In this symposium, four top investigators will present the audience with cutting edge information on the design of powerful learning environments. These researchers have been carefully chosen to present multiple viewpoints on intentional learning, which guarantees that the audience will be presented with first class information about what has been done world-wide to improve intentional learning. Each of the four participants represents a theoretical perspective, namely (1) a domain-specific learning perspective, (2) a conceptual change perspective, (3) an achievement goal perspective, and (4) an interest theoretical perspective. Each presenter will begin his or her presentation with a definition of intentional learning. Erik De Corte will start, followed by Stella Vosniadou, Julianne Turner, and Andreas Krapp. They each have 20 minutes. Next, Monique Boekaerts will discuss the various presentations, trying to find the common denominators, the dissimilarities, and the gaps in our knowledge (also 20 minutes). After these official presentations, each presenter will be given the possibility to react to what the discussant said or to what other presenters have proposed. The last 15 minutes will be devoted to general discussion. The audience can participate in the discussion from that point onwards.

Unraveling mathematics-related beliefs and their impact on intentional learning
Erik De Corte, University of Leuven, Belgium

Over the past 15 to 20 years researchers in the domain of learning and instruction have become more and more aware of the importance of beliefs for school learning. This is especially the case with respect to the domain of mathematics: starting with the pioneering work of Schoenfeld (1983) in the early 1980s, beliefs about mathematics have moved more and more to the foreground as a significant research topic. But although there is now general agreement among researchers that students’ beliefs have substantial impact on their learning and performance in mathematics (see e.g., National Council of Teachers of Mathematics, 1989), until recently convincing empirical evidence was rather scarce. Moreover from a theoretical perspective there was a lack of clarity: whereas different categories of mathematics-related beliefs have been investigated and described in the literature, the research has not resulted in an overarching conceptual framework that explains the relationships and interactions between the different categories of beliefs. In this contribution to the symposium an attempt will be made to develop such a more comprehensive framework involving three categories of beliefs, namely beliefs about mathematics as a domain and learning and teaching in that domain, beliefs about the self as a learner of mathematics (also called motivational beliefs), and beliefs about the social context (i.e. the specific classroom setting) in which learning mathematics takes place. It will be argued that these beliefs, which often remain rather implicit, can have a unique and substantial regulatory impact on students' motivation for and cognitive approaches to mathematical tasks and problems. For instance, how students perceive mathematics and their own ability to learn mathematics will strongly determine their intentions and efforts in the mathematics classroom. This has important implications for
instruction and the design of powerful learning environments. First of all, the often implicit mathematics-related beliefs have to be made explicit so that students become aware of them. Second, powerful learning environments should aim explicitly and intentionally at fostering positive mathematics-related beliefs. Initial studies showing that the latter is possible will be briefly reviewed.

*Learning environments for conceptual change: The role of intentional learning*
Stella Vosniadou, University of Athens, Greece

This presentation will focus on the description and explanation of a set of design principles for the construction of learning environments to promote conceptual change in the area of science. Special attention will be paid to the development of intentional learning. Conceptual change is required in the learning of science when the concepts introduced through instruction come in contrast with the naïve theories that students have constructed on the basis of their everyday experience. The term “theory” is used here to denote a relational, explanatory structure and not an explicit, well-formed and socially shared scientific theory. Conceptual change is the outcome of a complex cognitive as well as social process whereby an initial naïve theory is restructured in order to agree with currently accepted scientific views. Studies of conceptual change have shown that this is a slow and gradual process often accompanied by misconceptions, inert knowledge, internal inconsistencies and lack of critical thinking. Intentional learning is the kind of learning that is goal-directed and deliberate, internally initiated rather than controlled by the environment, and under the conscious control of the learner. In order to achieve this kind of learning, students must be purposeful and planful and able to regulate their learning in a metacognitive manner. Conceptual change can be greatly facilitated by intentional learning because intentional learners are better able to monitor their learning, have greater metacognitive awareness of their beliefs, and are better able to justify them on the grounds of explanatory adequacy. For a number of years now we have been experimenting with the design of learning environments to promote conceptual change and intentional learning, by focusing mainly on classroom discussion and model design with or without the use of collaborative building software, such as Knowledge Forum. Through collaborative learning and the construction of models we try to increase students’ ability to take the perspective of other students, to entertain multiple representations, to plan and monitor their learning, to adopt more constructivist epistemologies of science, and to learn to use more sophisticated mechanisms for conceptual change such as analogies, abstractions, and models.

*The relationship between achievement goals and intentional learning: Individual differences and contextual effects*
Julianne C. Turner, University of Notre Dame, USA

This presentation will address questions about intentional learning from the motivational perspective of achievement goal theory. Achievement goal theory answers the question: Why do people engage in academic behaviors? Two purposes have been studied. One purpose, a mastery goal orientation, is to develop one’s competence. The other purpose, a performance goal orientation, is to either demonstrate one’s competence or to avoid the demonstration of lack of competence. Achievement goal theory is unique because it is comprehensive. It describes a “program of cognitive, affective and behavioral consequences” (Elliott & Dweck, 1988, p. 11) related to the goals that students pursue. As such, achievement goals are reliable predictors of important and valued educational outcomes. Goal theory has contributed to our knowledge of intentional learning by describing the relationship between different achievement goals and adaptive (e.g., persistence, use of strategies) and maladaptive (e.g., avoidance behaviors) patterns.
of learning. Mastery goals have consistently been linked with adaptive beliefs and behaviors whereas performance goals have been related to mixed results. In addition, goal theory research has investigated relationships at both the personal level and the classroom and school level, demonstrating that learning environments have powerful effects on intentional learning. The implications of goal theory for instruction are growing. Classroom and school level studies of different goal emphases demonstrate that certain teacher instructional behaviors and discourse are related to more adaptive student motivational responses. These facilitative instructional patterns can be studied and adopted by teachers, thus increasing adaptive student patterns of motivation and learning and creating more powerful learning environments.

The motivational basis of powerful learning environments - Some conclusions from educational-psychological interest research
Andreas Krapp, University of the Bundeswehr, Munich, Germany

In educational-psychological approaches interest is interpreted as a more or less enduring specific relationship between a person and an object of his or her “life-space”. The actual pattern of interests determine both, the direction and the quality of self-determined intentional learning. Many empirical studies have shown, that interest based learning motivations have a positive influence on the learning outcome, especially with respect to educationally desirable categories such as deep-level learning, duration of acquired knowledge or the readiness to extend and differentiate existent knowledge and competencies outside formal education. The specific effectiveness of individual interests with respect to intentional learning and human development can be explained by the fact that an individual identifies with his or her object areas of interest. Thus, interests are important components of an individual’s self-system. Unlike many other motivational theories which are mostly based on an action-theoretical paradigm in the tradition of the expectancy-value model and have their main focus on circumscribed “learning episodes”, interest theories are also concerned with the question of how content-specific motivational dispositions have an influence on the developing structure of personality from an ontogenetic perspective (human development). Both, the theoretical concepts and the available amount of empirical results of educational-psychological interest research provided many suggestions for developing powerful learning environments in order to promote intentional learning and foster educationally meaningful human development. They relate, for example, to the selection and sequential arrangement of the contents of a curriculum, the organizational structure of the learning environment, the social interactions between students and teachers or the kind of feedback procedures used in an educational setting. From an interest-theoretical perspective the quality of a powerful learning environment should not only be evaluated on the basis of the amount of acquired knowledge and/or the level of cognitive competencies. It should also be seen in light of the long-lasting effect that motivation characteristics have on personality. Interest is not only a condition for learning; it is also an important outcome of a powerful learning environment.
EARLI Invited Symposium

LEARNING AND UNDERSTANDING WITH MULTIPLE REPRESENTATIONS

Organiser: Susan R. Goldman, University of Illinois, Chicago, USA
Chair: Susan R. Goldman, University of Illinois, Chicago, USA
Discussant: Susan R. Goldman, University of Illinois, Chicago, USA

There is an increasing awareness of the multiple forms in which information appears, e.g., text, diagrams, dynamic visualizations, tables, graphs, pictures. These different representational forms have different literacy requirements. That is learners need to know how to “read” them. How they come to do this, when certain forms help and when they hinder, and when working with multiple forms is useful for understanding are all issues that are at the forefront of research on learning and understanding. In this symposium, four researchers present research findings bearing on these issues.

*Can pictorial representations support sense-making in mathematics?*
Kenneth R. Koedinger, Carnegie Mellon University, Pittsburgh, USA

I will present an analysis of hypothesized advantages of pictorial representations for improving learning and understanding of pre-algebraic quantitative reasoning. A “Picture Algebra” strategy has been used successfully by 6th grade students as part of a new middle school mathematics curriculum. This strategy supports students in sense making both as they construct pictorial representations and as they use them to cue appropriate computations. Although we demonstrate that 6th grade students can use this strategy to successfully solve algebra-level problems, our detailed production rule analysis revealed limitations in our instructional approach and targeted areas for improvement. Based on this analysis, we revised our Picture Algebra instruction and I will present results of those changes.

*In search of optimal pathways to diagrammatic reasoning*
Elsbeth Stern, Max Planck Institute for Human Development, Berlin, Germany

Which kind of practice is needed to develop competencies in the use of diagrams as reasoning tools for mathematical word problem solving is a question as yet unanswered. According to the ecological theory of Gibson and Gibson, cognitive development may be understood as a process of discovering the affordances of action through interaction with the environment. I therefore argue that children who are introduced to the affordances of a visual-spatial tool via simple practice problems before learning to map complex word problems on this tool will show larger achievement gains in word problem solving than children who first learn to map word problems on visual-spatial tools. Two practice modules for solving Cartesian product word problems by using a matrix were developed for 30 fourth graders. In Module 1, students encountered the matrix as a means to store blocks of different size and colour in its cells. In Module 2, children learned to map the content of Cartesian word problems on the matrix. Two different orderings of the modules were used. Results revealed that students who had been familiarized with the affordances of the visual-spatial tool in the first place show higher achievement gains in word problem solving than students having started with mapping a complex content on the tool. Getting to know the
affordances of visual-spatial tools before learning how to map complex problems on these tools seems to be an efficient pathway to competent diagrammatic reasoning.

**Multiple perspectives on multiple representations**
Wolfgang Schnotz, University of Koblenz-Landau, Germany
Georg Hauck, University of Koblenz-Landau, Germany
Christian Kürschner, University of Koblenz-Landau, Germany
Tina Seufert, University of Koblenz-Landau, Germany

Recent research on knowledge acquisition assumes that learners construct multiple mental representations when they understand external representations. In text comprehension research, numerous studies have demonstrated that individuals who read and understand texts mentally construct multi level representations. New approaches on learning from pictures and graphs assume that comprehension of graphics also implies creating multiple mental representations. Texts, pictures or graphs represent a subject matter from a specific perspective. This implies that in the case of multiple external representations the perspectives can correspond to each other or they can differ from each other. Furthermore, learners can have their own perspective on learning materials. They can adopt a perspective suggested by the material, but they can also decide to adopt a different perspective. Thus, the question arises how different perspectives conveyed by multiple representations interact with the learners’ intentions and their prior knowledge. Two experiments were performed in which learners acquired knowledge about a subject matter from multiple representations adopting different semantic perspectives. Results indicate that the perspective used in a visual display affects the structure and the usability of the mental models constructed by the learner. However, it seems to be not sufficient to display information from specific perspectives. As individuals frequently do not spontaneously engage in sufficiently deep semantic processing especially in learning from pictures and graphs, it is necessary to provide instructional tasks in order to induce specific perspectives of semantic processing. As a further prerequisite, these tasks and the suggested perspective of processing have to fit sufficiently with the learner's prior knowledge and should be introduced in an appropriate sequence order to result in effective learning.

**Using representations to prepare students for learning**
Daniel L. Schwartz, Stanford University, USA

We present two uses of representations that prepared students to learn. In the first instance, students invented statistical representations to characterize differences between contrasting cases of data. The goal was not for students to reinvent conventional representations, but rather to notice the quantities that good representations need to handle. This prepared students to appreciate conventional solutions when they became available. Two studies with 200+ 9th-grade students showed that inventing representations prepared the students to learn from various resources better than college students who had already taken a semester of college statistics and 9th-grade students who did not invent representations. The second instance involved 100+ 12th-grade students who used representations to teach a computer agent to do logical reasoning. Students played an induction game in which they determined the rules that regulated the appearance of an empirical outcome. The rules increased in complexity as students “beat” each level (e.g., Factor A is necessary and sufficient; Factor A or ¬Factor B are necessary). Students completed the game in one of two conditions. In one condition, students played each level and filled out a representation to describe the rule they found. In the second condition, students also played each level and completed the representation. However, in this case, the representation “taught” an agent that
played the game and students could see the consequences of their representation. A logic posttest showed that students who taught the agent learned more. The independent performance of the agent representation prepared students to learn more from feedback.

F 3 28th Aug 8:30 - 10:30 Room BIO G C

SIG Invited Symposium

COMPUTER-SUPPORTED COLLABORATION AS A CO-ORDINATED ACTIVITY: THEORETICAL AND METHODOLOGICAL PERSPECTIVES

Organisers: Päivi Häkkinen, University of Jyväskylä, Finland
Richard Joiner, University of Bath, United Kingdom
Rupert Wegerif, Open University, United Kingdom
Chair: Järvelä Sanna, University of Oulu, Finland
Discussant: Paul A. Kirschner, Open University, The Netherlands

Research results of computer support for collaborative learning have been contradictory, and several studies have indicated collaborative learning to be far more complex phenomenon and difficult to realize in real-life settings than what has often been thought. Since collaborative processes are often over-generalized, and any tools for communication and correspondence are called “collaboration tools”, it is difficult to judge whether and when people learn from collaborative situations. The aim of this symposium is to discuss theoretical and methodological questions of collaborative learning with the aid of the studies that seek to understand the specific forms of collaborative learning instead of treating collaboration as a single learning mechanism. In order to understand collaboration as a co-ordinated activity, this symposium focuses on the emerging themes in this line of research. The research questions to be discussed in the presentations of this symposium are: What does collaboration as a co-ordinated activity mean and how is it accomplished? How can computers support discursive construction of shared knowledge around computers in classroom settings? How do co-ordination and collaboration strategies differ between face-to-face discussion and online discussions? What are the essential conditions for establishment of common ground in computer-mediated settings? What are the effects of social affording in distributed teamwork? How can interaction and engagement be promoted by modelling exemplary behaviours with the aid of animating agents?

Applying the ontological ambivalence of computers to resource and direct learning conversations
Rupert Wegerif, Open University, United Kingdom

Computers have an ambivalent nature. They can be made to act as if they were people but really they are objects and children know this from an early age. This paper presents a study designed to test the hypothesis that this ontological ambivalence uniquely equips computers to support a valuable type of teaching and learning exchange. When children respond to a prompt from the computer by sitting back from the screen and discussing what their response should be the educational exchange that occurs can be characterised as 'IDRF' where the D stands in for discussion between peers and the IRF refers to the more traditional teaching exchange of Initiation, Response and Follow-up. Taking the IRF sequence alone, users appear passive and the computer directs the activity. In discussion mode, on the other hand, users take charge and test their ideas out with the computer. In a recent study this approach was applied to teach one year of the science and mathematics curriculum for children aged 9 and 10 in three UK state primary schools. As well
as new and selected software activities we also provided teachers with off-computer lessons to prepare the children to engage effectively in learning conversations around computers. The effects of this intervention were assessed using controls groups and a variety of measures, including subject attainment tests. Both qualitative and statistical analysis strongly suggests that this IDR approach is an effective way in which computers can support the discursive construction of shared knowledge in primary classrooms.

Co-ordination and collaboration strategies employed in face-to-face and online discussions
Richard Joiner, University of Bath, United Kingdom
Sarah Jones, University of Bath, United Kingdom

The aim of this paper is to compare the different co-ordination and collaboration strategies in face-to-face discussion and online discussions, and investigate the relationships between these strategies and learning. The study employed the standard three step experimental paradigm with a pre-test, an intervention session, where they either had an asynchronous online discussion or face-to-face discussion and a post-test. The participants (N=71) were all undergraduate students at the University of Bath who were taking a second year undergraduate course in developmental psychology. The pre-test consisted of a mini essay on their opinion of smacking and a 21 point smacking scale, where they indicated how much they agreed or disagreed with smacking. Approximately a week later, they had a seminar discussion that lasted two weeks for the online group and an hour for the face-to-face group. The seminar was a discussion of the detrimental effects of smacking on children’s development. This topic was an assessed part of the course. The post-test was identical to the pre-test, but it also had a self-report measure of their opinion changed. We used Felton and Kuhn’s (2001) analysis of arguments to analyse the face-to-face discussion and the online discussions. In this analysis, they distinguished between transactive questions, transactive statements and non-transactive statements. We also analysed the discourse for sequences, identified by Felton & Kuhn, such as corners, rebuttals and blocks. This analysis indicated that the quality of the argumentation used in face to face was higher than that used in the online discussions. The implications of these findings for theoretical models of collaborative activity are discussed.

Process of grounding in online conferences: A case study in teacher education
Kati Mäkitalo, University of Jyväskylä, Finland
Päivi Häkkinen, University of Jyväskylä, Finland
Sanna Järvelä, University of Oulu, Finland

The aim of this case study is to provide empirical evidence to support the crucial role of grounding processes when interacting in online conferences. In collaborative activities, it is essential to reach an adequate level of common ground. During the interactive process of grounding individuals build and maintain common ground by sharing mutual understanding, knowledge, beliefs, assumptions, and presuppositions (Baker et al., 1999; Clark & Schaefer, 1989; Dillenbourg & Traum, 1999). This study is a case study of one group consisting of three pre-service language teachers who mainly met at distance. In the problem-based case-work the learning task of the group was to formulate joint research questions around common interests for further group work. The preliminary results indicate that there are several intertwined mechanisms that influence on establishing and maintaining common ground in collaborative online conferences. According to our results, negotiation of common goals is part of the grounding process, which is interactive, dynamic, changeable and time-consuming. This presentation offers empirical evidence of required
mechanisms of common ground in collaborative online activities as well as discusses the concept of grounding as a phenomenon that goes beyond linguistic level.

**Affording sociability for distributed teamwork**
Paul A. Kirschner, Open University, The Netherlands
Karel Kreijns, Open University, The Netherlands

Computer-mediated communication, coordination and collaboration (CM3C) systems - and environments based upon them - allow team members to be geographically and temporally distributed, enabling a shift from contiguous, real time learning and working groups to distributed learning and working groups. The communal opinion in education land appears to be that this could be the golden key to the future. However, all that glitters is not gold. The problem is that these environments tend not to work well. Designers and users of such environments tend to take for granted that social interaction in the groups will take place simply because the environment allows it and tend to pay too little or no attention to the social psychological/social dimension of social interaction that predominantly takes place outside of the task context (off-task behaviour). Good infrastructure and pedagogy are not enough. Environments must also socially afford teamwork. This means that there must first be a reciprocal relationship between group-members and the environment: the environment must fulfil the social intentions of their members as soon as these intentions crop up. Second, there must be a perception-action coupling: once a group-member becomes salient (perception), the social affordances must guide another member to initiate a communication episode (action) with the salient member. This contribution presents the results of a study of the effects of a tool for socially affording (by creating and enhancing group awareness) teamwork in asynchronous distributed groups spread throughout Europe.

**Cultivating collaboration in e-learning communities: Reconciling behaviourist and social constructionist approaches**
Andrew Ravenscroft, London Metropolitan University, United Kingdom

Many initiatives in CSCL and e-Learning communities emphasize the difficulty of cultivating and maintaining meaningful participation, communication and collaboration. This is hardly surprising, given that online interaction can seem anonymous, uninviting and somewhat ‘cold’. One way to improve this situation is through reconciling behaviourist and social constructionist approaches, considering environmental and affective factors as well as socio-cognitive aspects. Ongoing work at London Metropolitan University is operationalising aspects of Gibson’s (1977) theory of *affordances* and Bandura’s (1977, 1986) *social learning theory* within a framework for developing online communities and communication. One practical derivation is the devising of Animateurs and Animator teams (A-teams), working to flexible and authentic ‘roles’ and ‘scripts’, who invite, demonstrate and stimulate online behaviour. When other learners have begun participating and modelling exemplary behaviours, subsequently operating as active interlocutors themselves, these animating agents ‘fade out’, allowing the community to grow in an organic way. This approach is currently being trialled across three projects, where participation and interaction has thus far been limited. The findings will be reported in this presentation. Yet this is still only part of the picture. In a new media milieu where entertainment, style and fashion drive people’s participation and interaction, we must consider the implications for supporting informal e-Learning communities. Our technologies and communities need to be perceived as more than ‘useful’ and ‘valuable’, they must also be attractive, interesting and preferably ‘cool’.
SIG Invited Symposium

THE PROFESSIONAL DEVELOPMENT OF TEACHER EDUCATORS

Organisers: Theo Bergen, University of Nijmegen, The Netherlands
Michal Zellermayer, Levinsky College of Education, Tel Aviv, Israel
Chair: Michal Zellermayer, Levinsky College of Education, Tel Aviv, Israel
Discussant: Christopher M. Clark, University of Delaware, USA

The invited SIG 12 symposium with the title ‘The professional development of teacher educators’ focuses on the one hand on the professional knowledge of teacher educators and on the other hand on ways to stimulate the professional development of teacher educators. The symposium examines the issue of professional development of teacher educators from three perspectives. The symposium contributes to the discussion about how teacher educators develop professionally. The first perspective is by discussing how teacher educators’ conceptions of teaching may influence their teaching practice. The second perspective is related to how teacher educators develop professionally. Experienced teacher educators from various teacher education colleges in Israel were asked, using a semi-structured interview, regarding their opinion about professional development of teacher educators in general and about how they felt it could best be done. The third perspective deals with the construction of a profile of a competent teacher educator. In an extensive research study among teacher educators in the Netherlands the authors developed a profile and studied its effects on self-evaluations teacher educators make.

Professional dilemmas teacher educators face in their teaching
Harm Tillema, Leiden University, The Netherlands
Lya Kremer Hayon, Leiden University, The Netherlands

Previous research has revealed how teacher educators’ conceptions of teaching may influence their teaching practice. As it turns out these conceptions not only are partly connected to their own perspectives on professional development, but are also closely connected to the opportunities or affordances of their actual teaching practice, i.e. the teaching context in which they work. The concept of dilemma may provide an adequate framework to study how teacher educators go about realizing their conceptions of teaching in their actual teaching practice. Dilemmas are manifestations of the professional’s reflection on action. They deal with the linkage or connection between (a) concerns and experienced tensions in daily practice; (b) action orientations or problem solving in practice. Dilemmas more than beliefs are rooted in and may disclose actual thinking in teaching practice. In our research, teacher educators themselves identified their dilemmas. The study, using questionnaires as well as in-depth interviews, shows teacher educators were cognizant of dealing with the tensions in realizing their goals, attributing them to external as well as internal sources but could not often phrase or interpret them in terms of professional knowledge. This in itself constitutes a dilemma in the teaching profession.
Professional development for teachers has been the focus of professional literature for a few decades whereas there is less information available about how teacher educators develop professionally. In recent years there is, however, evidence that the situation is changing, and the professional body of teacher educators is today given more attention in the professional literature. Professional development is about becoming better professionals. How can teacher educators, who teach others how to teach, become better teachers and educators themselves? In this paper I want to discuss the whys and the hows of teacher educators’ professional development, including practical examples meant for individual and staff development. I will also discuss findings from interviews with teacher educators regarding some of the professional development activities proposed. Ten experienced teacher educators from various teacher education colleges in Israel were asked, using a semi-structured interview, regarding their opinion about professional development of teacher educators in general and about how they felt it could best be done. The findings show that there is general consensus regarding the importance of professional development for teacher educators. There is, however, greater variety in opinions of how it should be done. Some of the professional activity activities proposed, e.g. peer-observation, were found to be threatening to this group of professionals.

A profile of teacher educator competences as a guideline for professional development

Bob Koster, Utrecht University, The Netherlands
Cor Koetsier, Utrecht University, The Netherlands
Fred Korthagen, Utrecht University, The Netherlands
Theo Wubbels, Utrecht University, The Netherlands

What has been missing for many years in the professional development of teacher education staff is a clear profile of a competent teacher educator. In an extensive research study among teacher educators in the Netherlands we developed such a profile and studied its effects on self-evaluations teacher educators make. We used a three step Delphi procedure to arrive at a comprehensive list of necessary competencies of teacher educators. The first step consisted of a literature study and in-depth interviews in a group of 17 experts. Next, on the basis of the results of the first step, we sent a questionnaire to a large group of teacher educators (N=400), asking them to score a list of competencies on the degree to which they considered these competencies necessary for the profession. Finally, this has led to a draft version of a competence profile to which the same group reacted. The resulting competence profile consists of four major domains, covering 30 necessary competencies of teacher educators. In our contribution we describe what teacher educators see as the most necessary competencies and we look at differences between teacher educators from different types of teacher education. We used the competence profile in three groups of teacher educators (25 in total) with the aim of promoting the quality of their self-assessment. We analyzed the effect of reading the profile on the teacher educators’ self-evaluation. We conclude that the profile that we developed is helpful for making self-evaluations of teacher educators more specific.
In all cultures, reading literary texts is part of the school curriculum. Although the amount of time allocated to reading, interpreting and discussing literary texts varies within and between cultures and nations, introducing students in secondary education into the world of literary fiction is the main focus in all curricula. Literature is an almost ‘sacrosant’, privileged part of the secondary school curriculum: the rationale is not open for debate. Given this position of literature within the curriculum, it is remarkable that the literature curriculum has received so little attention from research in learning and instruction. In this three part symposium, three themes are discussed: a) how students read and interpret literary texts, b) personal and cultural factors that influence literary reading and interpretation, and c) the instructional contexts that may enhance these processes. In Part III of this symposium on reading and interpreting processes of literary texts, the central question is: How can interpreting processes and quality of interpretation be facilitated by teaching? Five research presentations from different regions, and with different methodologies, varying from case studies to experimental designs, focus on this question.

“Horizons of expectations” – Students, teacher and the literary character
Yael Poyas, University of Haifa and Oranim College, Israel

The variety of participants taking part in the literature classroom (i.e., students, teacher, text) suggests a unique situation which is inherent to the social-cultural encounter between readers and text. The ‘theory of reception’ describes the act of interpretation as a dialogue between the reader’s ‘horizons of expectations’ and the authentic ‘horizons of expectations’ of the author’s historical period (Jauss, 1982). In literature classrooms an additional factor is involved in the process of meaning making: the teacher. Teachers also have their own ‘horizons of expectations’ as readers, as well as being mediators between the text and the students. The difference between the various ‘horizons’ is salient when discussing literary texts published some decades or centuries ago. This presentation offers a qualitative analysis of the discourse of a literature lesson, which took place in Israel in a 7th grade. The teacher and her students discussed a ballad “The Rabbi’s daughter and her Mother” by Saul Tchernichowsky, published in 1942. The ballad takes place in Medieval Europe and raises issues such as the generation gap, cross-cultural romantic relations and cultural conflicts. The analysis focused on teacher’s and students’ interpretation of the symbolic world of the ballad. It revealed that the students’ interpretation to the symbolic actions of the characters emerged from their own horizons of expectations, which were different from the teacher’s horizons. The students’ language exposed their unique understanding of the relations among the symbolic characters, which was quite different from the teacher's understanding. This case raises
issues inherent to pedagogical situations of reading and learning literary texts, especially the canonic ones.

Learning to write argumentative texts about literature
Marleen Kieft, University of Amsterdam, The Netherlands
Gert Rijlaarsdam, University of Amsterdam, The Netherlands

In many European countries, the teaching of literature and the teaching of writing skills became increasingly independent from each other. However, in both sub-curricula, students have to write texts. In literature lessons, students write texts to improve their insights about literary texts ('writing-to-learn'). In language lessons, students write argumentative texts, in some cases reviews about literary texts to improve their writing and argumentation skills ('learning-to-write'). We assume that writing argumentative texts about literature is an effective way to integrate both curricula. Empirical studies (Galbraith, 1996, 1999) indicate a relationship between the personality variable self-monitoring and aspects of the writing process. To test Galbraith’s differential hypothesis and to bridge the writing and literature curriculum, we developed and tested lessons for learning to write argumentative texts about literature. The aims of the lessons are (1) to help students in learning to write argumentative texts, and (2) to enhance students’ literary understanding. Our lesson series has two versions: one for high self-monitors, one for low self-monitors. This makes it possible to improve weak points, and to profit from strong sides of the different students. We will show some examples of the lesson series and present the results of our first experiment in which half of the students (16 years old) worked in the adequate version of the module, while the other half worked with the theoretically less adequate version.

The influence of student and teacher conceptions of learning and reading performance
Gitte Ingerslev, Danish University of Education, Denmark

A longitudinal study of the relations between different approaches to literature teaching and the reading performance of Danish students at lower and upper secondary school. The study aims to (1) reveal possible connections between, on the one hand, students’ learning conceptions and learning approaches, and, on the other, their reading and interpretation skills in the subject of Danish language and literature; (2) investigate the extent to which a student preserves or changes his or her conception of learning, learning approach and literacy and interpretation skills at the shift from the disciplinary culture of lower secondary school to that of upper secondary school; (3) investigate the relation between the teacher’s conception of learning and knowledge within the subject combined with the student’s conception of reading and interpreting literary texts, and of learning in the subject of Danish. Phenomenographic data analysis produced conceptions of teaching and learning and of the reading of literature. Categories of description were then formed from the conceptions. The variation, or qualitatively different ways of experiencing the process, are presented in the words of the participants as they talk about the teaching of the subject, the learning in the subject, and the reading of literature.

Thinking and feeling poetry: Using emotions to unlock meanings in the literature classroom
Amy Eva-Wood, University of Washington, USA

General text processing theories and the ‘cognitive apprenticeship’ literature focus primarily on cognitive issues without acknowledging affective processes, which can also play a vital role in student learning, particularly in literature-based learning. One of the problems students face when reading poems is that they focus too much on “making sense” of the poem even though
defamiliarizing stylistic devices may be serving to counter that effort. If emotions can play a role in helping readers understand stylistic devices and interpret poems, then more explicit discussion of emotional response in literature classrooms should be emphasized. In an instructional study, I incorporate emotional response in a ‘cognitive apprenticeship’ pedagogy, which features teacher modeling through the ‘think and feel aloud’ process. This form of modeling is used to foreground cognitive and emotive processes that are otherwise invisible to readers. Students from two secondary school classrooms participate in a four-week unit on reading and responding to poetry. Students in the control classroom receive instruction that features traditional literary analysis while those in the experimental classroom receive think-and-feel-aloud instruction designed to highlight emotional facets of poetry reading. Pre- and post-unit assessments of student written responses to poems and discourse analysis of classroom discussions are used to examine the impact of classroom instruction that focuses on affective responses. I hypothesize that initial attention to affective response may help students sidestep some of the cognitive pressures they may feel when faced with poetry analysis.

