEMO 7 (Programm zur Forderung der Lesekompetenz und Lesemotivation fur die 7. Klasse; i.e., program for promoting reading competence and reading motivation in Grade 7). Its primary goal is to increase students' ability to grasp meaningful information embedded in expository texts and to integrate this permanently into existing knowledge structures. Training imparts metacognitive knowledge on learning and reading processes, particularly on the structure and usage of various text formats, and practices the effective application of reading strategies. The second goal is a long-term enhancement of reading motivation. This involved the inclusion of factors with a positive effect on reading interests and reading motivation. The training differs from existing programs in three ways: (1) It covers important continuous (e.g., product instructions) and noncontinuous expository text formats (e.g., tables). (2) It integrates tasks on all reading dimensions: extracting information, text interpretation, text reflection, and text evaluation (Kirsch, 1995; Kirsch, Jungeblut, & Mosenthal, 1998). (3) It promotes reading motivation. The pilot versions of LEKOLEMO were developed to test the material and training procedures. Two preliminary evaluation studies show that these versions already promote reading competence and reading motivation to some degree, even when implemented for only a limited number of sessions. As well as presenting the results of both studies, some planned improvements will be discussed.

Q 17   27 August 2005   11:00 - 12:20 Room E104

Paper Presentation
Distance Education

DISTANCE LEARNING

Chair: Jeroen van Merrienboer, Open University of the Netherlands, Netherlands

The Role of the Online Distance Learning: Examination of the Application of On-line COURSES
Roni Reingold, Achva-College of Education, Israel
Ofra Nir-Gal, Achva-College of Education, Israel
Talia Nur, Achva-College of Education, Israel
Rafi Gilbart, Achva-College of Education, Israel

Researchers and online educators stress that it is essential to change the role of the instructor when making the transition between the traditional classroom and the online learning environment (Dabbagh, 2002; Easton, 2003). In a report recently published in the U.S Zemsky & Massy (2004), the authors claim that the online distance learning revolution has failed. The main reason given is the absence of a pedagogical revolution to go alongside the technological one. The current research has focused on online course sites (and their design) in order to examine the online instructor's actual performance as expressed through course design and learning objects. Research samples included 100 online course sites. The courses took place in various higher education systems, including teacher education colleges in Israel and throughout the world, both in Hebrew and in English. For the purpose of collecting and analyzing data, the research team created a rubric, a tool for the Evaluation of Online Courses - in order to analyze the role and function of the instructor. Data collected has been examined using both qualitative and quantitative methods. Research data analysis shows that most instructors preserve characteristics of the traditional classroom in the virtual classroom. Instructors tend to maintain control of the learning process and of the use of information sources. Online instructors often ignore the possibilities offered by online learning such as: collaborative learning; encouragement of social interaction; directing students through advanced online literacy, research oriented methods during students' information retrieval; use of various media for student learning and knowledge representation; learning flexibility and consideration of student needs. The data shows that online learning taking place in higher education, including teacher education institutes, does not implement the change essential for the successful transition to the online distance learning environment.

Is Distance-Learning an effective instructional method for part-time, mature students in higher education?
Nikleia Eteokleous, P.A. College, Cyprus
Andreas Loizides, P.A. College, Cyprus
Michael Tscholl, University of College London - UCL, United Kingdom

The proposed study investigates the use of web-based technology for instruction in higher education. Specifically, the study consists of an in-depth comparison between in classroom instruction and a web-based one. The comparison will be based on the following parameters: achievement of educational objectives, achievement of lower vs higher order skills, student interaction, communication with the instructor, post-instruction student performance and student satisfaction. Moreover, the proposed study will examine the possibility of using the on-line technology for part-time mature students studying for a business administration degree in Cyprus Higher Education. The student subjects will be drawn from a unit from a Research in Business class. Education in two environments is investigated: an in-classroom and an on-line one. The online environment will be implemented in a web-site format, but customized to address the needs of this study. This website will provide the subjects with the standard lecturing material drawn from the in-classroom environment, as well as, chat rooms and discussion forums. These extra facilities are used to mediate the interaction among students and the communication with the instructor. Qualitative and quantitative data will be gathered to evaluate the effectiveness of the two simulated environments. To achieve the above, a field experiment approach will be applied. Various instruments will be used to collect the quantitative data needed: assignments and tests will be carried out as well as a questionnaire to measure the parameters outlined above. On the other hand, qualitative data will be collected through in-depth interviews. Based on the above, pedagogical and technological aspects which together affect the direction of innovation in distance learning are addressed through this proposed study.