Who makes the meaning? Teachers’ pedagogical approaches and students’ responses to text in secondary literature classes
Sieta van der Hoeven, University of South Australia, Australia

‘What is the experience of teachers and students as they engage in reading a contemporary adolescent fiction novel, set as a class text?’ This overarching question guided my recently completed study of four South Australian secondary English teachers and their classes. The study focused on how teachers and students engaged with their teacher-selected literary texts, and how the student readers’ interests and teachers’ expectations supported the way students made meaning of their study of the novels. The four teachers operated from within and across different literary critical approaches, and while all used an adolescent fiction novel as their class text, they did so for different reasons, including the notion that reading a good book is (morally) good for you; that the literary text is either a framework or a starting point for discussions about life; and that the novel can be used as a vehicle to teach about literary conventions and critical literacy. There is often an uneasy relationship between secondary students as readers and the texts prescribed for them. I reveal these tensions through metaphors which aim to encapsulate the teachers’ pedagogical styles and their (sometimes unacknowledged) underlying pedagogical and literary theories which also serve to position their students’ responses.

F 6 28th Aug 8:30 - 10:30 Room PSY 3 G

Symposium

DISCOURSE AND LEARNING

Organiser: Clotilde Pontecorvo, University of Rome “La Sapienza”, Italy
Chair: Clotilde Pontecorvo, University of Rome “La Sapienza”, Italy
Discussant: Michèle Grossen, University of Lausanne, Switzerland

Fourth of the five presentation that follow are part of an Italian national research project on “Discourse and learning” (coordinated by C. Pontecorvo). The aim was at first to identify teachers’ usual strategies and students’ participation structure in classroom’s verbal interactions, developed in different domains. The research group used an observational methodology based on videotaped lessons in natural settings, that were then fully transcribed and analysed with a CA approach. The
fifth presentation is offered by Anna Sfard (Israel) that focused on classroom discourse’s special routines, in which thinking as communication appears in mathematical learning is.

Reflexive activities and learning in multilingual classrooms
Anna Ciliberti, University for Foreigners, Perugia, Italy
Rosa Pugliese, University of Siena-Arezzo, Italy
Laurie Anderson, University of Siena-Arezzo, Italy

The study is based on segments of language arts lessons videotaped in primary and middle school classrooms. It distinguishes communicative activity from what can be termed ‘reflexive activity’. Reflexive activity is further subdivided into ‘metacommunicative’ and ‘metalinguistic’: in the former, the focus of interaction is on communication itself as an ongoing process, in the latter, on language as code. The proposed tools analyze the reflexive activities of teachers and pupils - describing their forms and functions, considering metalinguistic activities as a specific learning objective, and investigating the relationship between metacommunicative activity and processes of academic and social ‘labelling’ referred to foreign students.

The conversational construction of identity of children with learning impairment
Marilena Fatigante, University of Rome “La Sapienza”, Italy
Franca Orletti, University of Rome 3, Italy

Identity construction is the result of the combined interactional work of all the participants (Sacks, 1992). Given that classroom discourse in inherently asymmetrical (Orletti, 2000), we expect that impaired children can be cast more than the other children as peripheral participant in the activity and classroom discourse. The corpus is composed of audio and videorecorded interactions collected in three different classrooms. In the first two classrooms there were two children (8 years old) with language disorders while, in the last one, there was a girl (10 years old) with a certain level of learning, but with a relational impairment due to institutionalization. All the conversations have been transcribed according to the jeffersonian system of transcription. We then made a CA of the discursive sequences in which the impaired child was involved with the teacher. The analyses reveal that the interaction between teacher and the impaired child shows distinctive features as compared with interactions with the other children, both in the structure - more strictly formatted in the IRE fashion - and the content, much more concrete and simplified.

Learning routines: How to tell rituals from deeds and explorations?
Anna Sfard, University of Haifa, Israel

If thinking is conceptualized as a form of communication, then school learning may be interpreted as initiation to certain well defined, and usually highly valued, discourses. To be a participant of a given discourse means, among others, to be able to enact this discourse’s special routines. Discursive routines are learned by imitating other interlocutors rather through explicit instruction. Being hidden from the any direct gaze, this special learning has not received much attention in educational research. The present talk is a contribution to the current efforts to bring this theme to the fore. Different discursive routines would often produce identical performances. According to the goal of the performance, as perceived by the performer, we can distinguish between three discursive routines: deed, exploration and ritual. Deeds and explorations are both geared at extra-discursive reality: They are respectively, about changing the world and knowing it. In contrast, rituals are socially oriented: These are acts of solidarity with those with whom they are performed. The central claim of this talk is that rituals, far from being a “meaningless game”, as the world
‘ritual’ may imply, are likely to be a form of young children’s contact with the social world. If thinking is a special case of communication, and if communication begins as an interpersonal affair, this contact may only develop through other people. In the talk, the argument will be supported with examples coming from mathematics classrooms.

Teachers strategies in assessing text comprehension and in detecting errors
Ottavia Albanese, University of Milan “Bicocca”, Italy
Cristina Maronato, University of Rome “La Sapienza”, Italy
Caterina Fiorilli, LUMSA, Rome, Italy

Teachers’ conceptions of pupil’s intelligence affect students’ school successful learning. Two ideas of intelligence have been studied: a innatist versus a constructivist one. They were observed in the different teaching strategies (verbal/non verbal behaviours, assessment processes, teacher-students interactions). The innatist strate-gies are characterized by: close questions, focus on performance, frequent revision, etc. Constructivist strategies are expressed by open questions, interest for learning processes, construction knowledge. We hypothesized that constructivist teacher strategies affect pupil’s text comprehension and mistakes understanding. A questionnaire was used to evaluate teachers’ conception of intelligence. Videotaped teacher-pupils interactions were collected within six Italian primary classroom (8-10 years old). Each group (1 teacher and 5-8 pupils) was engaged in two activities: pupil’s text comprehension and teachers’ correction of pupil’s mistakes in the planned task. By CA we found that constructivist strategies facilitate both pupils’ comprehension processes and participation to knowledge co-construction. During teachers errors’ management two prevalent methods were identified: knowledge co-construction vs. teacher’s suggestion of answer. Error understanding resulted affected by metacognitive strategies of error detection.

Community of learners and technology
Donatella Cesareni, University of Rome “La Sapienza”, Italy
Maria Beatrice Ligorio, University of Bari, Italy
Antonio Iannaccone, University of Salerno, Italy

We discuss educational discourse of learners communities supported by technologies. Communication strategies, within and between classrooms, are described. The cases discussed are selected from several studies. Classroom activities and on-line interactions were recorded and analysed with categories designed upon the learners community model. Two types of data have been collected: (a) face to face interactions between peers, between students and adults (teachers, experts, tutors), which have been video-taped and fully transcribed, and (b) interactions between distant classrooms and mediated by different communication tools. In this case notes in discussion forum, chat-logs, activities in web-site and within a three-dimensional environment are automatically recorded. Sequences proving that a learners community was established were singled out and classified into eight aspects, each of them representing a typical aspect of the community of learners, such as: Preparing the settings; working with projects; knowledge building; appreciating individual differences; using a variety of sources; thinking together; experimenting new roles; and assessing the work.
Symposium

COGNITIVE LOAD THEORY: INSTRUCTIONAL IMPLICATIONS OF THE INTERACTION BETWEEN INFORMATION STRUCTURES AND COGNITIVE ARCHITECTURE (Part 1)

Organisers: Fred Paas, Open University, The Netherlands
John Sweller, University of New South Wales, Sydney, Australia
Alexander Renkl, University of Freiburg, Germany

Chairs: Fred Paas, Open University, The Netherlands
John Sweller, University of New South Wales, Sydney, Australia
Alexander Renkl, University of Freiburg, Germany

Discussant: Remy Rikers, Erasmus University, Rotterdam, The Netherlands

By considering the interaction between information structures and cognitive architecture, cognitive load theorists have been able to generate a unique variety of instructional designs and procedures. The papers of this double symposium discuss some of the recent theoretical and empirical advances regarding the management of cognitive load in multimedia learning environments (Part 1) and the relation between worked-out examples (WEs) and cognitive load (Part 2). Sweller opens Part 1 with an evolutionary account of the relation between the cognitive architecture and instructional design. Next, Moreno examines the guidance role of an animated pedagogical software agent in a multimedia learning environment and its effects on cognitive load and learning. Then, Brünken, Plass, and Leutner present a study on the usability of a dual-task approach for the measurement of auditory cognitive load in multimedia learning materials. Next, Paas and Tuovinen present a multidimensional approach, combining the measures of performance, training effort and test effort, that can be used as a diagnostic instrument to identify efficient instructional conditions. Finally, Salden, Paas, and Van Merriënboer present the transfer effects of dynamic learning task selection on the basis of such a multidimensional measure.

Why understanding instructional design principles requires an understanding of the evolution of human cognitive architecture
John Sweller, University of New South Wales, Sydney, Australia

Evolution by natural selection may be characterized as a system in which a large store of genetic information will persist indefinitely while it remains coordinated with its environment but will continuously produce small random variations that are tested for environmental effectiveness. Those variations may be critical when the system is faced with novel environments requiring alterations in the store of information. In any environment, effective variations will persist while ineffective variations will disappear. Similarly, human cognitive architecture includes a large store of information held in long-term memory that coordinates our behaviour with the environment. A very limited working memory tests the effectiveness of small variations to long-term memory with effective variations altering long-term memory while ineffective variations are lost. Both an existing genetic code and information in long-term memory provide a central executive that guides behaviour. Such a central executive is unavailable when an environment alters or when working memory must be used to deal with novel information. A major function of instructional design is to provide the otherwise missing structure when dealing with novel information and to reduce that structural support as knowledge accumulates in long-term memory. Cognitive load theory has been
devised to provide instructional design principles based on these changes to the manner in which information is processed in working memory as knowledge accumulates in long-term memory. A large and rapidly increasing number of such principles is now available.

*The role of software agents in multimedia learning environments: When do they help students reduce cognitive load?*
Roxana Moreno, University of New Mexico, USA

Can software pedagogical agents be used to reduce the high cognitive load that some multimedia learning environments present to low prior-knowledge learners? According to cognitive load theory, when new information is presented to the learner, it must be processed in a working memory that is severely limited with respect to both duration and capacity. When new information includes multiple, interacting elements that must be processed simultaneously in working memory before the information can be understood (such as the case of interactive multimedia environments), then working memory load will be high. In this paper, I examine the potential role that software agents may have in reducing working memory load: guiding students in the selection, integration, and organization of the multiple representations included in a multimedia environment. To do so, I first, present a cognitive theory of how people learn from agent-based multimedia environments. Then, I report two sets of studies that tested the guidance role of an animated pedagogical agent for two different interactive multimedia games: An agent that guides elementary students in their process of learning mathematics and an agent that guides undergraduate students in their process of learning about science. Both studies examined the agent’s guidance role by testing a cognitive-guide hypothesis according to which, agents that use a guided participation instructional method to process the multimedia materials promote deeper learning than those who present identical materials using discovery methods. The practical and theoretical implications of the findings are discussed.

*Assessment of cognitive load in multimedia learning with dual-task methodology: Auditory load and modality effects*
Roland Brünken, University of Erfurt, Germany
Jan L. Plass, New York University, USA,
Detlev Leutner, Essen University, Germany

This study extends prior research that introduced a dual-task approach for the measurement of visual cognitive load in multimedia learning (Brünken, Plass, Leutner, in press; Brünken, Steinbacher, Plass, & Leutner, 2002) with the measurement of auditory cognitive load induced by multimedia learning materials. In two all-within-subject experiments (N=20) we used two different multimedia learning systems as primary learning task. Each contained two treatment conditions with either visual or an audiovisual learning materials that were alternating pagewise. Both conditions included background music. Simultaneously, a secondary auditory monitoring task was presented to measure auditory cognitive load. In a third condition, controls worked on the secondary task alone. Dependent variables were reaction times in the secondary task for each of the three conditions and learning outcomes in the primary task for the visual and for the audiovisual learning materials. Both experiments showed a significantly higher auditory load in the audiovisual condition compared to the visual condition, as well as a modality effect: Participants performed better on the audiovisual than the visual materials. However, secondary task performance in the visual presentation condition did not differ from the performance in the control condition, indicating that the background music imposed no additional load on learning. This is contrary to findings on auditory seductive details by Moreno and Mayer (2000), who
reported deleterious effects of background music and sounds on learning. Our findings are in line with Cognitive Load Theory and our prior findings and underline the usability of the dual task approach for cognitive load measurement.

**A multidimensional approach to the mental efficiency of instructional conditions**
Fred Paas, Open University, The Netherlands
Juhani Tuovinen, Charles Sturt University, Australia

Research on Cognitive Load theory has shown that measures of cognitive load can reveal important information about the cognitive consequences of instructional conditions that is not necessarily reflected by traditional performance-based measures. Although, the individual measures of cognitive load can be considered important to determine the power of different instructional conditions, a meaningful interpretation of a certain level of cognitive load can only be given in the context of its associated performance level, and vice versa. This was recognized by Paas and Van Merriënboer (1993) who developed a 2-dimensional computational approach to combine measures of mental effort with measures of the associated primary task performance in order to compare the ‘mental efficiency’ of instructional conditions. In this approach, high task performance associated with low effort is termed high instructional efficiency, whereas low task performance with high effort is termed low instructional efficiency. Here we present a new 3-dimensional approach, which combines the measures of learning effort, test effort and learning performance. This approach can be used by instructional researchers as a diagnostic instrument to identify efficient instructional conditions and can be implemented in electronic learning environments for adaptive learning-task selection. It is expected that both functionalities will have a positive effect on students’ meaningful learning in complex cognitive domains where the efficient use of the limited cognitive capacity is very important.

**Mental efficiency as a determinant for the dynamic selection of learning tasks in aviation training**
Ron J. C. M. Salden, Open University, The Netherlands
Fred Paas, Open University, The Netherlands
Jeroen van Merriënboer, Open University, The Netherlands

Contemporary training methods have shifted their focus from group-based to individual-based or personalized instruction. As a consequence, the sequencing of training material has become dynamic, meaning that instructional adjustments can be made in response to the learner’s progress. Usually, learning tasks are selected dynamically on the basis of performance measures. We argue that task selection should be based on a measure combining performance and the associated cognitive load. The use of cognitive load measures is considered important because it provides the possibility to differentiate between learners with the same performance level and to identify and react to possible situations of under- or overload. Two experiments have been conducted with an Air Traffic Control training program in which a non-dynamic condition with a fixed predetermined sequence of learning tasks, was compared to three dynamic conditions, in which learning tasks were selected on the basis of performance, mental effort, or a combination of both (i.e., mental efficiency). The general hypothesis stated that dynamic task selection leads to more efficient training, that is, less invested mental effort and higher transfer performance, than non-dynamic task selection. Specifically, it was hypothesized that the use of dynamic task selection based on mental efficiency will lead to more efficient training than dynamic task selection based on performance or mental effort alone. Results of both experiments will be presented and discussed.
Symposium

LEARNING TO WRITE IN CLASSROOM COMMUNITIES

Organisers: Linda Allal, University of Geneva, Switzerland
Triantafillia Kostouli, Aristotle University of Thessaloniki, Greece
Chair: Madelon Saada-Robert, University of Geneva, Switzerland
Discussant: Geerdina van der Aalsvoort, Leiden University, The Netherlands

The aim of this symposium is to present evidence from a variety of cultures (Brazilian, British, Greek, Swiss) illustrating the range and complexity of the classroom-based interactive factors that shape children’s increasing understanding of writing as a form of communication. The discussion builds on two interrelated premises. First, classrooms are seen as learning communities which privilege specific genres which may, only partially, mirror genres found outside of school. Secondly, learning to write should be conceptualized as the result of a long-term process of meaning making, during which children learn to select among the linguistic, textual, and generic resources available those which help them instantiate certain socially recognized types of texts imbued with cultural significance. Although classroom-based processes are foregrounded in this symposium, they are examined in association with children’s textual experiences acquired in out-of-school contexts, particularly in Myhill’s paper which emphasizes the way children’s prior knowledge of written genres operates to facilitate or hinder the learning process. The processes of social mediation involved in the construction of classroom literacy practices are examined in the other papers which analyze three different types of data. Kostouli focuses on dialogic processes in the context of teacher-student writing conferences. Allal, Mottier Lopez and Lehraus analyze the relationships between whole-class discussions and the practices of text revision during dyadic peer interactions. Spinillo and Ferreira Lima explore collaborative peer interactions in several contexts of text revision. In addition to the methodological frameworks proposed by each author, the papers provide illuminating evidence on the ways different types of social contexts – as constructed in classrooms – provide children with experiences for appropriating school literacy.

The impact of prior knowledge on the socio-cultural (re)production of written genres
Debra Myhill, University of Exeter, United Kingdom

This paper will examine the characteristics of children’s writing at different ages and ability levels through detailed textual analysis, drawing on both socio-cultural and linguistic perspectives. Particular emphasis will be attributed to the potential of detailed analysis of writing in revealing children’s prior knowledge of written genres and how their appropriation of the linguistic and socio-cultural knowledge of written genres is affected by prior knowledge. The paper will explore how children are frequently required to learn new genres in order to succeed in school. School writing has specific genres of its own, genres which, although they may partially mirror genres found outside of school, are nonetheless very specific. A significant factor in school genres is they emphasise an asymmetric power relationship between the teacher and the writer, with the teacher not only knowing the conventions of the genre, but often also acting as the determiner of the title, and as the arbiter of the finished piece of writing. Moreover, children whose home background has socio-culturally prepared them for production of written genres are advantaged. Thus learning to write, for some children, is less about learning to be powerful, and more about social reproduction into an adult world which privileges certain written discourses, and certain people, over others.
Co-Constructing classroom writing contexts: Dialogism, collaboration, and asymmetries of knowledge
Triantafillia Kostouli, Aristotle University of Thessaloniki, Greece

This paper, through detailed analysis of classroom-based literate activities as these are constructed in Greek elementary schools, delineates a framework for analyzing the dialogic processes through which children are cognitively apprenticed into school-appropriate ways of constructing texts that make sense in Greek schools. Attention is directed to teacher-student writing conferences as social contexts which are not given or imposed but get co-constructed by the participants involved and, as such, in different ways across classrooms. While previous studies have documented the role teachers’ scaffolding strategies play for developing common knowledge and understanding, subsequent research, through the notion of collaborative learning, has been assigning a more active role to children as co-participants in the meaning-making process. The important issue is this: How is collaboration realized on the linguistic and textual level? How is collaboration feasible, in light of the asymmetries of knowledge participants bring into the classroom interaction? While, on the theoretical front, the notions of scaffolding, guided participation and collaborative learning are differentiated in rather clear-cut terms, this study indicates a more complicated picture. Attention is directed to the (scaffolding and/or collaborative) strategies teacher and students in two different classroom contexts employ for negotiating and, ultimately, reconciling their differences in textual schemata for the purpose of reaching some ‘common’ ground. Apart from their textual role, these strategies may be also employed for defining the activity itself, for clarifying participants’ conceptions as to what counts as an appropriate contribution to the developing discourse around texts, and for establishing and reinforcing relationships and allegiances among children.

Peer interactions in a situation of joint text revision
Linda Allal, University of Geneva, Switzerland
Lucie Mottier Lopez, University of Geneva, Switzerland
Katia Lehraus, University of Geneva, Switzerland

Text production and revision activities in school settings reflect the literacy practices constructed and shared by members of classroom communities. The perspective of situated cognition and learning provides new ways of understanding how the processes of social mediation produce literacy practices. One theme of particular interest for classroom research concerns the relationships between the referential framework constructed during whole-class discussions with respect to the aims and means of a literacy activity and the practices which are observed during peer interactions in small-group situations. The research to be presented concerns processes of social mediation of text production and revision in three fifth-grade classrooms. The writing activity, entitled “Life of a star,” took place in the following phases: 1) students form dyads and choose a star (in the area of music, sports, cinema, etc); 2) the teacher leads a whole-class discussion concerning the aims and means of the writing activity; 3) each student produces a text in response to questions from a journalist; 4) after a second whole-class discussion, each text is revised individually by its author and by the other member of the dyad; 5) the members of each dyad compare their texts, discuss their similar or dissimilar ways of imagining the star’s life and jointly revise each text. The analyses focus on qualitative data regarding the processes of social mediation. Analysis of the whole-class discussions delineates the referential framework constructed by the teacher-student exchanges. Analysis of the student dyad interactions includes a characterization of the dynamics of the student dialogues (in particular the degree of co-
construction of revision activity), a classification of the objects dealt with and a specification of
the impact of the interactions on the final version of each text.

*Children’s revision of written texts: Is together better?*
Alina Galvão Spinillo, Federal University of Pernambuco, Brasil
Elizandra Ferreira Lima, Federal University of Pernambuco, Brasil

Text revision should be considered part of the process of writing a text. However, this is not a
common activity in classrooms. When implemented, it is usually made by the teacher who aims to
correct the text itself rather than help the child to improve as a writer. This model of instruction
divorces children from responsibility for their own texts. Due to this, many children either do not
know how to revise a text or have a very limited view of revision. This study explores the actions
(nature and purpose) children implement when revising their texts. The data was collected with
Brazilian children (1st and 4th graders, 7 and 10 years old) who were given three tasks. Task 1
consisted of a written reproduction of a story read by the examiner. According to their
reproduction, children were classified into good and poor writers. The poor writers were asked to
revise their own text individually (Task 2) and in interaction with a good writer (Task 3). In
general, the results suggest that: (i) Young children tend to add new information and to focus on its
surface while older children tend to rephrase passages and to be concerned with changes that affect
meaning; (ii) revisions occur more often when in pairs; and this situation provides a feedback from
an immediate and appropriate audience that helps the writer to analyse and evaluate the text, so
that revision becomes meaningful. A collaborative approach to revision seems to be more effective
than individual approach and this should be encouraged in classrooms as part of the process of
writing texts.

F 9  28th Aug    8:30 - 10:30    Room BIO 1 E

Symposium

**ACTIVE LEARNING IN EFFECTIVE VIRTUAL ENVIRONMENTS**

Organiser:  Maria Beatrice Ligorio, University of Bari, Italy
Chair:      Alessandro Antonietti, University of Milan, Italy
Discussant: Alessandro Antonietti, University of Milan, Italy

This symposium is aimed at analyzing the educational impact of three-dimensional (3D) multi-
user environments. Various experiences, implying 3D software for the educational uses, will be
discussed. The presentations will attempt to defined the distinctive features of learning in virtual
environments. In general, the way learning occurs in 3D environment actively involves users since
they are called to plan and build collaboratively their own environment. In doing so social,
personal, and aesthetic dimensions are involved. Virtual communities are established and they are
able to sustain individuals and inter-subjectivity. The focus on communities allows to understand
how tools are shared and used, how new meanings and cultural activities rise, how each subject
obtain advantages of being part of the community, and what are the different levels of participation
to the community. In this perspective, the collaborative learning appears to be not only a process
concerning students but also teachers, trainers, and researchers.
Cross-fertilizing educational ideas in avatar inhabited cyberspace
Bonnie DeVarco, University of California, Santa Cruz, USA

Collaborative Virtual Environments (CVEs) offer unique opportunities for educators to use the medium they are studying in order to increase the ability to cross-fertilize ideas, methodologies and projects in a thin, rich and globally accessible communication environment. Vlearn3D.org is a non-profit international network hub supporting educators using 3D virtual worlds for informal and formal learning. For the past five years, Vlearn3D has used the ActiveWorlds multi-user 3D education universe (Awedu) as a location in cyberspace to mobilize and support this cross-fertilization by providing web-based resources and hosting annual conferences that bring together an international community for one day of panels and presentations. The conferences, which bring together dozens of speakers and attendees (both educators and students), utilize innovative aspects of the medium to explore effective examples of educators using multimedia in immersive virtual worlds. The conferences also act as self-reflexive examples of effective content and idea sharing in concentrated virtual settings. This study focuses on key lessons learned through the process of refining virtual conferences as cross-cultural and interdisciplinary collaboration tools. To be effective, many things must be considered, from ample rehearsal time and prepared text to the presentation of realtime slide shows of photographic material by a globally distributed crew. Because 3D offers the opportunity to design a “social environment,” venues for presentations have evolved to include more effective and prepared volunteer support, crowd control and active “telementoring”. The combined challenges of rich multimedia and social space in this hybrid environment present us with a significant area for further investigation and praxis.

Collaborating in a 3D virtual world for history, culture, and arts
Jeroen Janssen, University of Nijmegen, The Netherlands
Henny van der Meijden, University of Nijmegen, The Netherlands
Maria Beatrice Ligorio, University of Bari, Italy

Recent developments in the field of CSCL make it possible to support collaboration in an online, 3D virtual world (Ligorio, 2001; Ligorio & Van der Meijden, in preparation). This paper describes how 40 Dutch secondary education students collaborated on two projects in a 3D virtual world, offered by a software program called Active Worlds. Topic of the first project was Edgar Degas, for students who studied culture and the arts. Political posters and political history was the topic of the second project. Our research questions are: (1) What kind of collaboration processes take place in a 3D virtual environment created by Active Worlds? (2) How do students who collaborate in a virtual reality environment evaluate the functionality of the software program, and the communication process? To describe the interaction between students, we used a coding scheme to categorise the statements made by the students while collaborating in Active Worlds. To answer the second research question, two questionnaires were administered to the participating students. Preliminary results from the first project indicate that: (a) Students were able to construct an impressive virtual world together. (b) The statements students made during the collaboration processes were mostly on-task. Most of these statements could be categorized as containing a form of medium-level elaboration (e.g. giving answers without elaboration); high-level elaboration and regulation of the collaboration processes occurred less frequently. (c) Students evaluated the software as functional, but also indicated that they had difficulties communicating in Active Worlds.
**Effects of building in virtual: New communities and new roles**

Maria Beatrice Ligorio, University of Bari, Italy

This presentation is based on an educational virtual environment, addressed to primary schools and cross-national collaboration, called Euroland. Seven classrooms (four Italian and three Dutch) were involved on planning, building, and discussing the cultural content of Euroland. To be successfully implemented at school, virtual environments require students to acquire new communication skills; teachers to work in team; and disciplinary divisions to be overcome. Furthermore, virtual environments are an occasion to implement virtual communities and to define a new pivot between extra-school and in classroom activities. The virtual environment of Euroland was formed by a three-dimensional software (called Active Words) and a discussion forum (Web Knowledge Forum, designed by Scardamalia and Bereiter). The construction process of three-dimensional buildings was analysed using an ethnographic approach and the dialogical perspective was used to qualitatively analyse chat logs and notes. At the end of the project, Euroland was a virtual world filled by sophisticated “cultural houses” built through a real collaboration among all the “agents” involved (Ligorio, 2001). Here learning takes place by entering, “populating” and building a virtual world and by progressively being part of a new virtual community. The on-line experience also impacts the classroom's atmosphere. Students take charge of their own curricula, make decisions about what to learn, where and how, they organise their own work and new roles emerged. As one of the students stated: “learning in this way is different …. Also because for once we have something to teach to the teachers!”.

*Only connect: James Burke's knowledge Web project*

Patrick McKercher, University of California, Santa Cruz, USA

Too often learning is compartmentalized, so students have a difficult time understanding how disciplines relate to one another, and to their everyday lives. The Knowledge Web (KWeb) vividly demonstrates that all subjects are connected, and offers an innovative, compelling and powerful tool for their exploration. The KWeb is informed by Constructivist methodology, which holds that we learn by best by doing together and by teaching. An exemplary way to do this is for students build learning experiences for other students. Moreover, students and lifelong learners will be able to contribute content. In this ever-growing omnipedia, the user can get the kind of information she wants in the way she wants it (text, video, and simulations). But the Knowledge Web goes beyond interactivity to immersion. Selected people and places will be recreated in virtual reality; thus students could visit Da Vinci's studio, speak with him, read his notebooks, and solve a problem with him and other students using his apparatus. Perhaps the most important reason for educational VR is that it enables the creation of empowering metaphors. Educational VR allows roleplaying and simulations, which enable rich exploration of complex situations. Such roleplaying brings us back to the original meaning of e-ducation, to draw out: students can engage passionately but safely. Because students often excel teachers in mastering technology, this can have a beneficial leveling effect. Moreover, the teacher can become a coach, since to some extent the role of evaluator passes to the users of the project.

*Being competent and familiar with CVEs: University students working in small groups*

Alessandra Talamo, University of Rome “La Sapienza”, Italy
Cristina Zucchermaglio, University of Rome “La Sapienza”, Italy
Eleonora Piccioni, University of Rome “La Sapienza”, Italy
The efficacy of implementing Collaborative Virtual Environments (CVEs) in shared tasks for higher education is still understudied. The OPERA project aimed at exploring discourse in interaction and decision-making processes inside specific groups acting in Virtual Environments. The research aims at considering two aspects of acting together in CVEs: being familiar with the system and being competent on the content of the task. The corpus of data includes the interactions of small groups of university students chatting in a 3D environment while solving a task part of their university course. Groups of 4 students have been observed and recorded while chatting in a 3D CVE. Students were grouped according to gender and their previous chatting expertise of students: expert chatters, novice chatters, mixed groups of expert and novice chatters. Twelve online sessions, 3 per each group, have been analysed (5521 interventions in total). An analysis of these experiences was held with a particular attention paid to the efficacy of the decision making processes during the meetings. Main results show that being familiar with the chat system does not necessarily facilitate the participation in the problem-based task. Collaboration is mainly developed in those groups where participants are more competent in the subject area involved. Moreover, being competent in the subject allows participants to use time in a more effective way and to develop more complex and shared strategies for collaborating at the task.