Diverse instructional methods, online distance education and higher levels of learning: An action research study
Heather Kanuka, Athabasca University, Canada
Janice Picard, Lancaster University, United Kingdom
Elaine Laflamme, McGill University, Canada

The purpose of this applied study was to provide guidance and recommendations for the design and development of text-based Internet learning environments in ways that facilitate higher levels of understanding. The objectives of this study were twofold: to explore how well various instructional methods (1) translate to a text-based Internet learning environment and (2) facilitate higher levels of students' understanding. The methodology used was practitioner action research as described by Jarvis (1999). Using Kanuka's (2002a; 2002b) principles for effective online learning to frame the study, instructional methods were selected from each of the

principles and applied to five units offered within an online and distance delivered undergraduate course. The instructional methods explored in this study were the nominal group technique, synchronous brainstorming, debate, invited guest, and WebQuest (which also included role playing and a case study). Researcher observation notes, reflective position papers by the course participants, and the SOLO taxonomy (Biggs, 1999) were used to examine each of the instructional methods' effectiveness at achieving the research objectives. The participants were 19 adult learners enrolled in an online degree program at a Western Canadian Research University. The results provide support for the position that text-based Internet communication technologies can facilitate effective learning environments through the use of certain instructional methods, and have the capability of facilitating higher levels of student understanding. The instructional method most effective at facilitating higher levels of understanding was the WebQuest. This paper presentation will provide a description of the activities investigated and how to effectively adapt them to the online classroom in ways that help students to reach higher levels of understanding. These results may be useful to those who are involved in the design and/or instruction using text-based Internet communication technologies in higher education settings.

Issues of Cross-cultural Distance Learning
Ming Nie, Middlesex University, United Kingdom
Elke Duncker, Middlesex University, United Kingdom

This paper reports on a qualitative study examining the learning experiences of students in Hong Kong and Egypt, all of whom were enrolled in a distance learning program at Middlesex University, London, UK. Differences in learning were found in the areas of Learning styles, work ethics, motivation, and social relationships. All these differences were found to be related to Confucianism or Islam both of which support collectivist behaviour, while European cultures in general and British culture in particular focuses on individualistic behaviour. Diversity of this kind is difficult to address in a monolithic system of distance education, particularly as the Western Europe based institution and its content providers and managers are often only vaguely aware of cultural differences and simply assume Western European or English cultural values. Consequently, local students and tutors are being burdened with bridging the gap between their local culture and the culture of the distance learning institution. The nature of these attempts is often typical for the local culture in which they take place. While in Hong Kong local tutors try to coach students to any goal set by the distance learning institution, Egyptian students are more left to

their own devices and compensate by working together, exchanging information and interviewing the relevant UK lecturer. Students are successful in that they are doing well. However, they could do better, if the bridging of the cultural gap were not entirely their task. Our findings have great implications for distance learning in general and in particularly for instructional design, material development, and assessment design.

Q 18   27 August 2005   11:00 - 12:20   Room A018

Paper Presentation

LEARNING ENVIRONMENTS RESEARCH

Chair: Loucas Louca, University of Cyprus, Cyprus

How web-based learning and facilitation may affect in contextual learning orientations? The comparison of web-based and conventional learning environments in Higher Education
Vesa Korhonen, University of Tampere, Finland

In this research two comparison group of learners, open university students participating in a web-based learning environment and faculty students in a conventional higher education learning environment, were examined. Contextual learning orientations address what kind of learning friction develops between learner and learning environment. This friction mirrors learners' self-regulative, cognitive and epistemological approach of their own learning. In the web-based learning environment there was support for self-reflection and various forms of collaboration. The dominant orientation forms in the learning environments compared were called meaningful orientation, accommodative orientation and practical orientation. Meaningful orientation implies a strong emphasis on an active and self-regulated learning process, where learning is deep approached action and an intention to understanding. The friction could be characterized as constructive in a longer study period. The accommodative orientation as the opposite orientation group consists of learners who adapt their learning process according to the learning environment. The friction is more regressive than constructive. These two orientation patterns were dominant among web-based learners. In the orientation group with practical orientation there was an emphasis on appreciation of unambiguous and practical knowledge. It mirrors stabilising friction between learners' interest and the oppor-

tunities in the environment. This orientation pattern was more prevalent among conventional faculty students of the same domain.