F 10  28th Aug  8:30 - 10:30  Room BIO 1 D

Symposium

WHEN DOES E-LEARNING WORK AND WHEN DOES IT FAIL? SEARCHING FOR CRITICAL FACTORS

Organiser:  Rob Martens, Open University, The Netherlands
Chair:  Rob Martens, Open University, The Netherlands
Discussant:  Martin Valcke, University of Gent, Belgium

Technological and educational developments have increased e-learning. The technological push is in the large scale availability of powerful computers and standardized communication via the internet. There is also a strong educational development towards e-leaning, in line with concepts such as (social) constructivism, new learning and competence based education. Often developers or teachers provide information to students via the internet in a hypertext format. Motivated and active learning is promoted by realistic admissions and having students work together in various ways. Often e-learning is combined with traditional learning approaches, referred to as blended learning. Although implementation is technically rather simple, researchers present evidence that it is difficult to make e-learning effective. There is little insight in key factors responsible for these failures and above all empirical data to ground expectancies on are missing. This symposium presents four empirical papers in which possible key factors for effective e-learning are addressed. The first study evidences that only providing tools for self-regulated e-learning is not enough, so training should be added. The second study looks at another type of information that can be given to collaborating e-learners: functional roles. The third team of researchers states that the information structure in hypertext should not be standardised but adapted to prior knowledge. Finally Goodyear et al present data that may put it all together, by searching for profiles of ‘good’ e-learning. All studies are conducted in a higher education context. The discussant will focus on theoretical implications of the findings and on more practical aspects.
Study 1: Study 2000 – Creating and evaluating innovative Web-based learning environments
Antje Proske, Technical University Dresden, Germany
Susanne Narciss, Technical University Dresden, Germany
Hermann Körndle, Technical University Dresden, Germany

The purpose of the project “study 2000” is to analyse how web-based learning environments might be used in higher education to promote self-regulated learning. For this purpose, we developed authoring tools facilitating the combination and integration of multiple learning materials and media. These tools can be used to design innovative web-based learning settings for different instructional contexts (http://studierplatz2000.tu-dresden.de). As our intention is to initiate the design of learning environments that support, active and efficient self-regulated learning, we call these web-based learning environments “Studierplatz” (working space for learning and studying). Such a “Studierplatz” offers the student tools for active learning such as marking and note-taking facilities. In order to examine how university students learn with such a “Studierplatz” we conducted two studies: In the first study we found that providing tools for elaborated, active learning, and for monitoring and evaluation is a necessary, but no sufficient condition for promoting self-regulated learning with web-based learning environments. Even though, 53.4% of the students worked seriously with the “Studierplatz”, and used all the learning tools, 46.6% of the students hardly used any of these tools. The purpose of the second study was therefore, to investigate if individual learner characteristics might explain why some students use the tools and others do not. Furthermore, we examined the effects of using the learning tools on achievement and motivation. Results and implications of these studies will be discussed with regard to the question how to foster active self-regulated learning with web-based learning environments in higher education.

Study 2: Computer supported collaboration in higher education: Use of functional roles to support coordination in collaboration
Jan-Willem Strijbos, Open University, The Netherlands
Rob Martens, Open University, The Netherlands
Wim M. G. Jochems, Open University, The Netherlands

Conflicts regarding coordination of activities or time schedule may impede collaboration in groups. These ‘process losses’ may be countered through instruction that supports coordination and communication processes, e.g. the use of ‘functional roles’ (Hare 1992; 1994, Mudrack & Farrel, 1995). Functional roles are comprised of individual responsibilities and duties for group functioning, and aimed at decreasing ‘group management’ in favour of task-oriented communication. This paper reports studies that investigated the impact of functional roles, adapted for a computer mediated context, in a higher education setting. Central research question is: ‘What is the effect of prescribed functional roles, compared to no roles, on coordination processes, grade and perceived efficiency’. Result of two studies will be presented and discussed. Both were conducted in two years of the same course (the second study being a replication of the first) on ‘policy development’. Students collaborated in groups of four, for a period of three to eight months, in a computer mediated setting. Data collection consists of questionnaires and communication protocols. Questionnaire results of the first study reveal that roles increase the accuracy of perceived group efficiency. Whether the group performed well or poorly, their self report evaluation of group efficiency reflects better the actual performance, as compared to groups without these roles. Currently content-analysis of communication protocols in the first study are undertaken to assess whether functional roles affect coordination in time and coordination of
activities. Questionnaire results of the second study, as well communication protocols, will be analysed in the forthcoming month.

Study 3: Prior knowledge and hypertext learning in higher education
Jean Retschitzki, University of Fribourg, Switzerland
Veronique Zbinden Sapin, University of Fribourg, Switzerland
Martine Tercier, University of Fribourg, Switzerland

For more than a decade, researchers in education are arguing for the improvement of learning by new technologies, especially through hypertexts and hypermedia. But today, this claim is questioned by the lack of empirical results in favour of hypertexts. In fact, it seems that the influence of hypertext on learning depends on others variables: for example, on the prior knowledge of the learners. Our research is aimed at testing the interaction of the information structure and the prior knowledge on learning by university students. Participants were 37 university students in Fribourg, Switzerland. Our research is structured as a 2x2 repeated design, with the level of prior knowledge (low/high) as between variable and the information structure (Linear/Hypertext) as within variables. Each student went through 2 learning sessions of about 90 minutes each. We measured the learning time. Each session is followed by comprehension and memory assessments. Our first analyses show that 1) the level of prior knowledge influences the learning efficiency. Students with high level of prior knowledge are better on all comprehension and memory assessments. Both groups learn during the same time; 2) the prior knowledge does not interact with the text structure, neither on learning time, nor on learning efficiency. The information structure has no differentiated effect on students with high and low level of prior knowledge. However, we suggest that the Structure of information and the Content of a document could interact and have differentiated effects on learners with different prior knowledge.

Study 4: Constructing the "good" e-learner
Peter Goodyear, Christopher Jones, Mireia Asensio, Vivien Hodgson and Christine Steeples, Lancaster University, United Kingdom

Over the last five years, universities in many countries have seen an extraordinary take-up of what is coming to be called ‘e-learning’, notably using the technologies of the Internet/World Wide Web. Little of this shift is motivated by any clear ideas about the pedagogical advantages of new media. However, there has been a small but growing strand of empirical research which has aimed at understanding the conditions in which students can be said to benefit from e-learning, and to provide guidance for educational practice. In this paper, we attempt to synthesise the literature and three additional sources of research-based evidence about successful e-learning (at the university level). Our goal is to identify those characteristics of students, and their ways of studying, that are held to be well-suited to particular kinds of e-learning, especially those kinds of e-learning which involve group collaboration and discussion. Conversely, this helps identify circumstances in which e-learning may not be beneficial for certain groups of students. Our data sources are (i) a set of interviews with 17 experienced ‘e-teachers’; (ii) a set of interviews with 57 undergraduate students from six UK universities, all with recent experiences of e-learning (iii) a survey of students’ experiences of e-learning, involving nearly 250 students from four universities. Our synthesis of these sources allows us to summarise ways in which the students and teachers who have participated in e-learning describe ‘good learning’ and ‘good learners’. In many cases, the images they construct resemble ‘strategic’ rather than ‘deep’ ways of studying.
European Commission states in its publication “Towards a European Research Area” (2001), that research and development are seen as generators of knowledge, growth, employment and social cohesion. The amount of research conducted and the training of researchers have increased rapidly during recent years and will continue to increase in the future. Research learning and teaching are, however, poorly studied domains. What makes the issue even more problematic is that many students find research courses difficult and unattractive. This symposium discusses different factors of learning research methodology and methods. It raises questions on how much we can assume that students’ conceptions of research can change during courses, what kind of small groups would be most efficient, how computer-supported environments can improve the learning of research and how students’ motivation, conceptions, experiences and skills are interconnected. The aim of the symposium is also to discuss what kind of research we need in the future to overcome the problems of research learning and teaching.

How conceptions of science and research develop during three academic years?
Gunilla Petersson, Stockholm University and Karolinska Institute, Sweden

This paper highlights cognitive development within students at an academic level, in this case medical and nursing students. The point of departure is when the students begin their undergraduate program and the basis is Piaget’s theory of cognitive development as a construction of cognitive structures in interaction with the surrounding. In what way do these structures develop and how is this development related to the educational setting? The last four decades of research in this area indicate that students’ everyday conceptions, in this paper called commonsense conceptions, are often insufficient for understanding the more theoretical view of a phenomenon. An intentional method for analysis is used, i.e. the student’s action is focused on and the meanings of these actions are highlighted. The analysis is based on written essays, interviews and observations. The participants are from the beginning eight medical- and seven nursing students and they are studied during three (3) years. In the end of the study there are twelve students left (seven medical and five nursing students). The results indicate that whatever conceptions the students held about science at the beginning of their undergraduate programs, they generally held the same conceptions at the subsequent data-collection occasions, but that their conceptions had become increasingly developed and elaborated in the course of their studies. The analyses also indicate that the educational discourse seemed to be the main reason for the students’ conceptual development.

Equal or non-equal small groups in methods learning?
Thomas Lerche, University of Regensburg, Germany

This presentation will focus on the empirical research methods in educational sciences. Studies on these courses point out a poor rate of motivation in taking actively part in these courses. Most
students prefer to fulfill the specific needs of the test and decide not to deal with statistics during their entire studies. Searching for reasons, it has been shown that (1) some students’ mathematical and statistical prior knowledge is rather weak, (2) students in educational sciences prefer mostly not to deal with mathematics, and (3) some students have an initial belief about the nature of their study courses that they are mathematic-free. In order to foster students’ activity and motivation in empirical research methods we established a tutorial system. In this tutorial system students solve authentic problems in small groups. Our studies focus on the activity and outcomes within different types of groups. Based on our findings in previous studies on network-based learning environments, a higher rate of group activity and group outcome has been shown in groups with very equal properties in prior-knowledge, computer-based self-attribution, and willingness to work co-operatively. We have the presumption that a homogeneous group-composition in unpopular or mostly unknown topics may foster activity and outcome. Theoretical framework, research questions and outcomes of the study will be reported.

**Does computer-supported collaborative learning promote research methodology learning?**
Tomi Jaakkola, University of Turku, Finland

There have been several attempts in overcoming difficulties of learning and teaching research methodology. The potential benefits of collaboration and computer-support in overcoming these challenges have been widely recognised in many corresponding complex subject areas. However, there is very little empirical evidence of the added value of computers on collaborative learning outcomes. In order to clarify the situation and to help developing effective research methodology environments in the future, collaborative learning (outcomes) in computer-supported and non-computerised settings were compared. The study was conducted during a seven-month research methodology course. Participants were 71 1st year university students who worked in sub-groups of 3-4 people. They were assigned into two different conditions, in which some of the students (N=40) collaborated in a more traditional way, whereas others (N=31) replaced most of the face-to-face meetings with communication via web-based platform. The participants’ research methodological skills were measured both before and after the course with the test consisting of scientific concepts and research designs. Method of content analysis was used to score the students’ answers. Results revealed that the participants using online platform improved statistically significantly more than did the students working in the traditional way. Online-users’ perceptions about the benefits of the platform use will also be presented. Because the level of learning outcomes in both conditions were far from satisfactory, means of meaningfully integrating the traditional and computer-supported collaborative learning are further discussed.

**Conceptions, experiences and motivational orientation patterns in research learning**
Mari Murtonen, University of Turku, Finland

Students’ conceptions of learning have shown to be related to their study orientations, approaches to learning and study outcomes (e.g. Marton & Säljö, 1976; Entwistle & Ramsden, 1983). In a study on research methodology learning students’ conceptions concerning research methods were related to experienced difficulties in quantitative methods courses (Murtonen, 2001). Olkinuora and Salonen (1992) studied situational orientations to learning and found out that some pupils were not task oriented, but instead they had a self-defensive or a socially motivated orientation, which drew their cognitive activities away from the task. The aims of this study is to look if university students have orientations in methods learning situations that do not promote their learning and if the orientations are connected to conceptions of research and experienced difficulties. The participants of the study were 46 education students in Finland, and 122
psychology students in the USA. The questionnaire consisted of questions measuring situational orientations in imaginary statistics learning situations, experienced difficulties in quantitative methods course, learning approaches, and expectations of future work. The data were collected both in the beginning and in the end of the courses. According to preliminary results the students who experienced difficulties in quantitative methods learning showed lower task orientation and higher self-defensive orientation in learning situation than others. They also thought they would not need research skills in their future work. The experiences and orientations did not change much during the courses.

F 12  28th Aug  8:30 - 10:30  Room PSY 3 I

Symposium

STUDENT INTEREST WITHIN AND ACROSS DOMAINS

Organiser: Susan Bobbitt Nolen, University of Washington, USA
Chair: Suzanne Hidi, OISE, University of Toronto, Canada
Discussant: Suzanne Hidi, OISE, University of Toronto, Canada

Although interest is considered an important condition for learning (e.g., Alexander, et. al., 1994; Dewey, 1913; Hidi, 1990; Krapp, 1999; McDaniel, Waddill, Finstad, & Bourg 2000; Schiefele, et. al. 1983; Schraw & Lehman, 2002), researchers have begun to identify variations in its effect across domains within student (Renninger & Hidi, 2002; Renninger, Ewen, & Lasher, 2002). Findings such as these suggest that within-subject study may offer a particularly useful lens for further clarifying conditions necessary for supporting student interest and its development. The proposed symposium is an interactive session focused on two questions: (a) What are the continuities and discontinuities in the students’ performance within and across domains? (b) What is the role of interest and/or its development as a support of this performance? Short papers addressing student interest and student learning within and/or across domains will first be presented, following which the Chair/Discussant for this session will facilitate discussion among the presenters and between the presenters and the audience. Each presenter will briefly describe the results of a within-subject study in which the effects of interest on student motivation for learning was examined. The studies to be presented span several domains and students ranging from primary to secondary school. In addition to detailing the nature of their research questions, the theoretical framework(s) on which they draw, and the way in which they conceptualize and measure interest, each presentation will address the two questions of the session. Following the presentations, the Chair/Discussant will invite the presenters and the audience to reengage the session questions in terms of the other presentations, as well as the experience and work of those in the audience. It is expected that by grounding discussion in the definitions of interest employed and theoretical frameworks that guide the research conducted, that ensuing discussion will enable further consideration of interest, conditions necessary for its development, and indicators on which future research efforts might usefully be focused.

Individual interest and its impact on students’ work with expository text and mathematical word problems
K. Ann Renninger, Swarthmore College, USA
A. Kristina Lasher, The Math Forum, USA
Liza Ewen, Friends’ Central School, USA
This presentation draws on findings from a large project designed to identify the impact of contexts of less well-developed and well-developed individual interest on students’ work with expository text and mathematical word problems (Renninger, Ewen, & Lasher, 2002). In particular, findings from two parallel studies of 10-12 year-old students from a suburban school district will be used to respond to the questions of the session. In the first study, 192 students participated in a study of their work with both expository text and mathematical word problems as part of their on-going classroom work; in the second study 50 students worked individually with an experimenter to think-aloud as they completed study texts and problems. Students in both studies were interviewed following completion of target worksheets. Despite differences of method, data from these two studies suggests that the types of difficulties and strategies that characterized students’ work with both expository text and mathematical word problems vary in relation to the instruction that the students received. The impact of type of individual interest, task difficulty, and gender on student performance in each domain will also be described. Discussion will focus on (a) continuities and discontinuities in the way in which students in these studies worked with expository text and mathematical word problems generally, and (b) the roles of less-well developed and well-developed individual interest as an influence on these students' work more specifically.

Interest and learning history: Effects of instructional context
Pietro Boscolo, University of Padova, Italy
Laura Del Favero, University of Padova, Italy

Recent studies have underlined the importance of stimulating situational interest in teaching various disciplines (e.g. Baumert & Koller, 1998; Bergin, 1999; Renninger & Hidi, 2002; Sansone & Smith, 2000). However, few have analysed how interest, initially activated by attractive features of a learning context, might lead to positive orientation to a discipline. Classroom discussion is likely a productive context for developing situational interest: it can highlight novel aspects of a discipline, can allow students to participate in a discourse community and relate to peers. Two questions will be addressed: 1) Does discussion foster interest in the study of history? 2) How does interest in different historical topics develop, and does interest in one topic transfer to the other? Four 8th grade history classes, divided into discussion and no-discussion groups, learned two historical topics. Discussion either was followed by a decision or a new phase of learning, or it focused on students’ awareness of their learning, difficulties in studying history, and views on the interestingness and importance of history. All participants completed pre and post measures of historical knowledge, self-perception of competence in studying history, ability to argue, and interest in history. Following the intervention they wrote about their learning experience. Developing interest in a discipline appears to be a complex process that goes beyond the degree of topic attractiveness. Numerous aspects interact, including perceived difficulty of a topic, importance of themes, usefulness of tasks and activities, and sense of satisfaction in understanding. Multivariate analyses suggest that the discussion group made superior gains on the motivational measures; these were confirmed by personal comments comparing topics.

Student interest for physics generally, and for topics specific to physics
Tina Seidel, University of Kiel, Germany
Manfred Prenzel, University of Kiel, Germany
Lena Meyer, University of Kiel, Germany
Inger Marie Dalehefte, University of Kiel, Germany
Building on Krapp, Hidi, and Renninger’s (1992) discussion of interest as a combination of actualized individual interest and situational interest, and Haeussler and Hoffmann’s (1998) distinctions between topic interest, context interest, and interest for activity, the present study was designed to investigate the nature of 12-13 year old students' initial interest for different topics of physics. German students do not begin work in physics until they are 12-13 years of age. In the course of early instruction, the students are provided with opportunities to learn about different topics and to specify their expectations and beliefs about the instruction they receive. The study on which this presentation draws in order to answer the questions of the session includes videotapes of physics classrooms that include a total of 344 students. In addition, all students completed a questionnaire at the beginning and at the end of the school year that assessed their interest for and activity with the different topics covered in the course. Findings suggest that although most students develop a general interest for physics, this is mediated by gender, prior knowledge, and perception of the classroom. A mixed rasch analysis, however, indicates no specific differences of interest for different topics, if a student can be identified as having a general interest for physics.

The development of interest and motivation to read and write
Susan Bobbitt Nolen, University of Washington, USA

Interest research has focused primarily on how topic interest affects learning. Interest in reading and writing goes beyond topic interest, however, to interest in the activities themselves (Schiefele, 2000). Both are skills valued in school and society across content domains. Situationally interesting reading could lead to the development of individual interest in topics (Hidi, 2000; Krapp, in press; Nolen, 2001; Renninger, 2000), but do these experiences lead to motivation to read in general, across topics? Writing may be viewed as a skill used to express one’s interests, but how does interest in the process of writing itself develop (or decline)? Do interest and motivation in these two related domains show the same developmental trajectory? And is interest related to mastery motivation across domains? In a 3-year longitudinal study, 35 children in two schools were observed during literacy activities and interviewed in Grades 1, 2, and 3 about their motivation to read and write. The results of a content analysis indicate both differences and similarities in the patterns across domains. Some aspects of motivation were unique to one domain, others were common. The salience of interest increased each year as a motivator for both reading and writing, while the importance of mastery peaked in Grade 2 and then declined. Differences in change patterns between schools suggested a role for context as well as development. Motivation to read seemed less affected by school context than motivation to write. Methodological issues include young children’s understanding of interest, and how to determine when children are talking about interest rather than enjoyment across domains.

F 13  28th Aug  8:30 - 10:30  Room PSY 3 H

Symposium

WRITING TO LEARN AND LEARNING TO WRITE IN HIGHER EDUCATION

Organiser:  Olga Dysthe, University of Bergen, Norway  
Chair:  Olga Dysthe, University of Bergen, Norway  
Discussant:  Leena Laurinen, University of Jyväskylä, Finland  

This symposium explores various forms of writing in higher education in four countries. Writing-to-learn and learning-to-write are two complementary aspects of writing which are equally
relevant in higher education. The first study focuses on how reading and writing to learn tasks given by professors vary across disciplines and levels in secondary education and especially in university. The second paper explores the affective and social by-products of academic writing courses at three universities in Israel. The topic of the next two papers is writing and feedback in teacher education. One explores reflective writing as part of portfolios and the other one electronic feedback to teacher students. Feedback on writing is also the topic of the last paper. In order to get more time for discussion, the papers will be available at my website two weeks before the conference, and those who plan to attend the symposium, will be expected to have read them (http://www.uib.no/plf/english/index.html).

Reading, writing and learning in higher education: Domain, level and role differences
Isabel Sole, University of Barcelona, Spain
Marta Gracia, University of Barcelona, Spain
Sandra Espino, University of Barcelona, Spain

This paper provides an analysis and reflection about the tasks of reading and writing that are proposed by professors – and carried out by the students – with the objective of learning knowledge in the domains of science and social studies. We will present results from an analysis of the answers of a broad sample of professors and students in secondary and higher education. The answers were obtained through questionnaires that explored a range of topics which allowed not only for identification of the kind of tasks proposed, but also for characterizing them in relation to different dimensions (i.e. difficulty, interest, type of learning proposed, etc.). In this paper some the most relevant data of the study will be presented and discussed. The results reveal that there are significant differences between the reading and writing to learn tasks frequently proposed by professors in different knowledge domains. There are also significant differences between the tasks proposed by professors at different educational levels (secondary or higher education). Finally, data will be provided about the kind of learning teachers think that some tasks foster. We also examine the degree of agreement between teachers’ and students’ point of view about the value of these tasks for learning.

Affective and social changes perceived by students in EFL academic writing courses: Sources and links
Bella Rubin, Tel Aviv University, Israel
Hadara Perpignan, Bar-Ilan University, Israel
Helen Katznelson, Tel Aviv University and Beit Berl College, Israel

This study explores a phenomenon that occurs during the course of EFL (English as a Foreign Language) writing instruction. Students engaged in writing courses tend to perceive, along with the changes in the writing itself, various affective and social changes, including a range of interpersonal and intrapersonal behaviors, which might be reflected in other spheres of their lives (Katznelson, Perpignan, & Rubin, 2001). The aim of the current study is to explore this phenomenon in a greater variety of settings and to better understand the processes which may lead to the emergence of these by-products. Using a qualitative approach, the study examines close to 20 groups of students enrolled in various writing programs at the undergraduate and graduate levels, taught by 11 different teachers. Data on the students’ perceptions of the outcomes of these courses as well as teachers’ personal reports on their methods of implementing the diverse course syllabi, are collected in self-reporting questionnaires and in-depth semi-structured interviews. The data reveal three major categories of learning outcomes: perceived outcomes in writing in English, perceived outcomes in writing in general and perceived “by-products” of writing courses. Within
each major category, there have emerged both similar and distinctive subcategories within and among groups taught by different teachers. Possible connections between these findings and teachers’ reported teaching practices have been examined. Further exploration of by-products in L1 writing and in other skill-focused L2 courses could lead toward a greater understanding of the interaction between the affective and social aspects and the cognitive in higher education.

**Reflective writing in teacher training. Design, implementation and evaluation**

Jacqueline Beckers, University of Liege, Belgium
Caroline Scheepers, University of Liege, Belgium

The paper describes the results of an action research project focusing on reflective writing developed by the university in partnership with a high school. The project has two main purposes: to help the professors create activities centred on reflective writing and to help the students design their portfolio. The background is a recent decree introducing reflective writing and portfolios in teacher training. The action consists of designing and implementing portfolio activities for future foreign language teachers. In their portfolios students document different aspects of teaching: institution, education, teacher identity and write reflectively about their own teaching experience. This is an empirical qualitative study where the database consists of portfolios and interviews with students and professors. It is based on socioconstructivist perspectives (Vygotsky, Bruner) and on recent research about reflective writing: Ricoeur, Bucheton, Vanhulle, Jorro, Penloup. The outcomes of the intervention show that the portfolio contain both writing to learn and learning to write and is both a witness and an instrument of the evolution of the students’ conceptions about their training and their future job.

**Communicative conditions for learning in e-mail discussions in teacher education**

Torlaug L. Hoel, Norwegian Technical University, Trondheim, Norway

This paper is based on a project studying interaction between student teachers and a teacher educator in discussion groups via e-mail. Essential questions are: What basic needs should be taken into account in the communication situation to make interaction via e-mail a learning process? How does reflection develop in many-to-many-interaction in e-mail groups? The theoretical framework is sociocultural, mainly dialogism. Although face-to-face-communication in groups and communication via e-mail to a high degree are regulated by the same mechanisms, one main difference is the absence of a commonly shared physical context. In distant communication this will have to be constructed by and compensated for by verbal means, in this case writing. In the communication the participants will continuously need to take the readers' needs into account. The writing itself and the change of perspective may contribute to reflection on a higher level than in situations where the communication partners share the same physical context. Reflection is traditionally regarded as a purely cognitive, individual phenomenon. In this study reflection is looked upon as a social, collective phenomenon related to the interaction in the group. The participants continuously challenge each other in their individual zones of proximal development, creating and developing collective zones of proximal development.
The power of the group in graduate student supervision. An empirical study of group based mentoring and writing groups combined with individual supervision

Kariane Westrheim, University of Bergen, Norway
Olga Dysthe, University of Bergen, Norway

Writing has been identified as a major problem for master students. The vulnerability of the individual supervisor-student relationship is also well known. In order to create a richer learning environment and better supervision and mentoring practices for Master in Education students, a supervision model was tried out which combined 1) mentoring groups consisting of two supervisors, each with three master students 2) student writing groups consisting of the same 6 students (without teachers) and 3) individual supervision. This paper describes and analyses this model. It is based on a qualitative analysis of tape recordings of mentoring groups, writing groups and individual supervision sessions as well as a netbased questionnaire and interviews with students and supervisors. Our theoretical perspective is sociocultural, particularly dialogism (Bakhtin, Rommetveit, Vygotsky, Nystrand, Wertsch, Wenger, Säljö). Findings indicate that mentoring groups and writing groups are powerful mediating tools. Students report dual benefit from these groups; firstly the multifaceted feedback on their own texts, secondly giving response to peers sharpens their own ability to selfassess.

F 14 28th Aug 8:30 - 10:30 Room PSY 4 S

Symposium

FOSTERING THE WILL TO LEARN: NORDIC EXPERIENCES OF DEVELOPING CRAFTS AND HOME ECONOMICS EDUCATION AT COMPREHENSIVE SCHOOLS

Organiser: Päivi Palojoki, University of Helsinki, Finland
Chair: Sari Kivilehto, University of Helsinki, Finland
Discussant: Päivi Palojoki, University of Helsinki, Finland

The societal conditions have changed rapidly in all Nordic countries during the past years. It follows that home economics education and crafts education are in the state of development and transition too. There are challenges such as gender-aspects, multi-culturalism and equality which create possibilities for re-evaluating the contents and methods of both education and teacher training. Fostering the will to learn is challenging both theoretically and empirically. In this session we describe Finnish and Swedish studies focusing on different tools for developing education based on these premises. Hasselskog and Johansson focus on the challenges of crafts teacher education reform: new models of being a teacher should be developed. Pöntinen has created an IT-based learning environment to promote integration between different subjects by many-voiced group between home economics teacher students and students in other subjects. Simola describes a study carried out among in-service teachers facing multicultural students, there is a danger that multicultural tolerance remains only theoretical in classroom practice. Janhonen-Abruquah seeks for best practices of multicultural work, also outside school-environments, and from these experiences new ideas and experiences for home economics practices. In all of these studies, effective learning is seen as collaborative activity benefiting both social relations as well as different kinds of material tools, and physical environment. Social interactions within the classroom and networks outside classroom are an essential part of learning needed for students’ active problem solving and contribute fundamentally to individual learning outcomes.
Connections between the new role of the subject “slöjd” [craft and design] and the teacher training in the Swedish comprehensive schools

Peter Hasselskog, Göteborg University, Sweden
Marlene Johansson, Göteborg University, Sweden

There is an old tradition of slöjd and handicraft in Sweden. In school, the slöjd subject [craft and design/sloyd] used to be divided into textile handicraft for girls and wood and metalwork for boys, but has now developed into one combined subject. What is characteristic for the subject today is the process, where the pupils start out from an idea of their own, then plan and implement it, and finally evaluate what they have done. The current motives for the slöjd subject, according to the national curriculum, are (1) to develop personal qualities, (2) to encourage influence and responsibility by the pupils, (3) to make the pupils prepared to act, (4) to develop skills, (5) to understand different perspectives, (6) to practise the working process. The previous goal of developing skills in what used to be typically female or male techniques and materials has been replaced by the goal of preparing all pupils for everyday life. Since 1997 the training of slöjd teachers at Göteborg University is aimed at the combined subject, i.e. soft as well as hard materials, and open for both women and men. The new training programme uses the same approach as in comprehensive school, mainly by giving the students a lot of influence over and responsibility for their own education. Every student formulates an individual study plan based on her or his previous knowledge. Throughout the training, focus is on the process and everyday life, where techniques and materials are used as means rather than goals.

Home economics teacher students' ICT-supported collaborative learning
Silpa Maria Pöntinen, University of Helsinki, Finland

The overall aim of my research is to develop new ways and methods for home economics teacher education and for teaching home economics at school. How could information technology be taken advantage in problem solving and learning processes? At the first phase of the study, I focus on home economics teacher students and their knowledge building on selected everyday life phenomena in the ICT-based learning environment. In the next phase, following questions will be considered: how will students use their knowledge and skills learned in subject studies at their teaching practices? How will teacher students act as innovators and creators of future learning environments? In practice, we build a network with home economics, biology and possibly chemistry teacher students as well as their tutors. This network is an attempt for enhancing their collaboration in order to foster a learning environment, which enables pupils’ thinking to be more integrated and whole. Collaborative learning processes are supported by net-discussions. These discussions are collected and analyzed. Data is also collected by saving video-conference sessions focusing on the interaction between learning groups at Helsinki and at Savonlinna. In this presentation I will discuss the methodological issues, e.g. how to apply discourse analysis in this connection.

Good practices in multicultural and domiciling work, implications for home economics education
Hille Jahnonen-Abruquah, University of Helsinki, Finland

Schools have a key role for anti-racist education. There is an evident need to develop teachers’ readiness and willingness to teach students with different cultural backgrounds. Finland is undergoing rapid changes form homogenous culture to heterogeneous where immigrants from all over the world are making Finland their home. A total of about 100 000 foreigners in Finland is
relatively a small number compared to other countries but the increasing rate is significant if not. Working together towards shared aim is successful in anti-racist education. Collaborative learning in peer group could work as a useful framework for enhancing tolerance towards differences. Learning, doing, working – and why not eating as well – together are good practices for breaking down the cultural walls. A lot of successful multi-cultural work has been carried out in Finland. Legislation is new and changes are made regularly. But in the real life setting is Finland a tolerant place for different cultures to meet? Are Finns curiously open to new cultures or eager to learn from cultures different from their own? Unfortunately the answer is no. In this study I search for the good practices in multicultural and domiciling work in order to find key elements for successful multicultural work. I am interested in how doing hands in collaborative setting could help in bringing up cosmopolitan citizens. Finding a useful framework for analysing the good practises and collaborative learning is needed.

*Developing practices in multicultural education: From teacher's culture-shock to joint learning experiences*

Salla Simola, University of Helsinki, Finland

The purpose of this study was to find out teachers’ attitudes, values and tolerance when working with immigrant students in Helsinki area schools. We aimed to find out how teachers perceive interaction with immigrant students and how they take responsibility for their learning results. In addition, we aimed to find out how teachers solve conflicts with immigrants. The data was collected in two phases. At first teachers attitudes were studied through questionnaires. Secondly teachers of multicultural classes were interviewed to understand better their answers regarding the questionnaires and to understand their attitudes and values. Our analyses revealed that Finnish teachers in multicultural schools around Helsinki area do not understand multicultural student’s role in school culture. They understand their own role as a significant part of immigrant’s life. In addition they understand school’s role as an institution and as a part of a renovation of the culture. A multicultural classroom and immigrant student were seen at the same time as a possibility and as a threat. Every teacher in this research felt that immigrants are a possibility for internationalism if they learn how to behave in their school culture. Every teacher had met difficulties with immigrants when it comes to schools rules and regulations. Co-operation between immigrants’ homes and school was felt difficult. According to this study the teachers think that language skills of the immigrants are the basis of everything when speaking of learning results.

F 15 28th Aug 8:30 - 10:30 Room PSY 4 R

Symposium

**USING NOTATIONS IN PROBLEM SOLVING. A DEVELOPMENTAL PERSPECTIVE**

Organisers: Eduardo Martí, University of Barcelona, Spain
Annick Weil-Barais, Angers University, France

Chair: Eduardo Martí, University of Barcelona, Spain
Discussant: Merce Garcia-Mila, University of Barcelona, Spain

The knowledge of notational systems such as drawing, writing or numerals is an early acquisition that begins before children enter school. During the preschool years, children begin to develop specific knowledge about the rules of each notational system. There is a lot of research that analyses this process. However, a related issue that has not been studied much, but that is very
relevant to education, is children’s competence to use notations as a means to solve problems. In this case, notations are psychological tools to reach diverse goals (i.e. notating to remember a given information or notating to communicate something). The present symposium explores this issue from different points of view that share two common trends. Firstly, studies explore the capacity to produce notations that must be used later by the same children in order to reach given goals: they focus on the functional nature of notations. In all cases, the notation is a means to solve a task. Secondly, all studies investigate the process of change of this notational capacity either at the microgenetic level (comparing different phases in a problem solving task) or at the macrogenetic level (comparing children’s of different ages). Results of this research allow the identification of the difficulties that children of different age encounter when they have to produce notations to solve a task.

Using notation in different problem solving contexts: Relation between the spontaneous notations and explicit knowledge related to the cognitive functions of the notations
Mathieu Charrier, Angers University, France
Sophie Ferret, Angers University, France
Annick Weil-Barais, Angers University, France

The goal of research is to examine whether there is a relation between the explicit knowledge concerning the cognitive functions of the notational systems and their spontaneous use in complex tasks by children. Two types of tasks were used. (1) A visual task of localization of objects in a plan: Chips are hidden under egg cups laid out side to side - 4 lines of 4 egg cups on a mobile square support presenting a coloured mark in an angle; 3 chips are successively hidden. The task consists in indicating the place of the hidden chips whereas the support turned, apart from the view of the subject. (2) An auditive task of localization of objects on a scale: Chips are arranged in drawers; the subject is invited to find their place starting from information (topological relations between the objects, for example “The red chips is above the blue chips”) orally presented with a numerical tape recorder. The subjects can freely stop the listening of the recording or choose to still listen to it several times. The place of the chips can be deduced from the set of relations. Two groups of children aged from 9 to 12 years were invited to solve these problems. After a phase where they try to find solutions without explicit instruction of notation, one suggests to them to use the material, if they write nothing spontaneously. At the occasion of another meeting subjects are invited to answer a whole of questions aiming at determining their explicit knowledge of the uses and the cognitive functions of the notational systems (Metacognitive Notation Questionnaire): Write to remember visual information, to remember heard information and to solve mathematical problems. The answers of the children were compared with those of adults.

Using notation as cognitive tool to memorise or communicate a shape: Developmental trend in 6- to 9-year old children
Christine Gaux, Angers University, France

This study was aimed to analyse the use of notation as cognitive tool in a problem solving task and to understand the functional value of notations in children. Specifically, we asked whether 6- to 9-year-old children spontaneously used notation to communicate information to an absent child or to register this information in order to recover this information later. Another questions addressed were whether children changed in the strategies to represent information according to their age and to the purpose of the task, that is to transmit to another child or to oneself, and how useful are the notations produced by children. The task to solve required the production of notation. Children were presented with a coloured shape made with self-adhesive piece of paper (collage - two-
How to use a cell phone? Children’s and adult’s written instructions
Eduardo Martí, University of Barcelona, Spain
Raquel Mayordomo, University of Barcelona, Spain

The underlying hypothesis of the present study is that producing of written instructions with a communicative goal is a cognitively complex acquisition. This acquisition is not only related to the capacity to represent information by mean of notations (writing, drawing and numerals) but also with the capacity to use them appropriately. Eight-, nine- and ten- year old children and a group of adults manipulated a cell phone until they succeeded making a call. They were also asked to notate on a paper what they thought was necessary for another person (who did not know how to use it) to make a call successfully. The analysis of the notations produced showed that the notational task was difficult before age 10. The informational content of the messages, the type of notational systems chosen by the participants (drawing and/or writing) and the notational organization in the sheet of paper (descriptive text, list of instructions, diagram) were analyzed. Our results show a clear progression in the exhaustivity of the notated information according to age. This progression was specially clear when the focus was on the sequence of actions to make a call. This progression also applied to differences in the type of notational system and to the organization on the sheet of paper. These results show the main difficulties children have when they have to create written instructions. They also show the cognitive gap between being skillful to execute a sequence of actions and to represent it notationally. The educational implications of such findings are discussed.

Notational practices within activities of preschoolers’ constructions of scientific knowledge
Spyridon Tantaros, University of Patras, Greece
Dimitris Koliopoulos, University of Patras, Greece
Maria Papandreou, University of Patras, Greece
Konstantinos Ravanis, University of Patras, Greece

The plethora of symbolic codes connected to new technologies related to information and communication, favors the acquisition of a variety of symbolic systems by pupils, based on the image. It is necessary to know how children understand and use these symbolic systems, which are not however included in the curriculum. The children’s attention for the functional learning of traditional symbolic codes (writing and mathematics) may be based, to a large extent, on the potential use of these systems as cognitive instruments. In this frame, we created an experimental situation aiming at studying pupil’s conceptualisation of the notions of “sinking/ floating” of various objects in water. An analysis of the ways in which preschoolers (N=20) try to note or not, elements of the experimental procedure (so that they can later “remember” or “explain their peers what they do”) followed. The first results reveal a difficulty of the children to note things spontaneously, while the main code used seems to be the pictorial representation of the procedure. Moreover, ther seems to be a tendency of children’s choosing notations that could represent possible developmental phases.
Note-taking, report writing and scientific thinking
Merce Garcia-Mila, University of Barcelona, Spain
Nubia Rojo, University of Barcelona, Spain
Christopher Andersen, Ohio State University, USA

The present study analyzes the relationship between scientific thinking, report writing and note-taking. The underlying assumption that scientific thinking and scientific writing interact is based on theoretical positions that relate the written culture with thinking (Ong, 1992; Wells, 1999; Olson, 1994) and the progression of scientific texts in the history of science (Halliday & Martin, 1993). Our definition of scientific thinking involves the ability to consciously articulate a theory, understand the type of evidence that supports or contradicts it, to generate such evidence and to justify the confirmation or disconfirmation of such theory (Kuhn, Garcia-Mila, Zohar & Andersen, 1995). Therefore, our analysis takes into account the entire process of investigation: knowledge explicitation by means of hypothesis, experimental design; evidence evaluation and theory revision. In this study, 34 preadolescents worked individually with the same task over seven sessions. Participants in the present design gathered data on a different day than they did the experiments, which created a need to take notes and more important, review them. Also, in the mid session participants were asked to write a report on their results. Our results show a progress in the strategies of scientific thinking that came along with a higher quality of participants' writing. Our claim is that the present design prompted a higher level of self-regulation that may have played an important role in the progress of scientific thinking strategies. Instructional design should take into account the metacognitive effect of getting involved in the writing process on the development of scientific thinking.

F 16 28th Aug 8:30 - 10:30 Room PSY 4 P

Symposium
EUROPEAN WORLD VIEWS, MORALITY AND RELIGION

Organiser: Kirsi Tirri, University of Helsinki, Finland
Chair: Kirsi Tirri, University of Helsinki, Finland
Discussants: Fritz Oser, University of Fribourg, Switzerland
Hannele Niemi, University of Helsinki, Finland

The purpose of this symposium is to explore the diverse world views of adolescents in different European countries. The world views include different religious beliefs and moral concerns. We have four presentations from three different European countries and two expert discussants who can reflect on the studies from two different perspectives. Each presentation provides a different European view on the theme studied. The study from Netherlands presents the opinions of Catholic secondary school students concerning the Christian religion and alternative forms of religious belief. The Netherlands represents a secularized European country with increasing diversity in cultural, religious and ethnic groups. The study from Finland explores the world views of adolescents and their relationships with the information society. Finland represents a European country with advanced technological innovations. The Finnish study adds to our knowledge on how different world views predict adolescents’ attitudes toward information society. The other Finnish study explores students’ concepts of Lutheran religion. Currently, over 80% of Finnish people belong to the Lutheran church and religious education in schools is arranged according to
students’ own religion. Hence, it is very valuable to know how students understand Lutheran religion. The Italian study explores the validity of Oser’s Religious interview in the Italian context. This presentation adds our knowledge on the cross-cultural validity of the research instruments. Furthermore, we gain information on the religious development stages of Italian people of different ages. The symposium provides a forum to discuss European values and beliefs by exploring them in different contexts including Catholic and Lutheran traditions.

Students' views on social values, religion and moral education
Cees A. Klaassen, University of Nijmegen, The Netherlands
Han A. Leeferink, University of Nijmegen, The Netherlands

In current western society, which the Netherlands is very much a part of and where secularization is flying high, an increase of cultural, religious, and ethnic diversity can be observed. In our presentation, attention will be paid to the results of an exploratory-descriptive study addressing the question of the relation between ideological opinions and value orientations of students, on the one hand, and their opinions regarding goals and practices of moral education at school, on the other hand. The questionnaire study was carried out in the last month of the last millennium with 857 Dutch secondary education students affiliated with a Catholic high school. In order to obtain an accurate image of the religious opinions of students, not only research on their opinions regarding the established Christian religion but also their important opinions regarding alternative forms of religious belief have been considered. In our presentation of the research results we will show the extent to which youngsters in catholic schools also adhere to these less traditional forms of religion. Our results show the students opinions regarding the methods of moral education to fall into two categories: transfer versus self-construction, with the latter encompassing the clarification, discussion, and development models of moral education. The concept of the school as a community offers fruitful insights for the educational policies of Catholic schools, but should be complemented with a reflection on the question how to cope with diversity.

How do world views predict attitudes toward information society among Finnish adolescents?
Olli Poutiainen, University of Helsinki, Finland
Kirsi Tirri, University of Helsinki, Finland
Petri Nokelainen, University of Helsinki, Finland

The purpose of this paper is to explore the world views of Finnish adolescents and their attitudes toward information society. The Finnish adolescents are presented by students from secondary school (N=263) and vocational school (N=145). The adolescents are 16-19-year-olds. In both data sets there are almost equal number of girls (N=202) and boys (N=202). The data was gathered with a quantitative questionnaire that used 5-point Likert-type scale to measure their world views and attitudes. The data was collected during the year 2001. We performed principal component analysis of the scales and found six main dimensions of world views. These were: Christian, New Age, Ecological, Neoconservative, Scientific and Humanistic. According to the factor score means Humanistic and Scientific world views were the dominant among Finnish adolescents. The attitudes toward information society were presented by two dimensions: Critical and Optimistic. The critical was the dominant one among the adolescents. The girls were shown to be more critical than boys toward information society. To further explore how the six different world views predict the critical or the optimistic attitude toward information society we performed a discriminant analysis by using Bayesian network classification. The results indicate that humanistic, ecological and scientific world views predict critical attitudes toward information society. Neoconservative
world view predicted optimistic attitude toward information society. The results can guide our efforts to build information society to different learners with diverse world views.

Secondary students’ conceptions of Lutheran religion
Elina Hella, University of Helsinki, Finland

This paper presents a phenomenographic study on secondary students’ conceptions as qualitatively different ways of understanding Lutheran religion. Religious education in Finnish secondary schools has been characterized as confessionally Lutheran, because the majority of students belong to the Evangelical-Lutheran Church. The qualitative aim of the study was to understand and interpret students’ understandings of Lutheran religion. The theoretical framework included a literature review introducing the starting-points for approaching the meaning of Lutheran religion from the second-order perspective, through students’ conceptions. The relevant concepts like religion, dimensions of religiosity, folk church and civil religion were used as analytical tools for interpretation. Data was collected from 33 students who were asked to write an essay on how they understood Lutheran Religion. Then 12 students were interviewed in order to deepen the interpretation of different meanings in the essays. The interviews were tape-recorded and transcribed. As a result of the analysis seven categories of descriptions including subcategories were found. They reflected two main dimensions of focusing either on the essence and features of Lutheran religion as faith or on Lutheran religion in life representing its appearance and expressions in practice. The study serves as a knowledge base for teaching and evaluating the Lutheran content of Religious Education and for further research on students’ and teachers’ understandings in relation to each other as a starting-point for investigating the instructional process in religious education.

The Oser’s dilemma in Italian culture: A preliminary adaptation study
Anna Laura Comunian, University of Padova, Italy

A major problem regarding religious development concerns moral development and role-taking opportunities. The present research investigates the usefulness and validity of Oser's Religious Interview in an Italian setting. In addition, the project was designed to test the universality of the stages and their sequence with the help of a cross-sectional study representing different age levels. It was then investigated (a) if religious judgment development is related to age; (b) if the religious development stages moral and development stages are related with role-taking opportunities. Subjects were distributed as follows: 40 subjects aged from 14 to 15 years (Mean age=14.35; SD=0.50); 38 from 17 to 18 (Mean age=17.57; SD=0.50); 38 from 20 to 25 (Mean age=22.86; SD=1.76) and 36 from 26 to 35 (Mean age=30.35; SD=2.99). Males and females in these four age groups were equally distributed. Different categories of characteristics classified: religious attitude (“non-believer” or “still searching”; “non-practicing believer”; “practicing believer”; “Roman Catholic priest”); “belonging to an oriented group” (“social-oriented” and/or “religious-oriented”); “not belonging to any oriented group”. The Italian version of the Oser’s Dilemma shows good levels of reliability and validity, which are comparable with those of the original version. Highly developed stages of religiousness involve role-taking opportunities and high moral development stages. A series of related questions remain to be further explored. Integrated longitudinal cross-sectional research studies would be comprehensive for examining these connections.
Symposium

TEACHER THINKING IN HIGHER EDUCATION: DIALOGUE ACROSS EPISTEMOLOGIES AND METHODOLOGIES

Organiser: Malcom Eley, Monash University, Australia
Chair: Cynthia Weston, McGill University, Canada
Discussant: Noel Entwistle, University of Edinburgh, United Kingdom

Four independent and methodologically different studies into aspects of teacher thinking will be examined to consider how these studies may jointly provide a more comprehensive picture. The Committee on the Foundations of Assessment (2001, 180) noted recently that “… differing theoretical descriptions of learning should not be viewed as competitive … [but as] descriptions [that] can often be combined to create a more complete picture …”. The same is true of teaching. Researchers into teacher thinking draw on different perspectives and methodologies, often using the same words but imputing to them different meanings. Integrating our varied perspectives could result in a better understanding of the complexity of teacher thinking. The symposium will attempt to encompass such differing perspectives, enabling productive dialogue and inquiry across discourses.

How do professors explain their decisions when planning and teaching?
Lynn McAlpine, McGill University, Canada
Cynthia Weston, McGill University, Canada

Drawing on a larger study of reflection on teaching (e.g., McAlpine & Weston, 2000), we compare and report two ways in which professors describe their teaching: a) thinking about a subject they are teaching, b) thinking about specific classes within that subject. Extensive interviews over an extended time provided the data for analysis. At the subject level, we analyzed comments about teaching and learning asked at two times: before professors taught a subject and a year and a half later. The abstract themes that emerged represent taken-for-granted and often unexamined beliefs that underlie teaching. These can be enacted in a complex range of ways influenced by, for instance, context, student characteristics. At the class level, we analyzed comments about specific classes taught as part of the same subject. Individuals articulated rationales relating to specific decisions and actions. In contrast with the themes that emerged at the subject level, here there was a direct functional relationship between the rationales and teaching actions that was apparent to us as well as the professors. In situating this study in the literature on teacher thinking, we conclude that the explicit thinking underlying the decisions of the teachers at the class level represents an intermediary level between teaching conceptions or beliefs and teaching actions. Our proposed model of thinking distinguishes yet provides links among conceptions, thinking related to decisions, and actions.

Teachers’ experience of change in their understanding of the subject matter they have just taught
Keith Trigwell, University of Oxford, United Kingdom
Michael Prosser, University of Sydney, Australia
Elaine Martin, Victoria University, Australia
Paul Ramsden, University of Sydney, Australia
The aim of the study was to describe the qualitatively different ways that teachers’ experience change in their understanding of the subject matter they have just taught. Phenomenographic interviews were conducted with 31 teachers from a wide range of first and second-year university subjects. While 20 reported no experience of change in their understanding, the reports of the 11 who did were used to constitute five qualitatively different categories of description. They range from (a) the experience of change as a quantitative adding of unproblematic knowledge to what is already known, (b) a reorganisation of unproblematic knowledge (c) a reorganisation of knowledge which is problematic, (d) a reinterpretation of knowledge which is problematic, to change as (e) a questioning of the theoretical framework of the subject matter. This new outcome space can be used to explore relations between the experience of change in understanding and experience of teaching and learning. The relations show that teachers who experience change in their understanding as being more about re-interpretation or the questioning of problematic knowledge (rather than as the re-organising or adding to unproblematic knowledge) were found to be more likely to experience teaching as student-focused (rather than teacher-focused). The implications of these relations are discussed.

*Teacher thinking during detailed planning, and a possible need to re-define the role of higher level constructs like conceptions of teaching*
Malcolm G. Eley, Monash University, Australia

The teacher thinking evoked during the detailed planning of specific teaching episodes was investigated. In a second, follow-up study, undergraduate teachers selected an introductory topic from within their own disciplines, and then engaged in real-time ‘think aloud’ planning for a hypothetical class on that topic. While evidence of student-centred planning varied, what seemed consistent was that thinking was constrained to the immediate teaching context. For instance, when planning sought to consider students’ learning needs, the perspective was what those needs might be for the immediate topic and context at hand. Planning was consistently not prefaced by the evoking of high level, general principles of what teaching might comprise. These findings corroborate earlier work, and seem counter to claims that constructs like conceptions of teaching might have direct functional involvement in the detailed planning and execution of teaching. Articulated conceptions of teaching might instead need to be re-cast as primarily distillations that result from teachers’ reflections on their more detailed and concrete experiences or practices. Perhaps teacher development should focus on specific teaching activities of immediate relevance, and use the presence of conceptions of teaching as an indicator of whether such contextually focussed development had been effective.

*A factor analysis of the approaches to teaching inventory*
Jan H. F. Meyer, University of Durham, United Kingdom
Malcolm G. Eley, Monash University, Australia

The approaches to Teaching Inventory (ATI) is an instrument developed by Prosser and Trigwell (1999) that is intended (p. 176) to ‘measure the ways teachers approach their teaching’ via two conceptually discrete dimensions (scales) of ‘approaches to teaching’; namely, (A) conceptual change/student-focused, (B) information transmission/teacher-focused. Within each of these two ‘approaches’ there is a further distinction (at a subscale level) between an ‘intention’ and a ‘strategy’. There are thus four possibly conceptually discrete, but not necessarily conceptually independent, dimensions of variation that may be considered: $A_1$: conceptual change/student focused intention; $A_2$: conceptual change/student focused strategy; $B_1$: information transmission/teacher focused intention; $B_2$: information transmission/teacher focused strategy. The present
study explores the psychometric properties of these subscales and the degree to which these dimensions may be empirically confirmed using factor analysis. Data are from a mixed sample of university teachers in England and Australia. Preliminary findings (N=104) suggest that there is an underlying common factor structure comprising just two dimensions of variation that generally supports the A versus B scale distinction. However, the individual subscales generally exhibit values of alpha that are barely acceptable for modelling purposes in terms of ‘conceptual change’ (A₁: 0.58; A₂: 0.52) and that are clearly not acceptable for ‘information transmission’ (B₁: 0.36; B₂: 0.41). Further data gathering is in progress and augmented findings will be examined at the Conference.

F 18 28th Aug 8:30 - 10:30 Room PSY 2 B

EARLI Invited Symposium

CULTURAL INVESTIGATIONS OF EPISTEMOLOGICAL UNDERSTANDING: EXPLORING CONCEPTIONS OF KNOWLEDGE AND KNOWING IN DIVERSE CULTURES

Organiser: Barbara Hofer, Middlebury College, USA
Chair: Paul R. Pintrich, University of Michigan, USA
Discussant: Angela O’Donnell, Rutgers University, USA

The role that personal epistemology plays in intellectual development, learning, and education has been investigated for several decades in the United States (see Hofer & Pintrich, 1997, 2002) and has recently been pursued in other cultural environments (e.g., Chan & Elliott, 2002; Limon, 2001; Mason, 2000; Pirttila-Backman & Kajanne, 2001; Qian & Pan, 2002, Zhang, 1999). Research suggests that epistemological understanding has important implications for learning: for example, beliefs about the nature of knowledge may influence strategy use (Schommer, Crouse, & Rhodes, 1992), cognitive processing (Kardash & Howell, 2000), and conceptual change learning (Qian & Alvermann, 2000). However, the primary constructs regarding students’ conceptions of knowledge and knowing – and the instruments to measure them – were all developed with U.S. college students (e.g., Perry, 1970; Schommer, 1990; King & Kitchener, 1994). This symposium addresses several questions: Are beliefs about knowledge and knowing represented similarly in other cultural contexts? What is the applicability of these models of personal epistemology in other cultures? Do they have similar antecedents and consequences? Are the measurements culturally appropriate ones? What advice can be given to new researchers in this area from those who have been conducting research on epistemological beliefs and epistemic cognition in contexts other than where the constructs were derived? What particular issues arise in conducting cross-cultural research on this topic? The panelists will each discuss their own research endeavors and findings and will respond to these and other questions about addressing epistemological understanding in diverse culture contexts. We will conclude with a discussion of the educational implications of this work, particularly in multicultural settings.

Epistemological beliefs and strategy use: Cross-cultural explorations in Japan and the U.S.
Barbara Hofer, Middlebury College, USA

Although there is a growing body of research on epistemological understanding and personal epistemology (see Hofer & Pintrich, 1997, 2002) there has been little attention to cross-cultural studies of beliefs about knowledge and knowing. Two recent studies suggest that the factor
structure of such beliefs, as measured by two of the instruments used in the U.S., may not be similar in other cultural contexts, particularly Taiwan (Chan & Elliott, 2002) and Korea (Youn, 2000). This study is an attempt to address issues of validity with a third instrument, a discipline-specific measurement of epistemological beliefs (Hofer, 2000), with college students in Japan and the U.S. Students also completed the Motivated Strategies for Learning Questionnaire in order to examine strategy use and motivational orientations and their relation to epistemological beliefs.

Instruments were translated and then reviewed by a Japanese-speaking U.S. psychologist, then examined and further revised by an English-speaking Japanese psychologist in order to provide for comparability of meaning. In addition to discussing the methodological issues and results of this study, I will also explore the possibility of expanding the construct to include dimensions suggested in other cultural settings. I will conclude by addressing the need for cross-national teams and samples at the theory-building stage and suggesting steps toward more culturally sensitive models of epistemological understanding.

**Beliefs about knowledge in the Moslem world: Challenges and opportunities**

Stuart Karabenick, Eastern Michigan University, USA
Samira Moosa, Sultan Qaboos University, Sultanate of Oman

Most studies of epistemological beliefs have been confined to, or involve comparisons between, European cultures. Whether the theoretical frameworks and assessment techniques based on those populations are generalizable to non-European cultures remains unresolved. Differences between cultures in terms of generalized beliefs about authority would be especially important to examine given evidence that authority-related beliefs are an important determinant of the acceptance of knowledge claims. For example, stronger Chinese than American students' beliefs that knowledge is simple and certain, and their resistance to desirable conceptual change, was attributed to such cultural differences (Qian & Pan, 2002). Similar results would be expected of students in Islamic cultures where religion-based authority permeates social life in general, and educational systems in particular. Although suggestive evidence from Islamic countries exists (Al-Salhii, 2001), no studies provide systematic comparisons that focus on authority, particularly religion-based authority, between Islamic and non-Islamic cultures. We present research that compares epistemological religious beliefs of Omani and American college students, including differences in the dimensionality (i.e., factor structure) of epistemological beliefs, degree of beliefs, and other moderating effects of culture. Methodological concerns regarding meaning and translation will be discussed, as well as implications of the results for educational practice.

**Unresolved questions in the current models of epistemic development**

Anna-Maija Pirttilä-Backman, University of Helsinki, Finland

In spite of the growing amount of research on the development of implicit epistemologies, several unresolved questions remain in the area. This paper addresses a few of them on the basis of our extensive Finnish interview material (N=149, one third of the sample studied longitudinally) utilizing the Reflective Judgment model and interview method of King and Kitchener (e.g. 1994). Some unresolved points in the Reflective Judgment model, as well as in some other related models, will be brought up and discussed (e.g. the status of the revolutionary character of contextual relativism in development). Moreover, a detailed analysis of the highest stage of development in implicit epistemologies will be conducted. This will include articulation (with the help of philosophical theories of truth) of the nature of the assumptions made in the highest stage, and the role of commitment in the mature epistemics. Another theme to be discussed is the role given to experts and expert knowledge in the models of epistemic development. On the theoretical
and empirical bases it will be argued that this is a more complex issue than is seen in the mainstream literature of the area today.

_Cognition, culture, and epistemic commitments: Why cross-cultural studies are not enough_
Eli Gottlieb, Israel and University of Washington, USA

In my contribution to this interactive symposium, I examine the assumptions underlying existing psychological accounts of epistemic development. Citing evidence from my own recent studies of religious and non-religious argumentation amongst Jewish Israeli children and adolescents, I argue that such accounts have tended to ignore the contexts in which people’s epistemic beliefs are formulated and held, thereby underestimating the extent to which such beliefs are shaped by culture-specific discourse practices and by the individual’s concepts of self, group identity and personal commitment. I show how divergent discourse practices in Religious and Secular schools in Israel foster divergent modes of epistemic commitment amongst pupils, and consider the implications of these findings for future epistemic development research and its educational applications in different cultural settings. I argue that, although cross-cultural studies may help expose some of the biases inherent in existing ways of studying epistemic development, the extent to which cross-cultural comparisons will illuminate the role of culture in epistemic development will depend on how successful we are in developing instruments and methods that are more process-oriented and context-sensitive than those psychologists use currently.

_Epistemological beliefs and self-regulated learning among Norwegian post-secondary students_
Helge I. Stømsø, University of Oslo, Norway
Ivar Bråten, University of Oslo, Norway

We used exploratory factor analyses to examine the underlying structure of Schommer's (1990) epistemological beliefs questionnaire (SEQ) with samples of Norwegian business administration students and student teachers. Four factors were found, (1) Quick learning, (2) Certain knowledge, (3) Constructed knowledge, and (4) Innate ability, with only (3) inconsistent with Schommers model. Our research thus demonstrated considerable cross-cultural generalizability of the factor structure of the SEQ. No differences were found between business administration students and student teachers regarding the four dimensions of epistemological beliefs. However, a set of multiple regression analyses revealed that relations between epistemological beliefs and aspects of self-regulated learning varied with field of study, with Certain knowledge seemingly more related to self-regulated learning for the business administration students, and with Constructive knowledge seemingly playing a more important role for the student teachers. Epistemological beliefs were also found to contribute more to students' self-regulated learning than their implicit theories of intelligence.
Symposium

MOTIVATION, EMOTION, COGNITION AND ACHIEVEMENT IN SCHOOL: RELATIONS AND DEVELOPMENTS

Organiser: Thea Peetsma, University of Amsterdam, The Netherlands
Chair: Thea Peetsma, University of Amsterdam, The Netherlands
Discussant: Willy Lens, University of Leuven, Belgium

What stimulates students’ investment and achievement in school? In order to explain or predict investment in school and achievement, traditionally there will be referred to motivation, cognitions and emotions towards school. However, researches on emotions have come up again just recently. Not only individual factors are known to be important, as well the social situation (home, peers and school). Three general categories of motivational constructs seem relevant to motivation in the educational setting (Pintrich & DeGroot, 1990): (a) individuals’ beliefs about their ability to accomplish a task, (b) their reasons or purposes for engaging in a task and (c) their affective reactions to a task. Motivational constructs, which are used more in reference to school in general in this symposium, than in a task specific way. In the symposium students’ (a) beliefs like self-concept, self-esteem, (b) reasons or purposes like values, goals, intentions and (c) affective reactions like anxiety, identification, well-being, are related to school investment and achievement.

To be motivated is one thing, but to keep up motivation is another question. Decreases in motivation over the school period have been observed before. Explanations have been for instance, a growing misfit between school life and students’ development in adolescence (Eccles & Midgley, 1989) or a growing concurring motivation between students’ time perspective on different domains of life and their perspective on school and a professional career (Peetsma, 1997). In this symposium development in motivation and the processes behind are studied further. Most of the research on development has been done in secondary education, but motivational problems can start before, in elementary education. Developments in secondary and primary education will be presented in the last three presentations.

Societal values and school motivation
Manfred Hofer, Stefan Fries, Heinz Reinders, Marten Clausen, Franziska Dietz and Sebastian Schmid, University of Mannheim, Germany

In this contribution, a theory is presented which aims at describing students’ learning behaviour as a result of a decision process between striving for competing values and goals. Students are seen as valuing intrinsic and extrinsic incentives differently, with intrinsic incentives being mainly present in social and leisure activities (striving for “well-being”) and extrinsic incentives mainly in school activities (striving for “achievement”). Since all activities require time and energy, instances are defined in which a competition between activities (especially between leisure and school activities) may arise. In the theory, the underlying motivational processes and their influences on succeeding cognitive and emotional processes and outcomes are specified. To illustrate the empirical value of the theory, we draw on results from problem-centered interviews with adolescents (N=30) and from cross-sectional questionnaire data (N=250). The interviews aimed at specifying the meaning adolescents attach to the concepts “academic achievement” and “well being” as well as the activities and justifications associated with these goals and potential competition between them. A content analysis shows that the incentives students report to justify
their engagement or non-engagement reveal the influence of the strivings across different contexts. Furthermore, empirical support for the relevance of the construct of competition and its solutions will be presented. Results of the questionnaire data show, that this distinction between striving for well-being and striving for achievement is also valid for quantitative data. At the end, the potential value of the research to explain students’ school motivation and achievement is discussed and further research steps are outlined.