The effects of learning-related student characteristics on their perceptions of a powerful learning environment

Karen Konings, Open University of the Netherlands/OTEC, Netherlands
Saskia Brand-Gruwel, Open University of the Netherlands/OTEC, Netherlands
Jeroen van Merrienboer, Open University of the Netherlands/OTEC, Netherlands

Although educationalists and teachers do their best to create powerful learning environments, students' perceptions of such environments are crucial for determining learning behaviour and eventual learning outcomes. Therefore, students' perceptions have to be taken into account in the educational design process. To be able to do so, first it is important to gain more insight in the background of students' perceptions. This study examined the influence of learning-related student characteristics on the perceptions of a learning environment, as well as preferences and satisfaction with this learning environment, by using two questionnaires. The Inventory of Perceived Study Environment Extended is used to measure perception, desires, and satisfaction. The Inventory of Learning Styles for Secondary Education is used to measure learning-related student characteristics. Both questionnaire were filled out by 1146 secondary school students. The results showed clear influences of learning-related student characteristics on perceptions, desires, and satisfaction. However, with respect to perceptions and satisfaction the results showed a remarkable pattern: Desirable learning-related student characteristics contributed to higher perception scores and higher satisfaction scores, while undesirable learning-related student characteristics contributed to lower perception scores and lower satisfaction scores. Implications of those results are discussed.

Learner experiences in video streaming networked environments: factors for successful implementation

Maria Zenios, Lancaster University, United Kingdom

This paper investigates uses of video streaming within communities of learners in higher education. Two interlinked case studies conducted at two institutions are used as part of a UK JISC funded project in order to detail the pedagogic values gained and the lessons learned about integrating video streaming technologies within existing teaching practice. The cross-disciplinary approach of the project allows to document differences between subject areas and to triangulate how different

pedagogical approaches combine with context to determine learning experiences. An action research approach informed data collection and analysis which involves an evaluation framework that includes a number of criteria (enabling, process and outcome criteria). Data from unstructured face-to-face interviews with students and academics involved in the development and implementation of video streaming events have been analysed within the research tradition of phenomenography with a view to allow participants to reflect upon the video streaming event. The paper identifies factors for successful implementation of video streaming initiatives in higher education. These factors include a)ease of access to the resources and related technologies, b)opportunities for learner autonomy, c)integration of video streaming events with other multimedia resources, d)bridging between theory and practice and e)taking learner attitude into consideration while designing and developing video streaming events.

Potential and real uses of ICT in the classroom: an integration of the technological and the educational perspectives in the design and implementation of face-to-face teaching and learning environments

Jose Rochera, University of Barcelona, Spain
Rosa Colomina, University of Barcelona, Spain
Teresa Mauri, University of Barcelona, Spain

The goal of this study is to analize the use of the information and communication technology (ICT) in a face-to-face (F2F) educational situation in which ICT are introduced to promote pupils' learning. We ground our work on a socioconstructivist perspective of teaching and learning which emphasises the joint activity of participants in the knowledge construction. We present the results of the analysis of the instructional uses of ICT as implemented during one instructional process in contrast with the uses of ICT that were initially planned by the teacher. The methodology consisted of a qualitative analysis of (1) the instructional planning and (2) the actual development of one instructional unit at grade 6 (12-y-olds) where computers were used for the topic 'Scientific Method' (see note below). The results of this study give us empirical evidences that let us consider three aspects: a) the integration of the technological and the educational dimensions in order to evaluate the usefulness of ICT for learning; b) this 'techno-educational' dimension needs to be studied at two levels: instructional design and final implementation; c) some factors and elements likely to influence both the instructional design and the classroom implementation, such as the teacher's pedagogical conceptions or his/her previous personal and professional experience with ICT assisted learning. To sum up, this

paper underlines the idea that the real effectiveness of the educational force of ICT as presented in the techno-educational design depends on the eventual implementation and the joint activity of teacher and students working together with ICT. Note: the instructional project can be visited at www.edebedigital.com/proyectos/228/

Q 19   27 August 2005   11:00 - 12:20   Room E003

Paper Presentation

LIFELONG LEARNING AND PROFESSIONAL DEVELOPMENT

Chair: Peter Rosseel, Katholieke Universiteit Leuven, Belgium

When she lost her temper: on conditions for learning from experience
Ellen Ramvi, Stavanger University College, Norway

This paper draws upon data collected for my PhD project where the goal is to explore the conditions for learning from experience among teachers. Learning from experience as described by the psychoanalyst Wilfred Bion, involves participation in an emotional experience in such a way that a modification of the personality takes place. In this paper I contrast this psychoanalytic view with a Social constructive perspective represented by the sociologist Hochschild and her concept of feeling rules. My data is collected through fieldwork in a middle school. In this paper I present a teacher's story about losing control over her feelings with a student. I am interested in the psychological work the teacher is faced with in this particular situation and I explore the following question: What is the different between following feeling rules and learning from experience? In my psycho-analytical interpretation it is how one regards feelings that constitutes the main difference between these two angles. Avoidance of feelings can be the result of following feeling rules. Working with acceptance and tolerance of feelings can be the result of an emotional experience. To learn from experience it is necessary to be able to separate feelings from handling. In Bion`s theory it is exactly the space between feeling and action that is so important. Learning from experience means working on a psychological level - one has to be able to contain the threatening feelings that arise in a frustrating situation.