Learning in social context: Motivation, self-concept and identification with peers, families and school
Pam Maras, University of Greenwich, United Kingdom

The aim of this paper is to illustrate the importance of both social and individual factors within the social context of young people’s learning. Findings from three studies with 480 school students aged 11-16 years are introduced to illustrate links between individual (self-concept), social (social identity) processes and motivation to learn. The young people completed measures of general and specific self-concept, social relations, academic competence, academic effort and academic importance. Academic competence was found to be related to identification with peers, academic importance was found to be related to identification with peers and school and academic effort was found to be related to identification with families. In addition, the quality of a young person’s peer relations was found to account for a large proportion of the variance in predicting their academic effort. Academic effort was also found to negatively predict the young people’s ratings of their own general self-concept. These findings suggest that educators should consider the relative impact of identification (with school, family and peers) in respect of young people’s perceptions of academic importance, competence and effort when designing programmes to enhance young people’s motivation to learn.

Personal and school-based determinants of stability and change in motivation and emotion over adolescence
Jean-Luc Gurtner, University of Fribourg, Switzerland
Isabelle Monnard, University of Fribourg, Switzerland

Based on results taken from a semi-longitudinal study of the evolution of motivation, emotion and achievement among 12-16 years old, this contribution aims at characterising what changes and what remains constant in a student’s learning intentions and anxiety state at school throughout adolescence. Data come from questionnaires administered five times over two years of school and from the collection of students’ grade point average in math and in language both at mid year and at the end of each school year. They are interpreted using repeated measures analysis of variances, regressions and structural modeling. Results show that stability or change in learning intentions and in anxiety state are influenced by the nature and evolutions of two sets of factors, within school factors on the one hand (for instance evolutions in grade point averages or perceptions of teacher and peers’ commitments towards learning) and evolutions in personal factors on the other, such as self-esteem, personal goals in life and ambitions to study. Appraisals of the kind of those defined by Boekaerts (19) namely perceived relevance of school work, school attraction or subjective competence as well as motivational beliefs such as goal orientations play in this evolution an important role as mediating factors. Semi-longitudinal and longitudinal studies not only allow for a better understanding of what controls the evolution of motivation but also provide some clues on how to detect at-risk students before they become demotivated and eventually drop out of school.
Self-concept, social integration, well being and achievement in primary education: A longitudinal study
Jaap Roeleveld, University of Amsterdam, The Netherlands
Thea Peetsma, University of Amsterdam, The Netherlands
Reinoud Stoel, University of Amsterdam, The Netherlands

Using structural equation modeling, this paper models the relations between achievement, self-concept, social integration, well-being and biographical factors in the higher grades of primary education in The Netherlands. Effects of background variables on both motivational and emotional factors, as well as achievement, have well been established in the literature. However, relations between motivational and emotional factors and achievement seem to be more complex and to some extent reciprocally in nature. A longitudinal approach can give more insight in the mutual influence of motivational and emotional factors and achievement. Data are taken from the PRIMA cohort study in The Netherlands. In this study children are followed from grade 2 in primary education up to grade 8. We use two samples of 4246 students measured both in grade 6 (age about 10 years) and in grade 8 (age about 12 years). The second sample is used to confirm the model developed on data of the first sample. Achievement is measured by scores on tests for language, reading and mathematics. Academic self-concept, social integration and well-being in school are measured by self-ratings of the students. In grade 6, these concepts are modeled to effect achievement. Part of the effects of background factors (gender, ethnicity, parental education) on achievement is intermediated by the motivational and emotional factors. In the longitudinal model, combining the measurements in grade 6 and grade 8, motivational and emotional factors and achievements show to be relatively independent. Achievement in grade 8 is mainly influenced by achievement in grade 6. And although motivational and emotional factors in group 8 are effected by the prior achievements in grade 6, the main influence comes from the prior motivational and emotional factors.

Relations between pupils’ investment in school, self-confidence, well-being and school achievement at different ages in primary education
Thea Peetsma, University of Amsterdam, The Netherlands
Jaap Roeleveld, University of Amsterdam, The Netherlands
Reinoud Stoel, University of Amsterdam, The Netherlands

This paper summarizes a study into the relations between achievement, investment in school, self-confidence, well-being and biographical factors of children in primary education. Data are taken from the PRIMA cohort study in The Netherlands. In this study children are followed from grade 2 in primary education (age 5-6 years) up to grade 8 (age 11-12 years). We use a sample of 2693 subjects measured on four consecutive occasions. Achievement is measured by language and mathematics test. Investment in school, self-confidence and general well-being in school are measured by ratings of the teachers. Over the period from grade 2 to grade 8, there is an obvious increase in achievement in both language and mathematics. With respect to school investment and well-being, we find a decrease over the years, while self-confidence remains the same. For every year, the relations between achievement, investment in school, self-confidence, well-being, and biographical factors are analyzed using structural equation modeling. School investment, self-confidence and SES show positive effects on school achievement; a higher SES leads, in addition, to higher motivation. Ethnicity has negative effects on school achievement: children from migrant families achieve less. Girls have both higher motivation and better well-being than boys. This pattern of relation remains more or less the same across the four measurement occasions (and thus
at different ages). However, for pupils indicated by their teachers to be ‘at risk’, effects of motivation on achievement are much smaller than for the other children.

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Symposium

THE QUALITY OF STUDENTS’ PEDAGOGICAL KNOWLEDGE: WHAT THEY KNOW ABOUT LEARNING AND TEACHING

Organiser: Michael J. Lawson, Flinders University, Adelaide, Australia
Chair: Michael J. Lawson, Flinders University, Adelaide, Australia
Discussant: John R. Kirby, Queens University, Ontario, Canada

When making public statements about aims, schools and universities often indicate that students will, for example, actively direct their learning and have knowledge of how to undertake study tasks. Such expectations are compatible with contemporary descriptions of learning, which give emphasis to processes like self-regulation. An assumption in these aims and descriptions is that teachers will address such issues in their teaching, so that students can access knowledge about how to direct their learning. Students must have pedagogical knowledge, knowledge about domains of both learning and teaching, especially when they are studying. Yet it is not common to gather detailed knowledge about students’ knowledge in these domains. In this symposium we report studies of students’ pedagogical knowledge. A major focus has been on teacher education students in Australia and Vietnam, because we expect these students to develop their own pedagogical knowledge and to then help their own students to do likewise. Other participant groups include school students, medical students, childcare students, and mature-age students who hope to enter university without a traditional secondary school preparation. We report studies of students’ knowledge about what helps them to learn, of how class discussions can be used to assist learning, and what they know about teachers’ use of different types of questions. A second major focus of this symposium is to identify dimensions of knowledge quality that allow us to move beyond description of what students know about, to analysis of differences in the quality of that knowledge.

Identifying dimensions of quality in learners’ knowledge about teaching and learning
Helen Askell-Williams, Flinders University, Adelaide, Australia
Michael J. Lawson, Flinders University, Adelaide, Australia
Rosalind Murray-Harvey, Flinders University, Adelaide, Australia

People actively construct new knowledge in integration with existing knowledge. The importance of good quality knowledge in subject domains (such as science) is well recognised. An equally important knowledge domain is knowledge about teaching and learning. Such knowledge mediates students’ engagement with subject matter. Contemporary models of knowledge include the presumption that certain kinds of knowledge (well-connected, complex, deep, higher order, networked, schematic) are of better quality. However, the construct “quality” has remained relatively undifferentiated or justified with circular arguments (e.g., Meaningful knowledge is better remembered and knowledge is remembered better when it is meaningful!). My thesis is that quality in knowledge is multi-dimensional, and that it is possible to identify and interrogate those dimensions. Teacher and learner participants were selected from primary, secondary, adult, pre-entry university and graduate entry university settings. Situated, focussed interviews sought to
identify participants’ knowledge in four broad domains: The nature of the subject matter; the nature of teaching and learning; the nature of the learner, and the nature of the learning environment. A framework identifying five dimensions of quality (scope, structure, well-foundedness, abstraction and context) was developed and applied to the interview data using NUD*IST, network displays and matrices. Use of the framework: 1) shows that high quality knowledge is distributed within cohorts of learners; and 2) allows identification of the nature of the substantial between- and within-group variation in dimensions of quality of knowledge.

Comparing regular strand and problem-based learning (PBL) strand teacher education students’ perceptions about what helps them to learn in class
Rosalind Murray-Harvey, Flinders University, Adelaide, Australia
Michael J. Lawson, Flinders University, Adelaide, Australia
Helen Askell-Williams, Flinders University, Adelaide, Australia

Student teachers are both learners and prospective teachers. An important outcome of their studies is that they develop well-founded knowledge about the learning process. Such knowledge can be expected to guide not only their own learning, but also their future pedagogical decisions about how they will teach to facilitate their own students’ learning. The broad aim of our study was to better understand what teacher education students know about what helps them to learn and how they structure their understandings about these procedures. Of particular interest was whether students who had enrolled in the PBL strand manifested different structural conceptions to students who had enrolled in the regular strand of a teacher education degree. One hundred and forty six students sorted and ranked 40 statements related to the question “What helps me to learn in my university classes?” The statements represented categorised ‘idea units’ generated by students in an earlier phase of the research. Cluster analysis (CA) revealed seven coherent clusters and Multidimensional scaling (MDS) revealed three perceptual dimensions: intellectual engagement, structural context, and conceptual frames. Differences and similarities between PBL and regular strand students’ perceptions are discussed. Findings are considered in light of literature that recognises that learners are active constructors of their knowledge; research on developing communities of inquiry among learners; and, promoting self-directed learning, and implications for improving pedagogical practices in tertiary classrooms.

Teacher education students’ knowledge about how class discussions help them to learn
Michael J. Lawson, Flinders University, Adelaide, Australia
Rosalind Murray-Harvey, Flinders University, Adelaide, Australia
Helen Askell-Williams, Flinders University, Adelaide, Australia

Self-regulatory perspectives on learning imply that students need to possess knowledge about 1) themselves as learners, 2) how to build effective knowledge structures, and 3) how to further develop and apply their knowledge. In a teacher education context we hope that students would be able to explicitly articulate such knowledge, not only in relation to themselves as learners, but also as potential teachers of other learners. We asked final year Bachelor of Education students to specify what helps them to learn in their classes. The students’ most frequent response was, “Discussions”. We then conducted focussed interviews where students elaborated upon their written responses. In these interviews we probed each student’s understandings about how discussions helped them to learn, until the student could not elaborate further on this topic. We created a coding framework for analysing students' responses based upon research literature on classroom climate, motivation, self-regulation and psychological- and social-constructivism. We also developed a scale to rate the degree of development, or complexity, of their knowledge about
class discussions. Students made explicit statements about a wide range of features of class discussions that have been discussed in contemporary research, such as affective/emotional concerns, processes of analysis and knowledge linking, situational influences and problematic features of class discussions. Some students articulated reasonably well developed mental models of knowledge organisation. The scale used to analyse knowledge complexity provided a way to make quantitative comparisons of differences in the complexity of students knowledge about class discussions.

University students’ pedagogical knowledge of teacher questioning
Tu Anh Thi Tran, Hue University, Vietnam
Michael J. Lawson, Flinders University, Adelaide, Australia

It is assumed that if students have well-developed knowledge about how to respond to a teacher’s actions they are better equipped to construct good quality understandings. Yet much less attention has been paid to this student pedagogical knowledge than to the knowledge used by teachers in classroom lessons. The aim of this study was to investigate the pedagogical knowledge that students have about teacher’s questioning in the classroom, how this knowledge is organised, how it varies among students, how it relates to teacher’s pedagogical knowledge and to students’ performance. One hundred students from a university in Vietnam watched a 15 minute videotaped lecture about attribution theory and completed a questionnaire about their understanding of different types of questions used by the lecturer. Half the students were in the first year of their program, the others being final year students. A subset of students from both groups, and six lecturers, completed semi-structured interviews focussing on their understandings about the lecturer’s use of the different question types. Interview data was coded for both the content related to questions and rated for complexity. The results showed that students’ had detailed pedagogical knowledge about the purposes of teacher questions, and about the effects of these questions on teachers teaching procedures and on students’ learning. Students’ knowledge addressed issues discussed in contemporary research on teacher questioning, though it was better developed about simple recall than about more complex application questions. Both student and teachers showed considerable variation in the complexity of their pedagogical knowledge.

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Symposium

LANGUAGE AND LEARNING IN MULTICULTURAL/MULTILINGUAL EDUCATIONAL SETTINGS

Organiser: Ed Elbers, Utrecht University, The Netherlands
Chair: Ed Elbers, Utrecht University, The Netherlands
Discussant: Guida de Abreu, University of Luton, United Kingdom

Because of migration processes, the school population in many European countries has become culturally and linguistically diverse. Education in multicultural and multilingual schools is an important issue for educational psychology and educational policy. However, we know very little of what happens in multicultural and multilingual schools and classrooms. How do teachers cope with a class with students who have appropriated to uneven degrees the language used in the school? How do students between them communicate, how do they solve communication problems originating from the variety of mother tongues in the classroom? What problems and
challenges do minority children encounter and how do these children adapt to a monolingual curriculum? How are cultural and linguistic boundaries constructed and deconstructed in everyday classroom life? Can linguistic diversity be seen as a resource instead of as a barrier to learning? This symposium brings together researchers from Norway, Spain, Sweden, Switzerland and the Netherlands who have studied learning and interaction in multilingual settings and who will address the issue of education in a multicultural society. The contributions deal with multilingual education in kindergarten, primary and secondary schools.

Discourse and learning in a Norwegian multicultural classroom
Lutine De Wal Pastoor, University of Oslo, Norway

During the last few decades, the Norwegian primary school population has become increasingly ethnolinguistically diverse. A considerable number of linguistic minority pupils have to acquire Norwegian as a language for school through classroom discourse. Research carried out in a multicultural third grade class of a Norwegian primary school reveals that linguistic minority children face quite a challenge by being simultaneously involved in processes of “learning language” and “learning through language” (Halliday, 1993). Minority pupils’ learning involves not only acquiring linguistic and cognitive competence, but also demands acquiring knowledge of Norwegian culture. The research class has 24 eight-year-old pupils, 13 of them are linguistic minority pupils, representing 9 different home languages. The primary database is composed of field notes of nearly 200 lessons made during classroom observation carried out through the school year 1999/2000. About 80 of the lessons were audio recorded, and 30 of these were videotaped as well. The data analysis is directed both at identifying recurrent events, cf. key events (Greene and Bloome, 1997) and critical events (Wragg, 1994), which are more particular occurrences illuminating special features of classroom interaction. The presentation is based on qualitative analyses of classroom talk, focusing on lessons where subject matter is taught, using transcribed audio recordings, field notes and interviews. By means of illustrative examples from classroom discourse, some of the problems minority children encounter in the process of learning of and in a second language will be discussed.

Adaption processes in a multicultural classroom in Catalonia
Montse Benlloch, University of Vic, Spain
Fransesc Martinez, University of Barcelona, Spain
M. Teresa Feu, University of Vic, Spain

In this presentation, we examine several manifestations of the adaptation processes that occur in a multicultural classroom during the kindergarten stage (ages from 3 to 5). This research is being developed in a public school located in a small town at the countryside in central Catalonia. The origin of the kids spreads approximately into 50 % of native children (from Catalonia and other Spanish regions) and 50 % of Moroccan children, mainly Berbers. Our work is based on transcriptions of 27 videotaped hours, captured in the classroom during one academic year. We performed an analysis on three different components of the classroom activity: a) the kind and variety of the tasks performed by the kids and the teachers b) the different ways of organising the classroom group, and c) the resources used for the realisation of these tasks. A comparative analysis between the first four sessions of the course and the last four ones showed significant differences in the activity of all participants. The comparison between the sessions at the beginning of the school year and at the end also encompasses an analysis of the changes in the verbal interactions among the children and between the children and the teachers.
Drawing boundaries in everyday life. Identity markers in visually oriented school settings in Sweden
Sangeeta Bagga-Gupta, Örebro University, Sweden

This paper is based on studies conducted since 1996 at upper secondary and compulsory level “bilingual” schools for the Deaf in Sweden. It takes its point of departure in how human beings in visually oriented institutional settings construct membership in terms of significant categories (i) through everyday mundane interactions and (ii) through the way time and space are organised in these settings. It attempts to explore how cultural and linguistic boundaries are (de)constructed in everyday life. Previous analyses show that different linguistic codes – primarily Swedish Sign Language and Swedish – are used in complex patterned ways (called chaining) in some, not all, of these settings. It has been suggested that different types of chaining of these codes has a potential bearing on language learning opportunities in these settings. However, constructions of identity appear to be aligned to “perceived language ownership” which in turn is dialectically built on a human beings audiological condition and not their cultural or linguistic orientations. This means that categories like “deaf” and “hearing” take salience over other potentially significant categories like “ethnicity” or “linguistic alignment” especially in terms of how the meaning of these categories are negotiated communicatively and organisationally. Examples of everyday interactions and the use of time and space will be used to explore the work of membership categories in visually oriented settings. It is argued that studying everyday institutional interactions allows for expanded understandings of identity and bilingualism in terms of visuo-culturally oriented human beings and complex discursive practices.

Multilingual socialisation of young children in a Swiss kindergarten
Christiane Perregaux, University of Geneva, Switzerland

Education in multicultural societies involves children who grow up in a multilingual environment. Schools rarely take account of this fact. Their curriculum and educational approach are monolingual and often neglect the first language learnt by the children at home. There is an obvious gap between the competences appropriated in the family and the competences taught and presupposed by the school. This gap is the more serious when the culture and language at home is very different from the school and country in which children are living. In this presentation, I shall propose a new multilingual educational approach beginning in kindergarten. This approach respects the linguistic competences learnt by minority children in their families. It consists of a program of multilingual activities which aims at awakening children’s interest in languages. I will present a study which is being carried out among children of 4 and 5 years of age. We compared two groups of children. One group participated during one year in the program of multilingual activities, the other group did not. Overviewing the results, we will discuss why it is important for the child, the family and society at large to develop multilingual approaches in kindergarten and infant schools.

Collaboration and the construction of word meaning in a multicultural classroom in The Netherlands
Ed Elbers, Utrecht University, The Netherlands
Mariëtte De Haan, Utrecht University, The Netherlands

This paper concerns the construction of word meaning by students during collaborative activities in a multicultural classroom at a Dutch primary school. The analysis is based on recordings of student talk in small groups of four or five students during mathematics lessons. Twenty hours of
recordings were used for the analysis. The recordings were transcribed and the situations in which language problems occurred were analysed. The tasks which the students had to solve consisted of realistic mathematics problems. These tasks contained words that were unfamiliar to minority students, for whom Dutch is their second language. Difficulties with specific terms and expressions frequently arose in the works of the groups. These language problems were the subject of discussions among the students. Sometimes, children explicitly told the others that they did not know a term or an expression. At other times, children, in their work, built on wrong assumptions about the meaning of a word, and were, in some cases, corrected by others. In the groups with both Dutch and minority children the Dutch children helped the minority children to overcome language problems. However, the Dutch children did not elucidate the meaning of the unfamiliar words but gave minimal information, often by deixis, which was just sufficient for minority students to solve the task. In the groups with only minority children, the students sometimes deduced the meaning from the text or from the accompanying picture. At other times, one of the minority students claimed to know the meaning of a word, but this claim was sometimes not justified.

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Symposium

BEYOND THE MEANS AND SCORES: WHAT CAN WE LEARN FROM PISA AND OTHER INTERNATIONAL STUDIES

Organiser: Zemira Mevarech, Bar-Ilan University
Chair: Zemira Mevarech, Bar-Ilan University
Discussant: Eckhard Klieme, German Institute for International Educational Research, Germany

The main purpose of international studies, such as TIMSS and PISA, is to examine how well different countries educate their students. In particular, PISA assesses reading, mathematics, and science literacy of 15 year-old students, and attempts to discern what it is about school policy, and the sociological environment in certain counties that result in higher levels of student literacy. One of the most important issues regarding PISA and other international studies is: What can we learn from such studies beyond the rating of the countries? The present symposium addresses this question. It includes four papers, each focuses on different aspects of this general issue, and each utilizes different methodology to address its specific questions. Neubrand compares detailed performance of students who studied in countries that received similar means in PISA mathematics literacy examination but their mathematical profiles are quite different. Kramarski and Resh investigated the relationships between teaching styles and teachers’ perceptions of the grading processes. Another angle was taken by Ester HO Sui Chu. She focused on social capital and its impact on students’ literacy in reading, mathematics, and science. Finally, Mevarech, Kramarski, and Catz, compared schools that scored high or low on PISA literacy examinations. They identified the major characteristics that distinguish between good and poor schools, including: School atmosphere, social capital, school policy, and school resources. Given the ambitious scope of the international studies and their tremendous costs, it is important to understand how such studies can assist educational systems, including: Policy makers, educational researchers, educators and the community in large. The symposium, thus, will highlight the theoretical and practical implications of these issues.
Evaluation of students learning and achievement is a significant component of the teaching process and an important signpost in students’ school life. By providing feedback about student’s academic performance and future prospects, grading process contributes to the shaping of academic self-image, motivation and expectation. Furthermore, by creating a status hierarchy in classes, it affects students’ social position, popularity and friendship formation. It is not surprising therefore that the process of evaluation and grading looms large in the scientific inquiry, as well as in students and teachers’ school life. In this study, we focus on teachers’ perceptions of the grading and its relation to teaching style: What are the “proper” weights that are given to various considerations in determining students’ grades, and now they relate to a set of teaching attitudes and class practices. More specifically, we investigate the “teacher profiles”, encompassing teachers attitudes towards teaching practices (frontal – authentic), teaching styles (child centered – material centered), teaching practices (“conventional” – “progressive”), and teachers’ considerations in the allocation of fair grade (“output” measures – “input” measures). We also investigate the possibility of differential “profiles” by the subject matter taught (language, mathematics and science). The study is based on a Israeli national sample of about 377 teachers from 150 high schools that participated in PISA study (2000). From each school one teacher in each subject participated in the study: Language, mathematics and science. Each teacher was interviewed though a self-administered questionnaire.

Comparisons of good schools and poor schools: What can we learn from Pisa data?
Zemira Mevarech, Bar-Ilan University, Israel
Bracha Kramarski, Bar-Ilan University, Israel
Or Katz, Bar-Ilan University, Israel

The purpose of the present is to identify the characteristics that distinguish between schools scoring high or low on PISA literacy examinations. Data from Israel PISA pilot study were utilized to address these issues. One hundred and eighty schools participated in this study. All students were administered the reading mathematics and science literacy tests. In addition, all students and principals completed questionnaires regarding various aspects of the learning and teaching processes. On the basis of these data, we selected sixteen schools: Eight schools were ranked two-third standard deviations above the overall literacy mean, and eight schools were ranked two-thirds standard deviations below the overall literacy mean. We defined the former as good schools and the later as poor schools. The major findings are the following: (1) Good schools have a larger number of students than poor schools, and the students in good schools come from higher socio-economic status than students in poor schools. (2) School resources are allocated differently in good and poor schools. In particular, compared to poor schools, much more time is allocated in good schools to academic courses. (3) The academic atmosphere in good schools is different than that in poor schools. In the former, the teaching and learning processes take place in less noisy classes, with less disturbances, and higher expectations from students to perform at high standards. Furthermore, good schools set higher academic demands on their students than poor schools. (4) No significant differences were found between good and poor schools in terms of student-teacher interactions, students’ attitudes toward schools, or students’ interest in their studies. The theoretical and practical implications of the findings will be discussed.
Impact of social capital on reading, mathematics and science literacy: What we learn from the Hong Kong Pisa project

Sui Chu Ester Ho, University of Hong Kong, China

The creation of social capital has fueled a growing interest in the field of sociology, economics and education. However, it appears that the meaning of ‘social capital’ varies with people, and that little has been done to investigate how different types of parental involvement and forms of social capital created in Asian educational system can facilitate student learning. In this paper, three research questions are addressed: (a) Identifying the different types of parental involvement and diverse forms of social capital in Hong Kong; (b), examining the relationships between parental involvement and social capital; and (c) exploring the impact of different forms of social capital and different types of parental involvement on students’ learning outcomes. Data for this study were collected as part of the PISA pilot study, involving a total of 1081 – 15 year-old students from Hong Kong. Four forms of social capital were measured: Obligation, norms, expectations, and network. Parent involvement referred to the frequency with which they engaged in school- and home-based activities. The main findings are the following. (1) The study identified four types of parental involvement: Home discussion, home supervision, school communication, and school participation. Levels of home-based involvement were generally higher than levels of school-based involvement. (2) Students SES, gender, family size, home languages have moderate effects on the extent of parental involvement. (3) The four forms of social capital have significant association with the four types of parental involvement even after controlling for student background factors. (4) Generally, literacy are positively related to parental involvement and social capital.

Remarks on the “inner structures” of mathematical achievement: Evidences from the Pisa mathematics data

Michael Neubrand, University of Flensburg, Germany

PISA, the “Programme for International Student Assessment” is the latest and the biggest international comparison. The first test in a cycle of three was in 2000, the data are now released to the public by ACER. The mathematics data-file contains the percent-correct-data for every PISA mathematics item, for each of the 31 participating countries. Assuming mathematics is a uniform and culture free field, the difficulties of the items should be more or less homogeneously distributed in each of the countries, and the main difference between the countries should result from a “better vs. weaker” distinction, then. However, this is definitely not the case. One observes distributions of the difficulties that are indeed just parallel translations from the OECD average, but also distributions which seem to show that mathematics comes very distinct in that country. Furthermore, one can observe that some countries seem to foster weaker students only, and others who show advantages for all students equally. To come closer to an exploration of these differences, it is worthwhile to differentiate the mathematics items along several directions. One can distinguish the cognitive demands of the items, or the ways they are presented, or the demands from the mathematics education point of view. By such distinctions one can reveal both the specific profile of the PISA test as a whole, and characteristic differences between countries. This leads immediately to specific conclusions and considerations about the ways mathematics is taught in a certain country, or which view of mathematics is dominating the PISA test.
SUCCESSFUL UNIVERSITY STUDENT LEARNING IN DIFFERENT LEARNING CONTEXTS

Organiser: Kirsti Lonka, Karolinska Institute, Stockholm, Sweden
Chair: Jan Vermunt, Leiden University, The Netherlands
Discussant: John Richardson, Open University, United Kingdom

This symposium looks at university student learning in different contexts, e.g. medical education, technology education, and in general. Students’ approaches to learning, attitudes, general study orientations, learning strategies, success expectations, and students’ academic achievement are looked at. The intention of this symposium is to provide an overview of the varying research methodology and the complex nature of university student learning. Students’ general orientations and approaches may not be directly related to their study success. Rather, these are mediated by students’ situational study practices that take place in a specific context.

University students’ situational reaction tendencies: Reflections on general study orientations, learning strategies and study success
Jarkko Mäkinen, University of Turku, Finland
Erkki Olkinuora, University of Turku, Finland

In recent research on students learning, a need for multi-layer models has been pointed out. This paper aims to bridge situational level measures to more general level analyses regarding university students’ study motivation. General level measures indicate what are the general reasons for studying among students (meaning of studying as whole). Situational measures include explorations on what kinds of reactions university students report when they visualize a study situation, which has been personally experienced and felt somehow demanding (interpretation of a study situation). Both general study orientations and situational reaction tendencies are measured through retrospective self-reports. The reliability of the method applied here has been questioned in several previous studies. In this particular case, however, it seems to produce systematic and logical results. Possible reasons for this are discussed in the paper. The empirical data of the study consists of both inventory-based data of 612 second year university students and statistical information (GPAs and credit units) from the student register concerning the same students. Students are divided into four groups based on their situational reaction tendencies. These groups are compared in terms of differences in general study orientations, applied learning strategies, and actual study success. The results indicate that students’ situational reactions are systematically connected with their general study orientations. They have also influence on what kinds of learning strategies students apply. Finally, quite clear connections between students’ situational reaction tendencies and their study progress and success were revealed.

The classroom as social context: Implications for our understanding of teaching and learning in higher education
Sarah J. Mann, University of Glasgow, United Kingdom

From reflection on personal experience, discussion with colleagues and students, and from the findings of research, compliance - as a stance taken towards the activities of learning and teaching
- seems to be a feature of modern day higher education. This paper seeks to examine how such a
stance of compliance might come about and what the implications are for how we may need to
rethink processes of higher education. The paper will first present a case illustration of
‘compliance’, taken from interviews conducted by the author with a higher education teacher and
his students about their experience of and actions within the same classroom. This paper will offer
a micro-analysis of the factors that seem to contribute to this dynamics as it is revealed within the
particular local context of the case. The paper will then offer a theoretical exploration of this
analysis based on the concept of “social context”, particularly as it is used within the fields of
pragmatics, socio-linguistics, and critical linguistics. Implications will be drawn for our understand-
ing of teaching and learning in higher education as situated social practice.

Learning in a Web-based system in medical education
Italo Masiello, Karolinska Institute, Stockholm, Sweden
Kirsti Lonka, Karolinska Institute, Stockholm, Sweden

New learning environments such as distance education and computer-aided instruction promise to
bring a change in today learning environment by adjusting the relationship between the learner, the
educational content and the organization of education. In our study we wanted to understand
whether students’ approaches to studying were related to their perception of a new learning
environment. Students’ approaches to learning scores were measured by some selected scales of
ASSIST (Tait H. et al, 1998), while attitudes towards ICT were measured by a combination of
rearranged questionnaires. Principal component analysis was carried out to examine the interaction
between the different approaches and also between the different ICT orientations. We then
measured the relation between the approaches to learning and the ICT orientations by calculating
correlation coefficients. High loadings on surface and on deep and strategic sub-scales characteri-
zed the two-principal component solution of the approaches to learning scales. At the same time a
three-principal component solution illustrated the ICT attitudes scales, giving Blended Orientation,
Independent Orientation and IT Orientation. We also found correlations between ICT attitudes and
approaches to learning. Early identification of approaches to learning and attitudes towards ICT
may prove important in order to provide assistance to aid the transition of students with diverse
individual approaches and to the design of new learning environments.

The role of success expectation and task-avoidance in academic performance and satisfaction
Katariina Salmela-Aro, University of Jyväskylä, Finland
Jari-Erik Nurmi, University of Jyväskylä, Finland

To investigate the prospective relationships between individuals’ success expectation and task-
avoidance, and their academic achievement and satisfaction two longitudinal studies among
university students were carried out. In study 1, 231 university students were examined five times
yearly throughout their university careers. The results showed that university students’ success
expectations predicted their academic achievement and satisfaction later on, which in turn
increased their subsequent success expectation. Moreover, students’ task-avoidance predicted low
academic achievement and dissatisfaction later on, which again was predictive of subsequent task-
avoidance. In study 2, the task-avoidance behavior and pre-examination anxiety, of 198 university
students who had participated in Study 1, were examined and compared with their subsequent
grades. These results showed that university students’ dispositional task-avoidance predicted their
grades only to the extent to which it was reflected in their task-avoidance behavior.
Factors related to study success in technology education
Päivi Tynjälä, University of Jyväskylä, Finland
Risto Salminen, Lappeenranta University of Technology, Finland
Tuula Sutela, Lappeenranta University of Technology, Finland
Anita Nuutinen, University of Jyväskylä, Finland
Seppo Pitkänen, Lappeenranta University of Technology, Finland

Recent studies on student learning in higher education have paid attention to the relationships between the characteristics of learning environment and students’ study orientations and study success. The purpose of the present paper is to examine these relationships in university level technology education. The data was collected from Lappeenranta University of Technology, Finland, with an Internet survey (N=394). Grade point average, credits per semester and students’ qualitative evaluation of their learning outcomes were used as indicators of study success. The findings of the study indicate that students’ perceptions of their learning environment were related to their study orientations which in turn were related to study success. Regression analysis showed that a deep study strategy and trust on own abilities were related positively to study success, while lack of regulation, doubt of own abilities and a surface study strategy were factors negatively related to study success. The results gained by cluster analysis and cross tabulation confirm this finding showing that meaning orientated and self-regulated students using a deep strategy were those who succeeded the best in their studies. They were the most successful measured with both quantitative and qualitative indicators. Study success of the externally regulated students using a surface strategy was the worst. The findings of the study suggest that this learning environments encourage deep learning.

Syposium

HOW CAN EXPERTS BE FLEXIBLE AND INNOVATIVE?

Organiser: Giyoo Hatano, University of the Air, Chiba, Japan
Chair: Giyoo Hatano, University of the Air, Chiba, Japan
Discussant: Patricia A. Alexander, University of Maryland, USA

Experts have acquired their domain-specific competence through experience in the domain over thousands of hours, which often takes the form of training called ‘deliberate practice’. As a result, in knowledge-rich domains, they not only possess a great amount of domain knowledge but also have the knowledge organized into useful chunks that can be triggered readily by perceptual cues. Thus those experts can solve problems in the domain quickly and accurately by classifying them and applying the routine solutions associated with particular types. These are now well established facts. Although there have been many fewer studies, it is strongly suggested that some experts can go beyond this routine competence. For example, they may understand why their procedures work, modify known procedures or even invent new procedures. They may respond quite flexibly to contextual variations. They may also be able to cross a boundary between domains in order to find better solutions. How can these non-routine competencies be possible? What experiences or conditions of solving problems lead to such flexible, innovative competencies? In this symposium, we will discuss these issues and also their educational implications. Since the acquisition of flexible, innovative competencies is much desired but seldom achieved in school learning, understanding of these issues must be highly relevant to the effective design of instruction.
Domain-crossing expertise of masters in the Japanese traditional weaving
Yoko Oura, Niigata University, Japan

Previous research on expertise has focused on the process of a novice becoming a specialist within a domain with support from old-timers. This model of expertise is premised on a strong assumption that the community will be sustained without critical change, because, otherwise its educational system would not work effectively. When socio-economical situation changes drastically, however, any community can not keep its system as it used to. When facing such a critical situation, what kind of experts would the old-timers become? Observed subjects in this study were seven expert managers of two generations; each of them had had about 30 years of experience in producing the goods in one of the production centers of the Japanese traditional weaving. In the older experts’ generation in which ‘kimono’ clothes were greatly wanted among women of middle or advanced ages, novices in the weaving domain were expected to be skilled task-doers of weaving who produced goods of high quality quickly at request of brokers. In the younger experts’ generation in which kimonos were not everyday wears but clothes for specific uses, however, experts were required to develop new goods attracting fickle customers. In order to develop goods, knowledge about specialties other than weaving was required even for managers of weaving firms. Data showed that, by struggling against the critical situation the industry faced, the younger generation experts crossed boundaries between domains and developed their adaptive expertise.

Flexibility and consistency in experienced magistrates' sentencing of a thousand thieves
Jeanette Lawrence, University of Melbourne, Australia
Ross Homel, Griffith University, Australia

Experts in professional roles need knowledge and processes in order to reduce uncertainty and perform efficiently on routine problems. They also need to be able to respond flexibly and adaptively to new information and environmental circumstances. What cognitive processes allow this kind of consistency and flexibility and how are cognitive processes used within social institutions with their own cultures and discourses? Although professional magistrates of Australia's lower courts hear minor criminal cases alone, their decision processes are constrained by legal discourse, the quality of information presented to them, and by the culture and resources of the court. Within these constraints, experienced magistrates develop personal tendencies for dealing with routine cases (e.g., tough, lenient). They also rely on interpretive schemas for categorizing details and types of cases and directing their attention to cues in an array of information. We analyzed the schemas for categorizing cases of theft by 14 magistrates from 4 courts and their normal sentencing tendencies, then related these measures of sentencer cognitions to a large array of details of 1129 cases they had actually sentenced over two years. Actual courtroom sentencing tendencies interacted with schemas, and both showed individualized responsiveness to key pieces of information in the cases. What they said they do correlated highly with and explained individualized sentencing patterns and responsiveness to information.

Socially supported cognitive autonomy of expert senior shutterbugs
Giyoo Hatano, University of the Air, Chiba, Japan
Keiko Takahashi, University of the Sacred Heart, Japan
Makiko Tokoro, University of the Sacred Heart, Japan
Thirty-five senior amateur photographers were individually interviewed. Most of them had begun to learn photography techniques after their retirement and completion of parental responsibilities, and participated in a monthly seminar given by an instructor (Mr. H). Sixteen of them were old-timers or experts, who had participated in the seminar for longer than ten years, and 19 were newcomers or novices, who had done so for shorter than six years. Most of the experts had their own special genre of photographs, whereas the novices were still looking for their genre. All the experts had received awards in contests. When asked to evaluate several photographs taken by other amateurs, the experts gave varied and principled comments more often. Several experts, but no novices, indicated their autonomy by saying, e.g., “This layout is Mr. H’s favorite (but not mine)”, or “I like this though Mr. H may not”. Both the experts and novices mentioned the significance of psychological support given by people surrounding them in their photographing activity. About 70% of those people were the instructor and peer photographers, and the remaining people were family members. Regarding their information source for photography both the experts and novices often referred to the instructor and peers. In short, the experts seemed to have some cognitive autonomy based on their own evaluative criteria, though their activity was socially supported.

F 25 28th Aug 8:30 - 10:30 Room BIO G E

Expert Panel

PROFESSIONAL LEARNING IN SCHOOL AND BEYOND. AN EXPERT VIEW ON EMERGING THEMES

Organisers: Henny P.A. Boshuizen, Open University, The Netherlands
           Hans Gruber, University of Regensburg, Germany
           Chair: Erno Lehtinen, University of Turku, Finland

Development of professional expertise is a human activity that stretches over many years, sometimes more than 40 years. In the beginning of the developmental process, at least in modern western societies and regarding areas of formal expertise, the acquisition of domain knowledge is emphasised. Formal education plays a very important role in this process. In most expertise domains schools and universities are responsible for an important, initial part of the developmental path, while the remainder of the learning process takes place in practice, with the former student working as an apprentice or as a full-fledged professional. In this process a couple of phenomena take place that need further theoretical elaboration. Among them are: expertise development itself and the changing dynamics over the developmental process; the problems graduates have in connecting theory and practice, and how they can learn from their experiences; whereas advanced learning while working, especially for those people whose present work and initial schooling don't have anything to do with each other anymore is another topic receiving increasing attention. Five experts will briefly report on the most eye-catching research findings in their fields and will formulate the new theoretical questions that emerge from these findings. The panel will discuss how these findings and questions relate to other theories. Input and participation from the audience in this discussion will be stimulated.
Theoretical underpinnings in analysing professional expertise
Anneli Eteläpelto, University of Helsinki, Finland

In recent discussions cognitive and knowledge-based approaches have been criticised for their basic belief that knowledge and expertise are located in the heads of individual subjects. The situated and social learning approach, which has challenged the assumptions of cognitive and knowledge-based approaches, suggests that knowledge and expertise are primarily present in the discursive interactions of practical communities. In these approaches, which use the participative metaphor, knowledge is understood as ways of relating to and participating in the world. Learning and acquiring professional expertise is conceived as a process of identity formation within practical communities. In empirical studies, identity formation is analysed in terms of the negotiation of meaning as part of the authentic practices of such communities, for example in work organisations. Taking up the challenge of analysing some recent approaches to professional design expertise, the presentation will critically discuss two mainstream notions in analysing expertise. We shall focus on cognitive and knowledge-based approaches on the one hand, and social theory of learning approaches on the other. On the basis of studies which analyse expertise in terms of contextual and strategic knowledge, we seek answers to the question of how to analyse design expertise in a way that recognises the context-sensitive nature of professional expertise, without neglecting professional subjects and their developing skills and knowledge.

Changes of expert knowledge during professional learning: Do and should we care about differences within domains or differences between domains
Hans Gruber, University of Regensburg, Germany

Professional performance is based on different kinds of knowledge. To adequately deal with domain-specific problems, professionals have to acquire much knowledge and develop an expert knowledge base. To describe this knowledge base, different kinds of knowledge can be distinguished (e.g., declarative vs. procedural knowledge; theoretical vs. practical knowledge). Current models of the acquisition of expertise describe professional development as change of the nature of knowledge during professional learning. For instance, Boshuizen and Schmidt’s encapsulation theory plausibly describes changes in medical experts’ knowledge bases during the transition from beginner to expert. It is plausible to assume that these changes of knowledge structures depend on domain-specific experiences during professional learning. Thus, however, for the advancement of a theory of professional learning and of the acquisition of expertise, differences between domains are as important as changes within domains. Until now, differences between domains are widely neglected in research. Based on results of a between-domain study of professional learning - in the domains of psychological counseling and of organizational counseling, an outline of future research directions is outlined that attempts to integrate differences within domains and differences between domains.

Disrupted learning lines on the way from school to work
Henny P.A. Boshuizen, Open University, The Netherlands

One of the goals of education is to promote expertise development, or at least to prepare students in such a way that they have enough knowledge and skills to function at an adequate level after graduation in their first jobs. Furthermore students should have the self directed learning skills to make sure that they can update themselves while already at work. Research shows that on the long run graduates are indeed able to improve their performance, but on the transition for school to work it turns out that the knowledge and skills that students bring to the workplace are not fit for
the problems they encounter there and still require a lot of relearning. Furthermore the learning skills brought to the workplace are not fit for learning in and from practice. An analysis will be given of the factors that contribute to this discontinuous process and ways for remediation will be explored.

Learning to use scientific knowledge in the workplace
Michael Eraut, University of Sussex, United Kingdom

Scientific knowledge is normally taught through books and laboratories and not in naturalistic settings. Novice learning in the workplace focuses on current practices and recognising when and how to use them. Scientific knowledge is more likely to be embedded in practice than used explicitly; and its explicit use is reserved for more complex problems in which novices are only peripherally involved. Hence there is little overlap or even interaction between practice-based learning and the learning of scientific knowledge. The relevance of scientific knowledge is unclear to novices; and the process of learning to use scientific knowledge is not only invisible, its very existence is denied by treating application as translation rather than transformation. An examination of scientific knowledge in use shows that at least four processes are involved: understanding the context; selecting the most relevant aspects of knowledge; transforming each distinct chunk of knowledge into a form that suits the context; and integrating the selected and transformed knowledge into a platform for decisions and actions. This complex learning process involves more than simple reasoning. It also involves the acquisition of tacit knowledge over time, which cannot easily be explained to newcomers. Even partial understanding the use and acquisition of tacit knowledge is difficult and requires techniques involving the use of mediating artefacts and heuristic, cooperative inquiry. The evidence base for this presentation will be drawn from the author’s research in the field of nursing.

How to change your way of learning when you start to become a professional
Robert-Jan Simons, Utrecht University, The Netherlands

Although there are many changes in the way students in higher education are learning (see for instance problem based learning, computer supported collaborative learning, project learning, etc.), in general learning is still determined by other experts, who determine the learning goals, the learning strategies and the ways of testing. In higher education, students do not learn how to integrate learning in their work, how to strengthen their implicit learning, how to learn together with other professionals, how to learn from feedback and from clients and how to become a self-directed learning professional. The central statement in this contribution is that the ways of learning should change when people leave the educational system and start to become a professional. Three ways of learning are distinguished, as well as the ways to learn or unlearn these: guided learning, self-directed learning and experiential learning. These connect to different kinds of learning competences. An overview of these competences will be given. Although educational systems tend to become better in preparing students for their later professional learning with more emphasis on self-directed and experiential learning, system constraints make it difficult to do this very good. How can we help beginning professionals to learn in new ways on the job then they used to do in the educational system?
This symposium shows that sophisticated science concepts which are not usually part of the elementary school curriculum such as distribution, error, the nature of science, and density, can be taught in elementary school if classroom environments are conducive to students’ active inquiry, reflection, and focused communication. Investigations in this symposium study the development of scientific reasoning in the natural classroom context either in cooperation with classroom teachers or with experienced teacher researchers. Our studies show how over the course of investigating science topics students’ reasoning in all participating classrooms became more and more sophisticated through data collection, use of tools and scientific methods of investigation, and invention of representations that reflect observations. An important instructional means of moving students beyond their preconceptions were increasingly focused (teacher-guided) exchanges about students’ observations during experimentation, summaries, and comparisons of results that made necessary students’ use of certain means of communication such as common representations or adequate language. While two of the presented studies describe these processes in detail, the other studies involve in-depth measures of changes in students’ conceptual understanding after instruction. Quantitative results support the conclusion that this type of instruction greatly affects students’ general understanding of science methods, while also showing lasting effects concerning their conceptualizations of investigated phenomena even one year after instruction. This is especially promising because early reflective involvement with science methods and phenomena will provide students with a strong conceptual basis that is necessary for them to ground related topics treated in the secondary school curriculum.

When is a difference, really a difference? Children's understanding of variation in an inquiry centered classroom
Anthony Petrosino, University of Texas, USA

This paper reports on an eight-week teaching and learning study of elementary school students’ thinking about distribution. The research was conducted with an intact class of fourth-grade students and their teacher. The context for these investigations was a series of tasks and tools aimed at helping students consider error as distributed and as arising from multiple sources. In order for students to come to view variability as distribution, and not simply as a collection of differences among measurements, distribution was introduced as a means of displaying and structuring variation among their observations of the “same” event. Students measured first, the lengths of the school’s flagpole and a pencil, and eventually, the height of model rockets at the apex of their flight. Multiple sources of random error were identified and investigated. To distinguish between random and systematic variation, students conducted experiments on the design of the rockets (rounded vs. pointed nose cones). The goal of these investigations was to determine whether the differences between the resulting distributions in heights of the rockets
were consistent with random variation, or instead, if the difference could be attributed to the shape of the nose cone. They interpreted the variation of these distributions as representations of processes of measurement, so that increases or decreases in variation came to signal potential transitions in tools, methods, conditions, or measurers. Hence, measurement served as a context for joint consideration of center and spread, and students came to see that it is difficult to interpret one without the other.

**Distributions as signatures of growth**
Richard Lehrer, Vanderbilt University, USA
Leona Schaulbe, Vanderbilt University, USA

This research was conducted in an on-going teacher-researcher partnership for the improvement and study of student learning in mathematics and science, involving forms of mathematics not routinely taught in elementary grades (geometry and space, data, measure, and uncertainty). We investigated fourth- and fifth-graders’ increasingly sophisticated reasoning about distributions of a fast-growing plant, involving multiple cycles of classroom observation and experiments within one school year. Students grew plants under different conditions (for example, high and low levels of light or fertilizer) and compared results to draw conclusions about the effect of growth factors. Our analyses showed that students’ investigations entailed posing fruitful questions, identifying and defining attributes to be recorded over time (plant height, width, etc.), and agreeing about ways of measuring them. Characterizing changes in the plants required students to compare distributions of measures. Discussions usually started with talk about “clumps,” “holes,” and typical values of the distribution, and progressed to ways of picturing the “shape of the distribution” on different days. Students invented several ways of doing this, from case magnitude displays to hybrids of frequency graphs and stem and leaf displays. By swapping and interpreting displays, students became reasonably adept at using changing shapes of distributions to support plausible accounts of growth processes. Children investigated effects of the growth factors by segmenting distributions and comparing the density of measures within comparable intervals (e.g., in quarters). Finally, students explored sampling distributions and discussed how to know whether two different distributions of measures could be considered “really different.”

**Why does a large ship of iron float? Elementary school students’ understanding of “floating and sinking” in constructivist learning environments**
Ilonca Hardy, Max Planck Institute for Human Development, Berlin, Germany
Angela Jonen, University of Münster, Germany
Kornelia Möller, University of Münster, Germany
Elsbeth Stern, Max Planck Institute for Human Development, Berlin, Germany

In a classroom study of six units on “floating and sinking” we investigated effects of different degrees of structuring within constructivist learning environments with respect to third-graders’ conceptual understanding of density and buoyancy force. In a repeated-measures design instructional groups involving some instructional structuring (N=71) or open inquiry (N=70), and a baseline group without intervention (N=41) were compared before instruction, one week after instruction, and one year after instruction. Conceptual understanding was assessed with a test of objects’ floating and sinking considering both correct rejection of misconceptions and adoption of scientific explanations. We hypothesized that instructional structuring such as focused discussions and sequencing of instructional content would support students’ integrated conceptual understanding because of a direct confrontation with existing preconceptions and their resolution during discussions and experimenting. Results showed a significantly greater gain in conceptual under-
standing of the group with instructional structuring compared to the other groups one week after instruction. Compared to the baseline group both instructional groups gave up more misconceptions and adopted more scientific explanations, while the baseline group developed a basic understanding of material kind equally well. Effects one year after instruction showed a persisting gain for both instructional groups concerning misconceptions, scientific explanations, and material kind, whereas the baseline group intensified merely their understanding of material kind. Our study shows that complex physics topics are already accessible to elementary school children on a lasting conceptual basis, especially if instructional structuring allows the integration of students’ pre-existing and new concepts.

*Understanding the nature of scientific knowledge in elementary school children*
Claudia Thoermer, University of Munich, Germany
Beate Sodian, University of Munich, Germany
Patricia Grygier, University of Würzburg, Germany
Johannes Günther, University of Würzburg, Germany
Ernst Kircher, University of Würzburg, Germany

Children’s intuitive epistemologies of science have been described as severely deficient, lacking the differentiation of theories and evidence. On the other hand, cognitive developmental research has demonstrated a nascent understanding of the interpretive, constructive nature of the mind in elementary school children. We report the results of two teaching intervention studies in 4th grade classrooms, designed to enhance children’s understanding of the nature of scientific knowledge. Pre- post-test measures included a semi-structured interview (modified from Carey et al., 1989) addressing students’ understanding of key elements of the process of theory building, and revision, as well as experimentation in science. Results indicate that 4th grade children, prior to instruction, mostly conceive of science in terms of collection of facts. A short-term teaching intervention emphasising metaconceptual aspects was successful in inducing an at least implicit understanding of the notions of testing and explanation in the majority of the trained children, while a control group who was taught an almost identical teaching unit without emphasis on metaconceptual aspects did not show such progress. We argue that this training vs. control group comparison shows that teaching effects are attributable to the emphasis on metaconceptual points in the curriculum, not to unspecific effects of science teaching.
TEACHER EDUCATION AND PROFESSIONAL DEVELOPMENT

Discussants: Theo Bergen, University of Nijmegen, The Netherlands (posters 1-10) and Michal Zellermayer, Levinsky College of Education, Israel (posters 11-20)

POSTER G 1
Processes of change in the course “change in the education system” – From a real course to a virtual course
Shosh Millet, Achva College of Education, Israel
Eti Gilad, Achva College of Education, Israel

The goals of the research are to characterize learning and teaching in a course on “Processes of change in the education system” studied in three different frameworks while also considering future skills, and to examine processes of change, from a culture of physical learning environment to a virtual learning culture. The importance of this study lies in understanding the attributes of virtual training versus traditional training, in the hope of integrating various teaching methods as a response to processes of change occurring in the education system. The data analysis indicates that virtual culture is likely to offer inspiration for change in the organizational and pedagogic culture at the college, the development of new courses, combining different amounts of virtual teaching-learning in response to the varying needs is recommended and compulsory virtual courses should be included in the students’ timetable.

POSTER G 2
The Digital Learning Center (DLC) in Levinsky college - A research-based model for training teachers to novel learning environments
Nili Mor, Levinsky College of Education, Israel
Ida Heilweil, Levinsky College of Education, Israel
Miriam Mevorach, Levinsky College of Education, Israel

The present study suggests a model to training teachers to novel learning environments based on research: The Intel Laptop Project (Mor, 2001) and practice: The Levinsky Digital Center. The Intel Laptop Project tested the hypothesis that having student-teachers experience, design, and reflect upon novel, technology-intensive learning environments would change their conception of learning. No such change was found, but there was a tendency to shift to the newly experienced mode even after a short-term experience. This gave rise to the thought that using this model in a more intensive way, might lead to a conceptual change. Thus The Digital Learning Center (DLC) was launched, and used by both faculty and student-teachers. The main findings indicate that a change in the conception of learning and teaching occurs only after a long-term practical experience in constructive technology rich learning environments.

POSTER G 3
Assumptions underlying adult educator practice
Jane Morgan, Auckland University of Technology, New Zealand
The aim of this research has been to explore my personal and other educator’s assumptions underlying their philosophy and teaching practice within foundation programmes in New Zealand tertiary learning institutions. It is proposed that these assumptions stem from personal beliefs and value systems influencing educational philosophies and teaching practice. Through narrative taped interviews of consenting colleagues within tertiary foundation programmes, the researcher aimed to document personal perspectives on assumptions underlying purpose and practice. Transcribed interviews have been analysed for commonalities and differences in individual perspectives, using an interpretivist approach from a qualitative paradigm. Discussion of findings incorporated current political, social and academic initiatives currently pervading the tertiary education sector within New Zealand.

POSTER G 4
Dealing with diversity: Pre-service teachers’ perceptions of their training and preparedness
Donatille Mujawamariya, University of Ottawa, Canada
Gada Mahrouse, University of Toronto, Canada

This paper reports on a research project that examines current curricular initiatives used to engage and instruct pre-service teachers in equitable and inclusive teaching strategies in Canada. The paper explores the ways pre-service teachers perceive the efficacy of the efforts made by teacher education programs to prepare them to meet the needs of an ethno-racially diverse student population. Specifically, the paper will address how pre-service teachers assess the multicultural/antiracism education training they receive; whether they are leaving teacher education programs feeling equipped to deal with the ethno-racial diversity of urban Canadian schools; and their perspectives on how the multicultural and anti-racist education curricula currently being used in Teacher Education programs might be improved. The findings reveal that much ambivalence and apprehension shapes pre-service teachers understandings of, commitments to, and preparedness for responding to the needs of a diverse student body.

POSTER G 5
Theories and practices of teachers of young learners of English as a foreign language
Marianne Nikolov, University of Pecs, Hungary

This exploratory qualitative study enquires into classroom processes of lower primary (ages 6 to 10) English as a foreign language (EFL) classes to explore the teachers’ practices and their underlying theories. Thirty EFL classrooms were observed, and as a follow-up the teachers were interviewed by pre-service English majors in Hungary in April 2002. The data collection instruments included an observation sheet and a structured interview. The presentation will discuss findings on the teachers’ and learners’ attitudes, motivation, classroom discourse, and interaction. Teachers’ actions, classroom language use, management practices and uses of tasks will be compared to their claims concerning the principles of early EFL programmes, to their professional wishes, and to the areas they consider as advantageous and disadvantageous characteristics of young learners.

POSTER G 6
Characterizing selected models of fieldwork in teacher education processes
Michael Orly, Achva College of Education, Israel
Shosh Millet, Achva College of Education, Israel
Rinat Oren, Achva College of Education, Israel
Pedagogical guidance is an important and central factor in teacher education processes. Its core is the practical teaching experience in the school. The objective of this research is to characterize practical working models in the framework of four major dimensions: 1) planning and preparing for teaching, 2) implementing teaching, 3) attunement to students’ needs, 4) reflection, evaluation and control. The research population was composed of 159 students who had experience in student teaching according to five different models in eight pedagogical classes. Students' questionnaires were used as the research tool. Data was analyzed by a quantitative method and by a qualitative method. The results described characteristics of five models. A number of conclusions and implications for teacher education are presented in the research. The significance of this research lies in its originality in the study of the practical field of student teaching experience. The results can contribute to change, improvement and upgrading of teaching training processes.

POSTER G 7
Tensions between beliefs and practices of a biology teacher
Janet Paul de Verjovsky, Autonomous University of Morales, Mexico

This paper presents the results of an analysis in a Mexican public high school of an experienced biology teacher’s practices and beliefs at the beginning of her participation in a five-year international science project TACTICS, which involves collaborative learning communities between four Mexican and two Canadian schools. This particular teacher had never worked with collaborative technology, so the long-term investigation is to identify any indications of transformations in her practices and beliefs during the project. The analysis indicates that at the start of the project the teacher employed traditional frontal strategies interspersed with extensive IRF interactions, using scaffolding to construct common knowledge in a very tightly controlled manner, but with scarce collaborative learning strategies. The comparison with her beliefs, as expressed through questionnaires and interviews, point out her dilemma of working in a traditional environment but believing firmly in constructivism, leading her to initially develop an “active-transmission” model.

POSTER G 8
Training teachers to “non teaching” science in science museum
Katerina Plakitsi, Panos Kokkotas, katerina Malamitsa, Panagiotis Piliouras and Ioannis Vlachos, University of Athens, Greece

Current science and museum education literature not only is dominated by discussions on constructivism but also is related to society and culture. In order to facilitate interaction between current museum education and school integrated science education towards the demands of modern literature, we have to re-educate teachers how to “non teach” science. At the Pedagogical Department of University of Athens we have established a training program named “The role of Museum in Science Teaching” for undergraduate students and also for in service teachers. In this context we carried out an action research program for a period of six months. Our basic aim was that: teachers should be able to design and evaluate an educational program associated to the current Curriculum, oriented towards science education, which can be carried out in a museum. The sample constituted from 30 undergraduate students and 60 in-service schoolteachers. The groups of teachers achieved the aims. Furthermore, teachers strengthened their already established positive attitudes for a proportional education.
POSTER G 9
The professional development of pedagogical instructors: Intuition or training?
Barbara Rosenstein, Mofet Institute, Tel Aviv, Israel
Rivka Reichenberg, Mofet Institute, Tel Aviv, Israel

This research aims at shedding light on the professional development of pedagogical instructors in an effort to establish guidelines for training programs. The authors base the research on a unique training program for pedagogical instructors offered at the School for Research and Development of Training Programs for Educators in the Colleges at the MOFET Institute, Tel Aviv, Israel. We examine features of professional development as expressed by the participants of the training program in an ongoing evaluation of the program. The methodology used in the evaluation was qualitative in nature and consisted of questionnaires, open interviews and focus groups with the trainees. The findings showed that the training program not only reflected the participants’ professional development, but contributed to it as well. Moreover, the evaluation revealed that the trainees fall into three categories or circles of professional development as expressed by their involvement in and influence on their professional settings.

POSTER G 10
The non-formal school teacher: Enhancing capacity to meet learners needs
Sara Jerop Ruto, University of Heidelberg, Germany

It has been argued that the quality of the teacher, is the most crucial determinant for the quality of learning. This paper, in line with this debate, will explore the teaching-learning processes in non-formal schools in Kenya and thereafter focus on the support systems teachers need to enable them to perfect their instructional methods. The working method will be two fold. First, the empirical data (comprising interviews, discussions and classroom observations), and the analysis will be presented. This will be succeeded by an exploration of the opportunities whether through mainstream training, or others, of how teachers can best be supported. It will be shown that instructional methods for non-formal schools lean towards the formal rather than the non-formal education paradigm. The paper will therefore be of interest to education practitioners in developing countries grappling with methods of imparting basic education skills.

POSTER G 11
Student teachers’ beliefs and practices about the use of technology in the teaching of English as a second language
Çigdem Sahin, Çanakkale Onsekiz Mart University, Turkey

This study focuses on student teachers’ beliefs and their practices about using technology in the teaching of English as a Second Language. Data were collected from interviewing student teachers and examining the materials they have developed to teach English as a second language. The research revealed that many of the student teachers believe that the use of technology in the teaching English as a Second Language is limited. In contrast to the interview findings, the materials they have developed indicated that technology can widely be used in the teaching of English as a Second Language. This indicated that student teachers use variety of skills during their practice that they may not always aware of. The research also provides original insights into the way that student teachers’ beliefs are influenced by recent developments in teacher education.

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POSTER G 12
Are teaching trainees aware of pupils’ test-anxiety?
Sarit Segal, Levinsky College of Education, Tel Aviv, Israel
Sara Shimoni, Levinsky College of Education, Tel Aviv, Israel

Current research by Bar-Hamburger (1999) showed that 25,000 pupils, who are 5% of the 12-18 aged Israeli pupils, reported using sleeping-pocks and relaxants before tests. These disturbing numbers indicate a vast problem that should be seriously dealt by the educational system. This research studied to what extent teaching-trainees notice test-anxiety symptoms manifested by pupils and whether there’s a connection between their own test-anxiety levels and their awareness of their pupils’ symptoms. 63 Teaching-trainees were asked to what extent their pupils manifested various test-anxiety symptoms, using a Likert-type questionnaire. They were further asked to respond to the “PETER” projective-test (Toubiana, 1995), checking their own test-anxiety. Findings show that although teaching trainees show noticeable levels of test-anxiety, they fail to notice their pupils’ anxiety. These surprising phenomena might attribute to active defense mechanisms such as denial or suppression, or to an egocentric frame of mind or being that makes them unaware of their pupils' needs.