On Modelling Professional Learning Using Fuzzy Logic

Georgia Nikolaidou, University of Bristol, United Kingdom
Maria Gravani, University of Bristol, United Kingdom
Sofia Hadjileontiadou, Hellenic Open University, Greece
Leontios Hadjileontiadis, Aristotle University of Thessaloniki, Greece

Professional learning in education has lifted its value as part of a winder concern with 'knowledge-based society' and 'lifelong' learning. The overall aim of this paper is to present a new modelling approach to professional learning, necessary to identify the factors associated with it, and successfully deal with its complexity and multi-variability. A number of studies have suggested that two key-parameters, i.e., climate and planning, and their associated variables (e.g., mutual respect, collaboration, mutual trust, supportiveness, openness, etc) influence professional learning. In this paper, we applied quantitative analysis to a series of representative data of such variables (drawn from an in-service training programme in Greece) and through fuzzy logic-based modelling, an innovative modelling theory, we were able to quantify the substantive effects of these variables and parameters to professional learning. We found that the proposed fuzzy logic-based modelling reveals statistically significant different trends in professional learning, however unidentifiable in the input data by human's inspection. This was the result of the intrinsic property of the fuzzy logic-based model to linguistically describe human's perspective and quantitatively track the 'fine-grained' processes of professional learning. In addition, our analysis highlights the advantages of the fuzzy logic approach to successfully capture the complex nature of professional learning, and introduces a framework for alternative engagement in the field.

Pupils' questioning within self-organized learning environments

Detlef Sembill, University of Bamberg, Germany
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To get more information about the potential and the function of student questioning we analysed learners' activities in a self-organized learning environment and combined the results with those of a pilot questionnaire on student questioning. The empirical study indicates that learners' questions have positive effects on learning outcomes (cognitive, motivational and emotional criteria). Although student questioning seems to be important in creating new knowledge and solving problems it is still not being used sufficiently. This, however, should be highly recommended because questioning is going hand in hand with positive emotional, motivational,

and cognitive processes especially in decentralized teaching-learning arrangements (cf. Sembill & Gut-Sembill 2004; Seifried & Sembill, in press).

The role of career guidance in lifelong learning and professional development
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Policy documents are increasingly drawing attention to the strategic importance of career guidance for lifelong learning and professional development. However, there is a lack of evidence regarding the nature of effective career guidance and its benefits. Despite this, the strategic, economic role of guidance has been emphasised in the UK both for young people and adults as one means of developing and supporting a learning society in which everyone, from whatever background, routinely expects to learn and upgrade their skills throughout life. A five year, longitudinal research study is currently underway in England which is examining the nature of effective guidance. This is in line with a current European policy interest in examining whether guidance increases the likelihood that adults will engage in learning, gain qualifications, improve existing ones or progress into, or within, work. Fifty in-depth case studies have been completed (2003/2004) and clients will be followed up over a further four year period (2004-2007), to track their progress. The professional contexts for the case studies are varied and include: further education, higher education, charitable/voluntary organisations, adult guidance organisations and the workplace. Qualitative methodologies have been used which problematise practice and raise issues relevant to theory development. Each case study has focused on strategies and skills used by guidance practitioners. They examine:
•the client's perceptions of the guidance episode;
•the practitioner's perceptions of the guidance episode;
•the perceptions of an 'expert witness' on the guidance episode;
•an examination of structures of provisions; working relationships with partner agencies within and outside case study organisations. The research will be used both to bring worthwhile career guidance practice into the public arena and give practitioners and learners a voice. This presentation will examine findings from the first phase of data collection, together with the first phase of follow-up.