POSTER G 13
A feminist reading of the professional concept of teachers
Orna Schatz-Oppenheimer, Hebrew University David Yellin, Israel
Lily Halpert Zamir, Hebrew University David Yellin, Israel

The purpose of this paper is to present a feminist-interpretive reading of the professional life stories of teachers through qualitative narrative research. Five professional life stories were collected from teachers through in-depth interviews. From the material received in the interviews, a feminist-interpretive reading about three teachers was read and two categories focusing on their perception of their professional position were defined: (a) The teachers’ perception was characterized by the preference of learning through interpersonal connections with less emphasis on intellectual qualifications; (b) Teaching with a therapeutic, empathic, caring approach with less emphasis on intellectual challenge. These approaches were apparent in the case of all three interviewees. It arouses interest in further research of the professional position in a gender profession considered to be predominantly female. For the future generation it is necessary to foster and promote thinking and the cognitive intellectual ability to cope while learning.

POSTER G 14
Teachers’ professional development in a process of redesigning the curriculum
Marie L. Schreurs, University of Heerlen, The Netherlands

Four years ago, the faculty of Facility & Hospitality Management of The Hogeschool Zuyd in the Netherlands started a redesign of the curriculum. The new curriculum was more student-centred, and consisted of problem-based, project-based and professional skills elements. In this curriculum the roles and attitudes of the teachers need to be different from their former roles. Therefore, the staff members were trained in the new tasks and roles. After four years, when the whole curriculum has been developed, an evaluation study has been conducted. The aim of this study was to investigate whether the curriculum change contributed to the professional development of the teachers. Research questions are: What are the attitudes of the teachers regarding the new curriculum? How do the teachers evaluate their new roles? What are the learning attitudes of the teachers concerning their own professional development? A questionnaire with 128 statements was
filled in by 37 teachers (response of 80%). Analysis of the data has been done with SPSS. The results show that the teachers’ general attitude towards the new curriculum was positive. However they felt that their daily practice in the problem-based and project-based sessions needed improvement. Teachers report of competency as a tutor was related to their length of employment as a teacher. After all they experienced a learning attitude and used mainly implicit ways of learning. The implications of these findings will be discussed: getting the teachers involved in a process of professional development seems crucial to successful innovation.

POSTER G 15
Novice teachers’ reasoning while making pedagogical decisions
Edna Shoham, Oranim Academic College of Education University of Haifa, Israel
Sophia Penso, Oranim Academic College of Education, Israel

This study examines novice teachers’ reasoning in relation to two levels of the teaching process: the preactive stage of lesson planning and the postactive stage of the analysis of the performance. The sample consisted of 24 novice teachers, all holding a bachelor’s degree but not a teaching certificate, who teach various subjects in secondary schools. The teachers took a course in pedagogy, during which they taught lessons in their fields of specialization. Qualitative and quantitative findings were gathered from the teachers’ reflective journals. Findings relate to (1) subjects expressed in pedagogical decisions; (2) reasons given for decisions; (3) range of reasons given for each such decision. The importance of the study lies in identifying teachers’ reasoning in planning and teaching a lesson. The identification we made indicates that the lesson is a complex and dynamic situation, in which analysis creates new contexts and insights that improve the entire educational process.

POSTER G 16
Lessons from a radical innovation in teacher education
Johannes Slabbert, University of Pretoria, South Africa

In 2002, completely new and innovative school based mentor partnership PGCE (a one year Post Graduate Certificate in Education) was designed and implemented at the University of education. It broke away completely from the traditional concept of teacher education. The achievement of such a paradigm shift in discourse by everyone involved was a mammoth endeavour. But what is equally important for researchers and all participants in such a programme as well as other institutions that may want to employ such a similar programme, is to share the many lessons learned from this venture. The aim of this paper is therefore to give an account of what the ongoing research and informal experiences has revealed about the programme. It will deal with the successes and problems in the major focal areas of the programme. I invite you to come and learn with me!

POSTER G 17
Self-study in the context of institutional change
Edith Tabak, Levinsky College of Education, Israel

This is a year-long self-study of teacher education practices, conducted in the context of constructing a school-college partnership. The study describes my self-directed professional development and traces a process through which I changed my role, from a traditional to a constructivist teacher educator; transform my individual work to collaboration and reciprocity; and become active as a change agent. The findings illustrate how I developed (a) a different stance
toward knowledge, (b) a deeper understanding of myself in relation to others, and (c) how I became an active member of a professional learning community. The study contributes to the understanding of the professional development of teacher educators. It provides a model for self-directed professional development that can empower teachers and change educational cultures from within.

POSTER G 18
Decay of skilled performance in medicine
Geert van de Brink, University of St. Radboud, Nijmegen, The Netherlands
Henny P. A. Boshuizen, Open University, The Netherlands
Pie Bartolomeus, University of Maastricht, The Netherlands

In this study initial performance and decay of a medical skill used in the intensive care unit was investigated. It was found that initial performance was far from perfect, that after three months performance dropped with another 50% on several independent measures and that in all cases self-assessment of expected performance was much higher than actual performance. To translate this finding to conclusions about training and organisation of work, kinds of mistakes made and their harmfulness, frequency with which the procedure has to be performed, the availability of alternatives and legal requirements have to be taken into consideration.

POSTER G 19
Drug calculation, nurse education and university preparation
Carolina Weller, Monash University, Australia

The main focus of this paper was the notion that undergraduate nurses have difficulties in calculation of drug dosages. To gather evidence to confirm or deny this hypothesis it was necessary to develop an instrument that could assess the ability of nurses to calculate drug dosages. The author designed a Drug Calculation Test (DCT) and a demographic questionnaire using Item Response Theory (IRT). Construction of the DCT, item writing and review as well as test administration will be discussed in detail. The findings clearly demonstrated that of the candidates who completed the DCT only 3% achieved a 100% proficiency score. If we accept as the literature suggests that an 80% proficiency score is acceptable then only 36% of the candidates achieved that result. Difficulties in calculating drug dosages were identified to be greater in candidates who had not been taught or assessed in drug calculation. Additionally lack of feedback during the course led to inaccurate perception of drug calculation ability.

POSTER G 20
Designing electronic network-based mentoring for preservice teachers
Shu Ching Yang, National Sun Yat-sen University, Taiwan
Shu Fang Liu, National Sun Yat-sen University, Taiwan

The purpose of this research is to investigate and develop tele-apprenticeships mentoring models for preservice education. The present study proposes an electronic network-based mentoring (ENBM) program for NSYSU preservice teachers with the aim of constructing and sustaining superincumbent teaching professional communities. This study focused on the following issues of conceptualizing, constructing, evaluating and refining of ENBM system. (1) Review the rationale, principles, and pedagogy of mentoring teacher education. (2) The conceptual framework of ENBM will be elaborated based on mentoring, activity theory, and situated cognition as well as cognitive apprenticeship. (3) Desirable features and scaffolding tools that will be built
into ENBM systems will be developed and implemented gradually. A package of tools (portfolio and apprenticeship mechanism) to nurture preservice teachers’ professional growth will be designed. Pilot-implement, observe and conduct an interpretive and situated approach to evaluation of the interface design of ENBM system, refine the system during the on-going process.

MOTIVATION AND EMOTION

Discussants: Suzanne Hidi, OISE, University of Toronto, Canada (posters 21-30) and Susan B. Nolen, University of Washington, Seattle, USA (posters 31-38)

POSTER G 21
Relation between children's math grades and attitudes and parents' attitudes toward mathematics
Lidija Arambašić, University of Zagreb, Croatia
Ves Vlahović-Štetic, University of Zagreb, Croatia

Parents’ attitudes play an important role in the mathematics achievement and children’s attitudes (Jacobs, 1991). The aim of the study was to find out effects of mothers’ and fathers’ math attitudes and children’s gender and age on children’s math attitudes and grades. Participants were 250 elementary school students (11 to 14 years) and their parents. The questionnaire about beliefs and attitudes about mathematics was administered to students during regular class and to parents during parental meeting. Math grades at the end of first semester were also collected. Results on children’s attitudes were analyzed by two separate analyses of variance (children’ gender X age X parental positive/negative attitude), one for fathers and the other for mothers. Results on children’s grade were analyzed in the same way. Obtained results confirmed some hypotheses about the effects of mothers’ and fathers’ math attitudes and children’s gender and age on children’s math attitudes and grades.

POSTER G 22
"Everything is determined?" Relationship between pupil achievement and personality, regarding some factors
Éva Balázs, University of Pecs, Hungary
Mihaly Kocsis, University of Pecs, Hungary
Irén Vágó, University of Pecs, Hungary
Terézia Reisz, University of Pecs, Hungary

The role of social background in the one hand and of cognitive abilities, considered generally individual characteristics in the other are deemed traditionally as significant in students’ achievements. Based on previous research, our presupposition was also to take up with the concept of the assumption of significant effects of social inequalities (eg. macro-, regional, school-system-based and micro-social circumstances) on pupils’ educational achievements. One of the intention of our investigations was to broaden this picture by adding some special features to that. Adjoining to the micro-social dimensions (teaching methods, cultural capital, etc.) as background of pedagogical work we are to include other characteristics of motivation, experience and other personality features in our investigations. What is more, in our view the effects of these factors on pupils’ achievements should not be considered as stable and determining ones. Multifaceted individual features and characteristics can be taken as relevant dimensions as influential to playing role in the shaping students’ performance, including educational achievements. Though the ‘system of effects’ is often seen by cognitive psychology and also by sociology as rather stable,
notwithstanding, supported by some recent psychological theories and empirical experiments, this area can be affected. Besides motivation, several dimensions of personality like the psychological immune system, some components of the personality, social abilities, self- and social reflection are important factors for influencing individual performance, including the potential to modify it. The complexity of the components of students’ performance in schools should be comprised in considering the possibilities of different agents of education system in influencing students’ performance in schools. The school can have a significant role in this influence from adaptive curriculum development to the differentiated ways of instruction and pedagogical style. Supported by empirical data on the investigation of May, 1999 in Baranya County we are convinced that there are a wide range of school-based development of students other than cognitive one. The presentation shows some findings, relevant to this concept.

POSTER G 23
Group differences in self-regulated learning revisited
Sarah Blom, University of Amsterdam, The Netherlands
Hein Broekkamp, University of Amsterdam, The Netherlands

This paper compares results from a repeated measuring of group differences in learning of two populations of 10th grade Dutch students (in 2000, N=650 and in 2002, N=780). In order to examine group differences in qualities of learning, a translated version of the MSLQ of Pintrich and de Groot (1990) was administered. In addition to the MSLQ- self-reports, data on ability, grades, SES, ethnicity and well-being were collected in 8 upper secondary schools in Amsterdam. Analyses of both data sets show a remarkable consistency in learning patterns, in differences between groups, and in school effects. On the other hand, shifts in mean scores on self-regulated learning and rehearsal measures between the two populations, and a rising of ability scores of minority students may indicate changes due to national and school policies.

POSTER G 24
Future time perspective, goal theory and student motivation in high school
Isabelle Bourque, University of Montreal, Canada
Frédéric Legault, University of Montreal, Canada
Monique Brodeur, University of Montreal, Canada
Sylvie Fréchette, University of Montreal, Canada

The research aims are to clarify the links between future time perspective and the academic goals students may adopt, and to analyse their joint impact and their possible interactions on academic engagement of secondary school students. Three scales were used to assess these three variables: Future Time Perspective Test (Lens and Moreas, 1996), QTBA (Bouffard et al., 1998), and EME (Vallerand, 1991). The questionnaire was administrated to 199 high, medium and low achievers students (10th and 11th grades). Results revealed that future time perspective was correlated with intrinsic school motivation and with mastery and performance goals. The analyses also suggested that there were no differences between high and low achievers on the scores of future time perspective scale. Some significant differences between boys and girls have also been found about motivation, future perspective and mastery goals. The overall results suggest that a three factor model can explain school engagement.
POSTER G 25
Elaboration and validation of a scale measuring self-regulated learning in a context of teachers’ educational integration of information technology
Monique Brodeur, University of Montreal, Canada
Julien Mercier, McGill University, Canada
Colette Deaudelin, University of Sherbrooke, Canada
Marc Dussault, University of Quebec, Trois-Rivières, Canada

This poster presents the development of a scale measuring self-regulated learning in the context of teachers’ educational integration of IT. A sample of 481 French-speaking-Quebecers preservice teachers permits the assessment of its validity. Confirmatory factor analysis showed that the 51 items of the questionnaire are grouped under three second-order factors: forethought, performance/volitional control and self-reflection, representing the three cyclical phases identified in the theoretical model (Zimmerman, 1998). Globally, parsimony indices (CAIC) seem to indicate a good degree of parsimony, despite that this indicator is not standardized. This questionnaire, with generic questions, could be adapted as a measure of self-regulated learning in different domains of teacher’s professional development.

POSTER G 26
Task demands and test expectations: Theory and empirical research on students’ self-regulated studying in preparation for teacher-made tests
Hein Broekkamp, University of Amsterdam, The Netherlands
Huub van den Bergh, Utrecht University, The Netherlands
Bernadette van Hout-Wolters, University of Amsterdam, The Netherlands
Gert Rijlaarsdam, University of Amsterdam, The Netherlands

According to contemporary theories on studying, effective and self-regulated students flexibly attune their studying to content demands (paying attention to task-relevant information) and processing demands (using task-appropriate processing strategies). We examined to what degree students who prepare for a classroom-test have an accurate perception of task demands. History teachers (N=22) and their 11th-grade students (N=451) rated the relative importance of 26 sections of a particular textbook chapter on which these teachers would be giving a teacher-made test. Furthermore, both teachers and students rated the degree in which four types of questions (verbatim, paraphrase, inference and skill items) were to be expected in the upcoming test. Ratings of individual students generally showed a low correspondence with those of their teacher and with the actual test questions. However, teachers’ ratings also showed a limited correspondence with the actual test. It seems that, in study-test situations, more clarity is needed about task demands.

POSTER G 27
The German adaptation of the strategic approach to coping scale
Petra Buchwald, Heinrich Heine University of Düsseldorf, Germany
Christine Schwarzer, Heinrich Heine University of Düsseldorf, Germany

Examination stress and test anxiety are pervasive problems in modern society. Because stress can cause decreases in learning and performance, the development of coping strategies to improve learning by managing stress is an important priority for teachers and counselors. However, valid measures of coping are still missing. The study at hand presents cross-sectional as well as longitudinal data from a German version of the Strategic Approach to Coping Scale (SACS) developed by Hobfoll (1998). This scale relies on the conservation of resources theory and the
associated multiaxial model of coping (Dunahoo et al., 1998). In our study, four different samples (examinees, teachers, nurses and sportsmen) provided information regarding psychometric quality of the scale such as internal consistency, discriminant and prospective validity. The German data support those of the original, U.S. version, but also indicate potential cultural distinction. The findings suggest that the German SACS is theory syntonic and has potential for elaborating coping research.

POSTER G 28
A self-regulated model to elicit teachers candidates’ motivation to teach
Maria Cardelle-Elawar, Arizona State University West, USA
Maria Luisa Sanz de Acevedo Lizarraga, University of Navarra, Spain

The purpose of this action research is to help teacher candidates better articulate the role of motivation in the development of their professional identity and change their perspectives about being a motivated teacher. The 352 subjects were enrolled in educational psychology classes. The IDEA model (I=Identify, D=Define, E= Explore, A=Assess) was the self-regulated teaching approach modeled by the instructor as a self-inquiry process involving participants in the critical reflection learn about themselves, learn from experts, and develop their professional plan of action. Data collection and analysis followed a narrative inquiry process in the qualitative analysis tradition. The resulting themes were correlated with findings from the literature and to the extent to which addressed the research questions. In the discussion, the authors described the implications of their results for the praxis of teacher education professors to better facilitate the development of a professional motivational teacher identity. Suggestions for improvement of teacher preparation programs are offered. Future research and policy implications are also articulated.

POSTER G 29
Are fixed and incremental conceptions of intelligence mutually exclusive?
Thérèse Bouffard, University of Montreal, Canada
Carole Vezeau, College of Joliette, Canada
Valérie Dubois, University of Montreal, Canada

According to Dweck, students’ conception of intelligence as fixed or incremental determines the type of achievement goals they endorse. To what extent a student agree or disagree with statements about intelligence that illustrate a fixed personal characteristic is assumed to indicate the nature of his conception of intelligence. This view of conceptions of intelligence as mutually exclusive is controversial. This study explored this issue and it also examined the links postulated between students’ conception of intelligence and their achievement goals. 487 undergraduates filled out questionnaires about conception of intelligence and achievement goals. Results suggest that the two conceptions of intelligence are not mutually exclusive. No much evidence was found to support the assumption of a link between conception of intelligence and achievement goals. How two conflicting conceptions of intelligence can coexist in a same person and the relevance of relationships between conceptions of intelligence and achievement goals will be discussed.

POSTER G 30
Prospective motivation: The role of feeling about reading, writing and mathematics from kindergarten to middle school
Lerida Cisotto, University of Padova, Italy
Daniela Lucangeli, University of Padova, Italy
This study examines the role of feeling about reading, writing and mathematics on children’s prospective motivation toward the future school grade. Elaborating the Feeling About School test (FAS) of Valeski and Stipek (2001), we investigated different aspects of the feeling about learning: academic competence, emotion, theory of intelligence and expectations of these factors in the future school grade. Participants included 131 kindergartners (attending the last year), 134 5th-graders (elementary school) and 123 8th-graders (middle school). We conducted correlational analyses to identify the relationships between the prospective motivation variables in the three learning domains considered and analyses of variance to see whether there were differences related to school grade and gender. The most interesting results concerned the different prospective motivational patterns in kindergarten, elementary and middle school, as well as in each learning domain investigated.

POSTER G 31
Fostering the will to learn: Which position for the tutor in distance learning?
Gerard Delacour, University of Nantes, France
Sandra Bruno, University of Paris VIII, France

Distance learning implies periods of distance communication. The aim of the study is to analyse the symbolic meaning of verbal data towards the question of the respective distance position of learner/tutor. How the attempts of the interlocutors – the base of the will to learn - are expressed when the synchronous aspects of communication are not present? The same sentence has a different meaning for one to one or not. For example: “Is there anybody ?”. In the inner of learning processes, the problem of distance communication raises three theoretical considerations: the objectivation of knowledge associated with the use of ICTs, the double person concerned in any training, and the way by which subjective aspects of shared knowledge can be preserved in the double person relationship inside distance learning process.

POSTER G 32
Self image and significant others’ perceived feedback as factors associated with school deviance: A pilot study in 11-14 year old Greek & Italian children
Georgios Dimou, University of Ioannina, Greece
Panayotis Tsakalis, University of Ioannina, Greece

Self-image is the result of a multidimensional psychological process. Aim of this study is to approach a definition of a “folk psychology of the self” and explore whether significant others’ reactions affect the manifestation of school deviance phenomena. Sociocultural and/or ethinical differences are also considered. The research was conducted in Epirus, Greece and Apulia, Italy. Approximately 270 11-14 year old subjects participated in the research process. The research tool was a self-description scale accompanied by a questionnaire surveying children’s perceived feedback received from significant others. The theoretical significance of this research lays on the definition of a folk psychology of the self and the determination of the effect of significant others’ feedback on children’s personality characteristics. The educational significance of the study varies, from providing helpful tips on improving the management of every day school practice to setting the guidelines for superior psychological/educational training of education professionals.
POSTER G 33
An NLP based goal setting procedure for fostering the will to learn and motivation of the 6th grade students at regional primary boarding schools in Turkey
Feyza Doyran, Middle East Technical University, Turkey

The purpose of this study is to investigate the effects of an NLP (Neuro Linguistic Programming) based educational goal setting procedure on the motivation and success of the 6th grade students attending Regional Primary Boarding Schools (RPBSs) in Turkey. Another purpose is to help the teachers be motivated applying NLP techniques. 10 RPBSs were visited and issues related to the students’ and the teachers’ motivation were investigated and motivation was found to be the biggest problem. An NLP based goal setting procedure for the students was designed and applied in order to increase their motivation and success. Moreover, a training seminar for the teachers was conducted. The results of this research revealed that the procedure increased the motivation and the creativity of the students considerably. The teacher seminars revealed that they gained the habit of writing educational and personal goals for themselves and they started helping their students write goals.

POSTER G 34
Relationships between coping strategies, stress, personal resources, school, and psychosocial adaptation at the adolescence
Michelle Dumont, University of Quebec, Trois-Rivières, Canada

One of the reasons why an adolescent receives psychological treatments could originate from inadequate coping used in periods of crises. One of the goals of this research is to measure how this profile could influence school performance, psychopathology, and noxious consumption. A few questionnaires were filled by 187 teenagers in third grade high school: Coping strategies, daily hassles, self-esteem, autonomy, optimism, school performance, psychological problems, noxious consumption and the number of hours spent in working a part-time job. Productive coping was positively associated with school performance and negatively with smoking and psychopathological problems. Social coping do not seems to be a good clue to predict mental health and consumption problems except for school performance. Unproductive strategy seems to be a good predictor for psycho-pathological distress but not for noxious consumption. Professionals have to help teenagers to improve their resources such as optimism, self-esteem, and autonomy since these are related with less dysfunctional coping.

POSTER G 35
Preservice teachers’ conception of students’ motivation within a knowledge-building process
Sylvie Fréchette, University of Montreal, Canada
Judith Lapointe, McGill University, Montreal, Canada
Monique Brodeur, University of Montreal, Canada
Frédéric Legault, University of Montreal, Canada
Isabelle Bourque, University of Montreal, Canada

This study focuses on the way trainees conceptualize and find solutions to students’ motivation problems within a knowledge-building process. A socio-cognitive model of motivation, based on the works of Bandura, is proposed. Three objectives are pursued in this research. Determining 1) the way trainees conceive students’ motivation problems; 2) the contextual factors they identify; 3) the solutions they propose. 155 students in a secondary education program participated in electronic discussion forums whose central theme was the motivation of their pupils during a six
weeks practicum. A coding scale was constructed and the analyses showed the interconnections between types of problems identified by the trainees, contextual factors, and types of solutions proposed. The difficulty to disentangle motivation and discipline problems points to the need of specific training about how to sustain pupils’ motivation. Self-regulation of learning appears to be a useful training device.

POSTER G 36
A training in self-regulated learning for computer science students
Heidrun Stoeger, University of Ulm, Germany

Zimmerman, Bonner and Kovach (1996) use the cycle of self-regulated learning as a basis to suggest a training to mediate time-management abilities and to improve self-efficacy. This training was conducted in the subject of computer science by student assistants (tutors) who had been trained as multiplicators over a period of several weeks. A total of 252 university students in the first semester of their studies (Training group: 122 persons, control group: 130 persons) took part in the study. The training had a positive effect on performance, self-efficacy, and the application of time-management skills and metacognitive strategies. A positive effect on the motivational states of the students could also be confirmed. An examination of various personality factors showed that students with an initially unfavorable motivational profile gained the most from the training. Based on the results obtained, it could be proven that tutors should be qualified in supporting their students not only with respect to the learning material at hand, but also in optimizing their learning processes.

POSTER G 37
The development of an instrument for measuring adult self-regulated learning
Cheng-Yen Wang, University of Kaohsiung, Taiwan

Lifelong learning (LL) is an important strategy to keep competition and enhance life quality in this age. The key condition for successful LL is self-based learning and a specific strategy, self-regulated learning (SRL) is raised here. SRL is a learning strategy covering the competency in domains of meta-cognition, cognition, affection and skill. For fulfilling LL via SRL, a significant prerequisite is to develop an instrument to measure individual’s literacy in SRL to decide whether to give remedial enrichment or to make full use of SRL. Since the period of adult learning plays a crucial role in LL, adults are selected as the target group here. The author analyzes the theoretical framework of SRL and then accordingly develops an instrument for measuring SRL. The reliability and validity for an effective instrument are examined. Implications about adult SRL and applications of its instrument will be also discussed.

POSTER G 38
Relationship between classroom management and students motivation: An exploration with factor analysis
Franco Zambelli, University of Padova, Italy
Eraldo Nicotra, University of Padova, Italy
Monica Frigo, University of Padova, Italy

In this study the factorial structure of three measures was examined. The first regards students’ attitudes to study in general, and was a revised adaptation of the McInerney Inventory of School Motivation (ISM) (McInerney et al. 1992, 1997). The next two measures regard teachers’ beliefs about student learning and motivation, and classroom management. We were interested in
the teacher’s role in supporting motivation, involvement and learning, and in classroom managing. To analyse classroom organization, and teachers’ management strategies, a questionnaire was designed by the authors: the Classroom Educational Management Test (CEMT). In addition, to evaluate teachers’ beliefs about students’ learning and motivation, a questionnaire (BLMT) was developed and tested. The study revealed several factorial structures regarding students’ motivation and teachers’ beliefs.

**LEARNING AND TEACHING**

**Discussants**: Joost Lowyck, University of Leuven, Belgium (posters 39-46) and Margarita Limón, Autonomous University of Madrid, Spain (posters 47-55)

**POSTER G 39**  
*Student quality of primary school life - A multilevel analysis*  
Carl Anthon Leonard, University of Newcastle, New South Wales, Australia  
Sid F. Bourke, University of Newcastle, New South Wales, Australia  
Neville J. Schofield, University of Newcastle, New South Wales, Australia

This paper presents the results of a study incorporating a multilevel analysis of student quality of school life differences between 448 Year 5 and 6 students in four primary schools and classes within these schools in the Lower Hunter Valley, New South Wales, Australia. Two causal models linking student and teacher demographic, background, questionnaire, and absence data, were hypothesised and developed for testing. Results indicated that student perception of the quality of their school life in Term 2, student absence in Term 3, and to a lesser extent Term 2 provided the bulk of the explanation of variance in student quality of school life in Term 3. Significant class and school differences were also evident. Possible explanations of the relationships identified are discussed, while implications including the apparent importance of positive peer relationships and an exciting, enjoyable curriculum in ensuring students have a high quality of school life are described.

**POSTER G 40**  
*Constructing knowledge by studying texts in compulsory secondary education*  
Eva Liesa, Ramon Llull University, Barcelona, Spain  
Montserrat Castelló, Ramon Llull University, Barcelona, Spain

Learning from text involves developing “a mental representation of the situation as described in the text” and, therefore, requires approaching the text with the aim of going further from what Kintsch (1989) called “recuperation of the text-base”. The study of a text, understood as learning from written information, implies knowing and applying a wide set of learning procedures, such as acquisition, interpretation, analysis, comprehension and/or communication of information. The level of rigidity or flexibility students use to adjust their representations to specific study demands will account for their success in handling tasks with different complexities. The main objectives of this work are: a) getting to know what learning procedures students of Secondary Education use while studying three texts with different study demands at the cognitive level b) establishing what is the variability in procedural declarative knowledge in students, and assessing to what extent having this kind of knowledge allows them to adjust to different study demands and achieve better results when developing a comprehension task.
**POSTER G 41**

*Technology impact on learning process in science teaching in primary school*

Katerina Malamitsa, University of Athens, Panagiotis Kokkotas, Panagiotis Piliouras, Katerina Plakitsi and Ioannis Vlachos, University of Athens, Greece

This study is concerned with the computer as a pedagogical tool in teaching science in primary school. Students do not learn from technology although technology can support meaning making by students. Computers may also function as cognitive technologies for amplifying and reorganizing how learners think. In addition the use of technology in teaching science may support reflective thinking, because it enables users to compose new knowledge by adding new representations, modifying old ones, and comparing the two. In order to examine the contribution of new technologies to learning science we conducted a research in a primary school in Athens. More specifically we explored if teaching science via computer simulation and animation influences students’ learning and understanding concepts of electricity. Although this was a relatively small-scale experiment, criticizing our findings we could say that: computers support a) knowledge construction, b) learning by doing and c) learning by conversing for discussing, arguing and building consensus among members of a learning community.

**POSTER G 42**

*The role of pictorial representations on problem solving: The case of ratio and proportion tasks*

Christina Misailidou, University of Manchester, United Kingdom
Julian Williams, University of Manchester, United Kingdom

In this paper we investigate the use of pictorial representations as a way of facilitating children’s performance on ratio and proportion tasks. A diagnostic instrument was given as a test to pupils aged 10 to 14 in two versions: one with “models” thought to be of service to children’s proportional reasoning and one without. We present the test data for three items of this instrument where “pictures” were used as a model. The case of a group of three pupils that was involved in a researcher-guided discussion on one of these items is also presented. A pictorial tool was used to facilitate argumentation. We conclude that the appropriate use of pictorial information could enhance the pupils’ problem-solving capabilities.

**POSTER G 43**

*The role of problems in the mathematics lessons of the TIMSS-video-study*

Johanna Neubrand, University of Lueneburg, Germany

Based on problems drawn from a subsample of lessons in the TIMSS Video Study, an analysis is presented which shows that teaching mathematics is very different in the three nations, US, Japan and Germany. These differences regard the number of problems in a lesson (most in US, least in Japan), the characteristics of the problems selected (the more advanced problems occur in Japan in Geometry), and the implementation of the problems into the lesson (most problems in Japan are totally worked out, and seatwork is integrated). This study capitalizes the assertion “teaching is a cultural activity” from the content point of view.

**POSTER G 44**

*The classroom microculture and students’ involvement in learning*

Lucie Mottier Lopez, University of Geneva, Switzerland
The poster questions the relationship between the microculture of two third grade classrooms and the “will to learn” of the students. Given our theoretical hypothesis of a reflexive relationship between sociocultural processes and individual psychological processes (e.g., Cobb, Gravemeijer, Yackel, McClain, & Whitenack, 1997), the main research questions are: to what extent do classroom norms and practices encourage the students to become actively involved in learning? And, reciprocally, to what extent does the individual activity of the teacher and the students support the development of the classroom microculture? The poster will present the main participation structures and norms that characterize each classroom community, and will illustrate the individual mathematical activity of several students carrying out a same mathematics activity in each classroom. A final discussion will be proposed regarding the relationship between the structures of participation and norms favoured in each classroom microculture and the quality of the students’ engagement in mathematics activities.

POSTER G 45
Teaching concepts by means of analogy: A process model
Andrys Onsman, Monash University, Melbourne, Australia

The effectiveness of teaching new concepts by analogy depends upon three factors. The student must have a clear and correct understanding of the tenor concept. The student must have access to the process that allows the analogy to be recognized and interpreted as such. The student must be motivated to engage in the process. This presentation proposes that the metaphor interpretation process operates on one of three levels: a direct one to one comparison of two specific instances; the comparison of an instance with a mental prototype; and the comparison of an instance with an abstraction. When lecturers expect students to grasp a new concept by referring to an existing one, they are expecting students to operate at the most complex level. However, if people tend to operate at the least complex level possible there is likelihood that misinterpretation will occur, particularly when the tenor concept is not clearly understood.