27 August 2005   12:30 - 13:30   Conference Center Room A

KEYNOTE ADDRESS

Chair: Thea Peetsma, University of Amsterdam, Netherlands

Long-term effects of early education in England: using research to inform policy
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The Effective Provision of Preschool Education Project (EPPE) is a large scale longitudinal study funded by the U.K. Department for Education and Skills which is tracking the progress and development of children between 3 and 7 years old. EPPE has collected detailed information about children's personal and family characteristics and their home learning environment from a sample of 2800 children from randomly selected pre-school centres. A further 300 'home' children were recruited with no pre-school experience. Children have been tracked from beginning pre-school to the end of Year 2 in primary school. The pre-school centres (N=141) were randomly drawn from six types of pre-school provision (playgroups, nursery classes, Local Authority day nurseries, private day nurseries, nursery schools and integrated centres) located in five different regions in England.The research monitors children's progress across the pre-school and early primary period in order to identify whether children in particular centres, or experiencing different forms of provision, make greater progress than others. An educational effectiveness design was adopted which used multilevel modelling techniques. This explores the impact of child, parent and home influences on Children's attainment between the ages of three and seven. The amount of pre-school provision (length of time although not number of sessions attended/week) had an impact on Children's developmental progress, even after controlling for social background and the home learning experiences provided by the family.   Other key findings include:
(a) Pre-school experience, compared to none, enhances intellectual and social development in all children.Good quality pre-school experiences (measured on the ECERS rating scale) support better cognitive and social-behavioural development for children.
(b) For all children, the learning environment in the home helps cognitive and social development.
(c) Disadvantaged children in particular benefit significantly from good quality pre-school experiences.

27 August 2005　　　12:30 - 13:30　Conference Center Room B

KEYNOTE ADDRESS

Chair: Andreas Demetriou, University of Cyprus, Cyprus

Does Learning Develop?
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Kendler and Kendler (1962) are remembered for their bold challenge to the behaviorist tenet, widely accepted in the middle of the 20th century, that the learning process functions in an identical manner across species and across the human life cycle. To the contrary, they argued, learning develops. Young children learn via associationist mechanisms, but by age 7, the learning process has been transformed into one involving internal mediating concepts that connect overt stimuli and responses. It is apparent that the Kendlers overstated their case in claiming that young children do not form concepts. There is ample evidence to the contrary, and a different explanation for age differences on Kendlers' learning tasks is required. Following the Kendlers' work, the question of developmental changes in the learning process was largely put aside, as interest in children's learning declined in general. Rather than formation of S-R bonds, learning is now more likely to be defined as change in understanding (Schoenfeld, 1999). In this context, it is productive to resurrect the question largely abandoned following the Kendlers' work. A study is described of 11-12-year-old children and young adults engaged in an identical learning task. Results support the proposal that learning comes to operate under increasing executive control in the years between middle childhood and early adulthood. Adults, it is suggested, are more likely to employ a meta-level executive allowing them to maintain dual representations, one of their existing understanding and the other of new information they are being asked to register. The executive allows these two representations to be maintained simultaneously and attended to flexibly. Without it, there exists only a singular experience of the way things are as a vehicle for understanding the world. New information may be assimilated to it, but no executive is available to monitor and manage the process.

27 August 2005   12:30 - 13:30   Conference Center Room C

KEYNOTE ADDRESS

Chair: Oser Fritz, Universitat Fribourg Schweiz, Switzerland

Social Context and Social and Academic Composition of Schools – Constraints and Affordances for Teaching and Learning
Juergen Baumert, Max-Planck Institute for Human Development, Germany

The social structure of a school's catchment area and the social and academic composition of its student population are considered to be major constraints and affordances for teaching and learning. In his well-known 1966 study entitled Quality of Educational Opportunity, Coleman concluded that the social composition of the student body is more closely related to achievement than any other school factor. Hauser (1970, 1976), in contrast, suggested that most of the context effects reported in the literature are simply the result of misspecified models. The issue remains controversial. In a recent review article, Hattie (2002) concluded that student grouping and tracking systems have no effects of any practical educational relevance. Yet in their literature review on school composition effects, Thrupp et al. (2002) were able to identify important effects of the school context. In my presentation Social Context and Social and Academic Composition of Schools – Contraints and Affordances for Teaching and Learning, I will start by analyzing the methodological problems and traps inherent in the analysis of different institutional treatments and in the examination of composition effects. In a second step, I will propose a theoretical concept for composition factors and a mediation model articulating the mechanisms by which social and intellectual contexts impact on the outcomes of schooling and instruction. I will use empirical examples to illustrate the magnitude of the context and institutional effects that can be expected and the serious misestimations that can occur when models are misspecified. I will close with the question of how well teachers adapt to differing contextual conditions. Empirical findings indicate that teachers do not respond to the problems associated with the less favorable social and intellectual composition of learner groups as well as they might.

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