POSTER G 46
Skills development and the value of undergraduate project work
Paul Orsmond, Staffordshire University, United Kingdom
Stephen Merry, Staffordshire University, United Kingdom
Kevin Reiling, Staffordshire University, United Kingdom

This presentation considers (1) student’s perceptions of their skills development and the value of undergraduate project work and (2) tutors’ perceptions as to what skills students developed and of what attributes of project were valuable to students. Perceptions were obtained using questionnaires generating, firstly, qualitative data showing a shift in students’ changing perceptions of the type of skills reinforced, developed and assessed within their project work as their third year project progressed and, secondly, quantitative data evaluating the personal and assessment importance of project work to students. The outcomes of this study have implications regarding tutor and student formative feedback discussions, the development of project marking criteria and the way project support plenary sessions need to develop. In particular with reference to the relationship between scientific thinking and writing.
POSTER G 47
*Interconnected versus compartmentalised knowledge: Seeking connections in English, French and German mathematics textbooks*
Birgit Pepin, Oxford Brookes University, United Kingdom
Linda Haggarty, The Open University, United Kingdom

In this presentation it is argued that lower secondary mathematics textbook in England, France and Germany place different emphases on 'connectivity' of mathematical knowledge. Popular selling textbooks from each country were analysed, in particular in terms of their treatment of “Directed Numbers”. What became apparent from the data collected was that textbooks in different countries provide different (mis)representations of mathematics for their students in schools. Whereas in some countries students are inundated with skills, procedures and disconnected mathematical knowledge, in others students are allowed to develop an appreciation of its interconnectedness and generalisable nature. Looking at textbooks and different representations of knowledge in different countries helps to sharpen the focus of analysis by suggesting new perspectives. Furthermore, they are likely to help teachers, and in particular student teachers, to prepare and present mathematical knowledge for pupil understanding in a non-fragmented and interconnected way.

POSTER G 48
*What the heck is “amphistomatic””? Plant identification as a cognitive process and as a subject of biology teaching*
Stephanie Pieschl, University of Muenster, Germany
Rainer Bromme, University of Muenster, Germany

Learning plant identification is mandatory in biology studies at university. To improve teaching in this domain we have analyzed the process of plant identification empirically. First, we have established a model of task demands. Additionally, the actual cognitive processes while identifying botanical species were investigated using a think-aloud method. The verbal protocols of two samples varying in the degree of botanical expertise (10 semi-experts, 13 novices) were obtained and learners’ difficulties were directly assessed. We also used a new ‘perspective-taking-method’. The semi-experts were asked about their assumptions on novice’s difficulties. These data were synthesized into a model of actual cognitive processes. We will argue, that the interplay between extensive prior knowledge of plant-features and the available external representations (i.e. so called ‘keys’) is critical for learning plant identification, but that keys are often not helpful for beginners. Finally, we will discuss how identifying plants could be taught considering our results.

POSTER G 49
*Applying a model of classroom learning processes in a case study of five students*
Harri Pitkäniemi, University of Helsinki, Finland

According to the Nuthall and Alton-Lee model of learning, students need 3–4 experiences of the related information, with no more than two-day gaps, if effective learning is to take place. This model was tested as part of everyday teaching using five 11 year-old students of a wide range of ability. The data collection was designed to track the learning process from prior knowledge, immediate representation after the lesson, after two days and after 6-7 weeks (N=10 per student). The findings support the sequential nature of the learning/non-learning proposed by the model (to the extent of N=47/50). Interviews and observation enabled us to explain why the level of students’ final productions varied in terms of their commitment to study, critical thought about the studying process and active use of prior knowledge.
POSTER G 50
Making sense of photographs
Lilian L. Pozzer, University of Victoria, Canada
Wolff-Michael Roth, University of Victoria, Canada

In some contexts, a photograph may be worth a thousand words; on its own, however, a photograph means little because it underdetermines its interpretation giving rise to many different ways of seeing and understanding it. The purpose of this study was to understand how high school students understand photographs that were accompanied by different amounts and types of co-text (caption, main text). The data for this study consists of video-recorded interviews with twelve Brazilian high school students. What students perceived was in part a function of the presence of caption and main text, which therefore not only described what could be seen but also constituted a pedagogy for looking at photographs. We conclude that high schools not only develop subject matter literacy but also a literacy concerning photographs.

POSTER G 52
Video-based, cross-cultural studies on the quality of math teaching and schooling: The international TIMSS-R video study and the Swiss national video study
Kurt Reusser, University of Zurich, Switzerland
Christine Pauli, University of Zurich, Switzerland
Isabelle Hugener, University of Zurich, Switzerland

The TIMSS-R video study is a video survey of eighth grade teaching in seven countries. Samples of approximately 100 videotaped mathematics lessons in Australia, Czech Republic, Hong Kong, Japan, the Netherlands, Switzerland and USA were analyzed quantitatively and qualitatively. The study had three main objectives: (1) to develop observational measures of classroom instruction and instructional quality, (2) to provide representative pictures of classroom teaching within each country, and (3) to compare teaching practices among countries. For the Swiss national video study additional data (student and teacher questioning) allow to tie the quality of educational outcomes to variations in the quality of instruction. The goal of this poster presentation is (1) to present the rationale of the Swiss national video study in relation to the international TIMSS-R video study, (2) to provide an overview of selected main results of the study.

POSTER G 53
Working at home for school: The significance of intelligence and school achievement
Natalie Rinner, University of Vienna, Austria
Petra Wagner, University of Vienna, Austria
Christiane Spiel, University of Vienna, Austria

The present study is part of the project “Working at Home for School”. It was the intention of the study to analyze the amount of time students invested at home for school with the focus on the influence intelligence and school achievement have on working time. The sample included 202 German students of academic secondary schools from grade 10 (aged 16 years). Data was collected via diaries. Students noted the amount of time invested in work for school during one week. In addition, they answered two ability tests measuring fluid and crystallized intelligence. On average, students worked 8 hours weekly at home for school. However, results indicated large interpersonal variations in time spent for school. In contrast to findings of previous studies no gender differences could be found. Results concerning intelligence showed a higher correlation
between working time and fluid intelligence than between working time and crystallized intelligence.

POSTER G 54
Research as design approach in the school development
Tiina Soini, University of Helsinki, Finland
Kirsi Pyhältö, University of Helsinki, Finland
Satu Eerola, University of Helsinki, Finland
Maijaliisa Rauste-von Wright, University of Helsinki, Finland

Research as design is an attempt to develop both theory and practice of education in the same design process. It is carried out in complex real world settings, and it is based on collaboration between researchers and practitioners in the field. The relationship between design and research is challenging for methodologies, and also for the people participating in the research. In the study presented here the participants of the research process were the group of learning researchers and practitioners (mainly teachers) of two school organizations. In this paper we make an attempt to take under consideration how some elements of these contexts regulate the collaboration during the research as design process. During the two year process of design and research the researchers observed here some essential differences in the perspectives on “how the things are done and thought”: 1) Time perspective; what is the length of the time-span of design; 2) Process perspective; does the (learning) process proceed linearly or in cycles? 3) Conceptual perspective; which concepts are used (and allowed) and how their are changed? 4) Perspectives on development of teachersh; is the change supplementary of reconstructive?

POSTER G 55
Toward a model of learning in the visual arts
Jeffrey K. Smith, Rutgers University and The Metropolitan Museum of Art, USA
Lisa F. Smith, Kean University and The Metropolitan Museum of Art, USA

The purpose of the research reported on in this paper is to work toward a model of what learning means in the visual arts. Just as the nature of learning in mathematics is clearly different from what it is in history or foreign language, so it is in the fine arts. We propose a model of learning in the visual arts that is most analogous to vocabulary learning/development. That is, we think that visual arts learning accumulates in a gradual fashion with repeated exposure to cultural content. We report on the development of a scale of visual arts learning and show it is related to arts-related training and frequency of museum visitation, but not to general educational level or age. We feel this work will promote discussion of this issue and provide a beginning for a healthy debate on an important topic.

LITERACY QUESTIONS

Discussants: Herre van Oostendorp, Utrecht University, The Netherlands (posters 56-61) and Maria Chiara Levorato, University of Padova (posters 62-67)

POSTER G 56
Story comprehension and related abilities in emergent literacy
Beatrice Accorti Gamannossi, University of Florence, Italy
Giuliana Pinto, University of Florence, Italy
Learning to read is a complex process that involves many skills as shown in the Whitehurst and Lonigan model (1998). Literacy is predicted, among others, by children’s narrative abilities, by their knowledge about functions of print and by their language skills, but the relationship among these variety of abilities is less studied. The present research investigated, in five years-old children, the relationships among narrative ability, general linguistic abilities and linguistic awareness in the perspective of the emergent literacy. Data were collected on 627 children; subjects were given a linguistic ability test, a linguistic awareness test, and a story comprehension task. Results show that in narrative ability seems to converge both linguistic ability and linguistic awareness: children who master the lexical and the syntactic level of language and know procedures and functions of the linguistic code, are significantly more able in comprehending story structure and temporal and causal links between parts.

POSTER G 57
Reading and thinking like historians in 4th grade: Linking performance assessment, theoretical constructs and curriculum
Peter Afflerbach, University of Maryland at College Park, USA
Bruce VanSledright, University of Maryland at College Park, USA
Ann Dromsky, University of Maryland at College Park, USA

This study focuses on a performance assessment that is based on evolving understandings of reading comprehension, content domain knowledge, and reading assessment. The performance assessment is linked to an innovative curriculum that helps students learn to read history like expert historians. The performance assessment focuses on interpreting texts of history and how readers of history must analyze the texts they read to determine reliability and trustworthiness. Think-aloud protocol data revealed that students were able to identify history source documents as primary or secondary. Students reported using 8 specific types of cues in text to make these decisions. The results of this study describe content domain reading strategies that help developing readers read like historians. Results describe the construct validity of the assessment and the promises and challenges that the assessment presents to teachers and students. Results also allow the examination of the alignment of constructs, curriculum and assessment.

POSTER G 58
Text and context: Undergraduate language students’ representations of translation
Charles Anderson, University of Edinburgh, Scotland, United Kingdom
Richard Easton, University of Edinburgh, Scotland, United Kingdom
Richard Wakely, University of Edinburgh, Scotland, United Kingdom

Very little research has been conducted on language students’ conceptions of translation and experiences of engaging with translation tasks. This paper reports on a sub-set of findings from an interview study that is seeking to address this gap in our current knowledge by examining in detail students’ conceptions of translation as they progress through the years of undergraduate study. The paper highlights methodological issues related to this area of research and presents points of contrast and commonality that have emerged from the analysis of students’ accounts of translation. Discussion centres on the ‘situated’ character of students’ representations of translation, noting how their conceptions of, and purposes and sense of agency in, translation are mediated by their perceptions of the activities and demands of their course context.
POSTER G 59
The learning process and reading comprehension of high school biology students reading primary literature
Gilat Brill, The Weizmann Institute of Science, Israel
Anat Yarden, The Weizmann Institute of Science, Israel

Biology education, like education in any other discipline, strives to make biology students familiar with the knowledge, activities, and ways of thinking of the community of biologists, and help them become literate biologists. We have developed a curriculum in developmental biology based on learning through primary literature, in an attempt to develop biological literacy among high school biology students. In this research we tried to characterize the ways two high school biology students read a research article from the curriculum in developmental biology. Together with the reasons for miscomprehensions, we describe the reading strategies the students use, and the change that evolved in their understanding. In a way, their effort to understand the research article combines a constructivist way of learning, with the beginning of a process of enculturation into the community of expert biologists reading primary literature.

POSTER G 60
Individual styles in learning to spell: Cognitive, learning and literacy profiles and their relations to interventions
Peter Brooks, University of Surrey, Guildford, United Kingdom
John Everatt, University of Surrey, Guildford, United Kingdom
Sally Weeks, University of Surrey, Guildford, United Kingdom

There has been much research on the cognitive and literacy development of children, but few related intervention studies. Data is reported on three individual children with varying cognitive/literacy profiles, and their responses to different teaching methodologies for acquiring spellings. It is concluded that the learning of spellings is most effective when teaching techniques are linked to the cognitive strengths of children. These intervention methods and findings contribute to theoretical models for literacy development and dyslexia, the range of methods that education needs to provide, and practical teaching. Individual styles of learning spellings were encouraged in a field trial in mainstream schools to test if they could be generalized and were usable in normal practice. They approximately doubled all children’s rates of spelling development. It is suggested that individualised strategies can be used across a range of learning fields, and serve to empower children regarding their own learning.

POSTER G 61
The development of definitional skills as a metalinguistic ability and their relations with school achievement
Gianluca Gini, University of Padova, Italy
Beatrice Benelli, University of Padova, Italy
Carmen Belacchi, University of Urbino, Italy
Daniela Lucangeli, University of Padova, Italy

Defining words can be considered a metalinguistic task (Wehren, De Lisi, & Arnold, 1981; Snow, 1990), in that definitions require an use of language which is auto-referential; this process involves the use of language to explain language itself, to make its formal and content components explicit, to reach the semantic core of a linguistic item by means of other linguistic expressions. Moreover, definitional skills, as a measure of decontextualized language abilities, are closely related to school
success (Snow et al., 1989). This study investigated the relationships between definitional skills, metalinguistic awareness and school achievement in children at the beginning (first grade) and the end (fifth grade) of their experience in primary school. Results clearly show positive relations between definitional skills, metalinguistic awareness and school success in both levels of age.

POSTER G 62
Impact of different aid systems in reading comprehension
António Gonzalez, ISPA, Lisbon, Portugal

We present studies concerning how to improve readers’ comprehension of expository texts by providing them aids before and during reading. In a first study (N= 185), we compared the impact of 3 different aid systems in reading comprehension. In Condition A, students received a simple instruction to read a text. In Condition B, they were given a precise reading goal and an interpretation scheme. In Condition C, in addition to this, they received a more coherent text. The main results point out that differences only appear in Condition C. A second study, still in progress, aims to investigate the effect of two main variables. First, we want to know the different impacts of aids given before and during reading. Furthermore, we want to know if thinking out loud after reading each sentence has impact in reading comprehension and in cognitive operations.

POSTER G 63
Notetaking and academic writing
Sara Hauptman, Achva College, Israel
Rivka Tamir, Achva College, Israel

Notetaking is an effective learning strategy linking between acquisition and structuring of knowledge. Studies show that effective use of notetaking strategies improves students’ achievements in different aspects of academic studies (Kiewra, 1985; Hartly, 1978; Carrier & Titus, 1979; Huffman & Spires, 1994; Cohen & Cohen, 1995). This study focused on the effect of notetaking on the achievements in academic writing. Studies show (Benton et al, 1993; Slotte & Lonka, 1998) a strong correlation between quantity and quality of notetaking and merit of the written product in the one-source essay. In contrast, we focused on quantitative and qualitative evaluation of notetaking in the multiple-source essay.

POSTER G 64
And what about the reader? A reading workshop
Vera Korine-Shafir, Levinsky College of Education, Tel Aviv, Israel

“Reading is an invitation to a creative partnership” writes author S.Yizhar (1982) expressing the concept that regards reading as a dialogue between the reader and the literary text. The purpose of the research is to present a reading workshop where various approaches to the reading of fine literature are implemented, to examine the type of “creative partnership” that develops from the methods used in a class that is based on the responses of the reader (Rosenblatt, 1978, 1995; Ingarden, 1975; Iser, 1978; Fish, 1980), and their implications on the professional development of pre-service teachers. The workshop and its strategies is based on research that deal with the enactment of response based practices in classrooms (Purves, 1993; Beach,1993; Newell & Durst, 1993; Langer, 1995; Rabinowitz & Smith, 1998; Courtland & Gambell, 2000; Sumara, 2002). Instructional strategies: Methods focus on the different modes of the “creative partnership” that lead to generative processes in class. They try to enact some response-based practices to a short literary text and to generate creative activity through tools from different medias (transmediation)
(Siegel, 1995; Smagorinsky 1995, 1998; Whitin, 1996; Wagner 1998; Short, Kauffmann, & Kahn 2000; Berghoff, 2001). During the workshop, participants are invited to engage in the reading, to use different sign systems as sketching and drawing, music, role playing, movement, etc., to discuss the text and to examine what processes take place when they respond. The use of art and other sign systems supports all of the underlying processes in learning including conversation and reflection. This study may help in the evaluation of workshop methods: 1) to encourage the reading of fine literature among pre-service teachers; 2) to encourage and define the potentials of transmediation in the classroom; 3) to define the role of the teacher as facilitator.

POSTER G 65
A study on wait-time in classroom interaction
Barbara Maroni, University of Rome La Sapienza, Italy
Clotilde Pontecorvo, University of Rome La Sapienza, Italy

This work studies social interaction in the natural context of school. The classroom interaction is characterized by the IRE structure, where the wait-time appears to be fundamental. The average wait-time is 0.9-1 second. With an increase of the wait-time up to 3-5 seconds, it is possible to observe positive changes in the answers of the students and in the questions asked by the teacher (Rowe, 1974). The aim of this study is, through the conversation analysis, verifying whether in Italian contexts too, a long wait-time of the teacher improves the answers of the pupils. The corpus of data is composed of 23 lessons in 12 Italian primary-school classrooms, videotaped and transcribed. The results show that the long wait-time favor the quality of the pupils’ answers, in particular when associated with turns of the teacher that encourage the collaborative participation of the children.

POSTER G 66
Fostering self-explanations when learning with text and animations: The use of an annotation facility
Monika Nobs, University of Heidelberg, Germany
Peter Reimann, University of Sydney, Australia

Generating explanations to oneself has proven to be a learning activity by which both declarative and procedural knowledge can be acquired in an effective, self-guided way (see Chi, 2000). Unfortunately, strong individual differences regarding amount and content of self-explanations exist, with many learners showing a very low frequency of spontaneous self-explanations. Furthermore, the influence that the representational format of learning materials may have on self-explaining remains unclear. This study explores the possibility to foster self-explanations through an annotation facility which takes the form of a structured tool containing special affordances for self-explaining. In addition, the effects of using different representational formats of learning material are examined: Learners generate annotations while studying a unit about the human cardiovascular system displayed either as text, diagrams, or animations. Results will further clarify the process of self-explaining by analyzing the influence of different presentation formats and by exploring ways to support self-explanations.

POSTER G 67
Negotiating about conceptual information during computer supported collaborative writing
Cathy van de Laak, TNO Human Factors, Soesterberg, The Netherlands
Jerry Andriessen, Utrecht University, The Netherlands
In this research we focus on the analysis of the negotiation during the computer supported collaborative writing of an argumentative text. During this negotiation students constructed a collective conceptual network by externalising concepts from their internal knowledge network in chat and text. In this context collaborative writing is very useful for the learning process and the transformation of knowledge. We have analysed the data (logfiles of chat and text) of 14 pairs of students to find out what forms of negotiation they used, what the relation is between these forms of negotiation and the content of the chat and what the relation is between the negotiation in the chat and the resulting text.

INSTRUCTIONAL TECHNOLOGY

Discussants: Andrea Kárpáti, Eötvös University, Budapest, Hungary (posters 68-75), Campbell McRobbie, Queensland University of Technology, Australia (posters 76-83) and Beatrice Ligorio, University of Salerno, Italy (posters 84-91)

POSTER G 68
Talking to the computer? Differences in adaptation strategies of initial users of speech recognition systems
Ivy Ackerman, University of Antwerp, Belgium
Mariëlle Leijten, University of Antwerp, Belgium
Luuk van Waes, University of Antwerp, Belgium

Case studies (Leijten & VanWaes 2001, 2002) show that (1) speech recognition allows writers with different writing profiles to maintain their own writing strategy, and (2) some people explore the possibilities of speech recognition, while others often resort to the more traditional ways of writing, using keyboard and mouse. In this paper, we aim at a quantitative foundation for these findings, exploring whether the results of the case studies are confirmed in a larger corpus as well. In analysing these data, we restrict ourselves to one focus point, that is, the use of modes (i.e. how often and how long do participants use keyboard, mouse or speech and how often do they switch between these different modes). On the one hand we expect a contrast between writers who are used to dictating versus writers using the computer. On the other hand we expect differences between people ‘experimenting’ with speech recognition versus people who easily resort to keyboard and mouse.

POSTER G 69
Knowledge spaces and adaptivity in e-learning
Dietrich Albert, University of Graz, Austria
Cord Hockemeyer, University of Graz, Austria

According to the technicians nowadays the aim is to develop eLearning systems supplying access to electronically based learning resources anywhere at anytime for anyone. The most advanced technology today for e-learning is the World Wide Web or Internet. Thus the present contribution is focusing on Web-based eLearning - but from psychological points of view. The aim is to make the Web-based system behaving like a private teacher. The Knowledge Space Theory (KST) is a mathematical-psychological framework (based on order and lattice theory) for representing knowledge and knowledge based behaviour. It has been used in our prototype of a Web-based system RATH (Relational Adaptive Tutoring Hypertext). During the tutoring process, the student's knowledge state can be updated at any step corresponding to the lessons learned. At any time, the student has access to only those components which are the next step on some learning path from
the current state to the destination or goal state. By far the most important topic in current eLearning research is adaptivity. In the already existing KST-based systems learning is optimised by adapting to the student's pre-knowledge, by adapting to the student's/teacher's learning aims and goals, and by adapting to the student’s actual knowledge. Systems providing such kinds of adaptivity based on the KST are the ALEKS system (http://www.aleks.com) and the RATH system (http://wundt.uni-graz.at/rath).

POSTER G 70
The mentor's role in real/virtual communities for learning
Adalgisa Battistelli, University of Verona, Italy
Benedetta Bellò, University of Verona, Italy

The mentorship, an interpersonal exchange between a mentor (more experienced colleague) and a protégé is also possible as a relationship involving a mentor that takes care of more than one protégé, providing support regarding their personal and professional development. It provides career functions (sponsorship, exposure and visibility, coaching, protection, challenging assignments) and psychological functions (role-modeling, acceptance and confirmation, counseling, friendship). The real/virtual community for learning “Di@pason”, sets up to experiment with the processes on which the acquisition/development of competencies are founded inside organizations (with the support of the ICTs, e-mails etc.), consists of 15 psychologists and a coordinator. The purpose of the present research was to analyse the “coordination” function inside the community, the functions of mentoring verifiable between the members, analysing the contents of their e-mail communications. The results show that the main functions provided by the relationship are sponsorship, acceptance and confirmation, and challenging assignments.

POSTER G 71
Children’s, teachers’ and parents’ point of view: Learning abilities and depression
Paola Bonifacci, University of Bologna, Italy
Cristiana Santinelli, University of Bologna, Italy
Silvana Contento, University of Bologna, Italy

It is well known that a relationship exists between learning abilities and affective development. What is more vague is the direction of this relationship and the way in which cognitive and emotional aspects interact (Ingram and Holle, 1992). In this research we tried to investigate how learning and cognitive functioning relate to depressive aspects. In particular we analysed how this relationship vary according to self- or hetero-evaluations. Results indicate that subjects (100 children attending elementary school) who evaluated themselves as depressed show lower verbal abilities and higher levels of anxiety. Teachers view depressed subjects as having difficulties in concentrating and low reading performances. Considering parent’s point of view, depressed subjects are more emotionally unstable and have difficulties in writing. Adopting a developmental perspective in the study of cognitive functioning in depression allows a deeper comprehension of the role that cognition might play in the development of depression (Gotlib et al., 2000).

POSTER G 72
Can ICT switch children on to learning? Indications from a longitudinal observational study
Carolyn Bromfield, University of West of England, United Kingdom
Susan Waite, University of Plymouth, England, United Kingdom
Steve Wheeler, University of Plymouth, England, United Kingdom
There has been considerable recent investment by the UK government in improving Information and Communication Technology provision in schools but relatively few studies evaluating its impact on teaching and learning at a micro level. This longitudinal case study combines quantitative and qualitative methodology to provide insights into the influence of ICT on children's learning, with particular regard in this paper to motivation and on/off task behaviour. We consider the use of ICT across the curriculum for group work, communication and incidental learning together with other powerful influences on motivation such as the personality and teaching style of the class teacher. Tension between ICT’s potential for stimulating creativity and current systems of assessing school standards is highlighted. A self-sustained will to learn appears to be fostered by shared values of teacher and children to work independently to complete tasks in combination with well resourced ICT which supports this style of learning.

POSTER G 73
*ThinkAboutIt*: A web-based tool for developing critical thinking
Roger Bruning, University of Nebraska-Lincoln, USA

Several studies testing a Web-based application aimed at promoting critical thinking will be reported in this poster session. The application, called *ThinkAboutIt*, is embedded in Web-based materials and requires learners to make and justify choices. A database then graphically displays the frequency of their and other learners’ choices, plus listing their own and others’ justifications. In two studies, teacher education students used *ThinkAboutIt* to learn about norm-referenced testing and classroom motivation. Students were randomly assigned to condition; some simply moved on after choosing and justifying their choices, others received graphical feedback, and still others interacted with others’ rationales. All conditions produced significant learning and self-efficacy gains, but did not differ in critical thinking outcomes. In current experiments, the tool's features are being studied with (1) classroom teachers judging student writing quality and (2) teacher education students judging teaching case studies. Newly added features include “coaching” and “expert” functions; data on their use as a function of user learning and motivational characteristics currently are being gathered. Overall, results show the utility of the tool’s feature requiring students to reason about cases and suggest new possibilities for promoting deeper learning.

POSTER G 74
*Visual dynamic events in 3D environments: The role of viewpoint in multimedia presentations*
Bärbel Garsoffky, IWM and Knowledge Media Research Center, Tübingen, Germany
Stephan Schwan, Johannes Kepler University, Linz, Austria

Designers of learning environments increasingly present dynamic visual events to illustrate learning contents, e.g. simulations in physics. Whenever motion in 3D-space is visualized, a specific viewpoint has to be selected, i.e. the perspective viewers have on the event. Up to now there is little empirical research concerning the choice of viewpoint either by the designers of learning environments or by the users in the interactive case. Two experiments show that (1) the viewpoint on a dynamic visual event becomes part of the cognitive representation of this event and therefore influences later memory processes, and (2) that users have a stable rank of preferences of different viewpoints. On the one hand these findings show that the selection of adequate viewpoints is important when presenting dynamic visual events, on the other hand it becomes evident that theories concerning visual presentations of static objects can also be useful for research on dynamic events.
POSTER G 75

How 6-9 year old students come to learn a computer game based on the operations of addition
Jacinthe Giroux, University of Montreal, Canada

This paper presents a computer environment (Animath) intended to involve students in an arithmetic activity based on the operations of addition. Learning a computer game calls on the processes by which a student constructs a more and more satisfactory representation of how the game works, permitting the deployment of winning numeric strategies. The environment was tested on 50 students, 6-9 years old, divided equally into regular and special education classes. Qualitative analysis of the students’ behavior distinguished a hierarchy of representations, suggesting that more and more complex relations and co-ordinations are built up by the player. For the students with learning difficulties the analyses pointed to a difficulty in interpreting the feedback from the environment, not only in terms of the indications of success and failure but also in terms of the arguments drawing on a co-ordination of aspects of knowledge of the series and of the operations.

POSTER G 76

Information retrieval and processing skills using hypermedia learning environments
Jean Loiselle, University of Quebec, Trois-Rivières, Canada
Josiane Basque, TELUQ University, Canada
Martine Chomienne, Cegep@Distance, Canada
Louise Marchand, University of Montreal, Canada
Hélène Fournier, University of Quebec, Trois-Rivières, Canada

Research shows positive effects of hypermedia environments on learning, but also displays difficulties associated with their use. Hypermedia environments forces learners to apply higher-order thinking skills, as they constantly make decisions and evaluate their progress. However, many users experience difficulties when researching and processing information gathered from hypermedia environments (Pierce, 1998). Many university students and professors are unwilling to use technology because they lack some basic skills related to information retrieval and processing (Hess, 1999). This proposal will present an overview of the researches on hypermedia use and learner information retrieval and processing skills. We will examine the skills needed to efficiently use such environments and the problems encountered by post-secondary students, related to information retrieval and processing. We will also analyze the effects of these environments on these skills and will report the results of an inquiry on information retrieval and processing skills of canadian post-secondary students.

POSTER G 77

Developing second language learner autonomy in Italian through the use of computer mediated audio-conferencing
Greer Johnson Cavallaro, Griffith University, Brisbane, Australia
Claire Kennedy, Griffith University, Brisbane, Australia

The paper reports on a project that examines and evaluates the use of computer-mediated audio-conferencing as a means for language students to practise speaking in the target language outside class contact hours. The students’ use of a Computer-Mediated Communication (CMC) tool, combining audio-conferencing facilities with a shared desktop, has demonstrated the potential to enhance the quality of the learning experience by facilitating more rapid improvement in students’ proficiency and their development as autonomous learners. The project investigates the quality of
the learning experience of a small pilot group of intermediate and advanced level students in order to identify key elements in an audio-conference that relate directly to (a) language acquisition and (b) the development of learner autonomy. The discussion focuses directly on the development of learner autonomy though the use of CMC as displayed in a series of autonomous learner vignettes.

POSTER G 78
Talking learning into being - A frame analysis of talk about web-based learning
Leena Kuure, University of Oulu, Finland
Maarit Saarenkunnas, University of Oulu, Finland
Peppi Taalas, University of Jyväskylä, Finland

Pedagogic and research experience have shown that the students’ perception of what happened during the course and what was supposed to be done is often different from how the teachers see these issues. If we consider the group of students alone, there is considerable variety among them in terms of such views and perceptions. What is ‘quality’ in learning, or the ‘topic’ for learning itself, may indeed be interpreted in several ways. This paper introduces results from a study of the talk between Finnish university students evaluating the processes and contents of an international web-based learning project. The data are from a videoed evaluation meeting after a four-month English course for student teachers that involved international case-work on the web with American students. The web interaction focussed on different aspects of the teacher profession. The research approach is discourse analytic and the specific method used for the purpose is frame-analysis.

POSTER G 79
Advancing understanding of technological fluency through a learning ecologies perspective
Brigid Barron, Stanford University School of Education, USA

This research investigated participation in technological fluency building activities among students in a technology-infused community. Ninety-eight seniors enrolled in AP level calculus participated. Findings indicated substantial variability in history of fluency building experiences despite similar levels of access. More and less experienced groups were defined based on their breadth of experience. Gender differences emerged with respect to participation in certain activities such as computer programming. Inquiry into the sources of learning suggested the need for a multi-context framework for the development of fluency that can reveal individual differences in students’ learning ecologies. Males and females who were more experienced utilized a broader range of learning resources and were more likely to learn from out of school classes and distributed resources such as on-line tutorials and reading material. Analysis of boundary-crossing females indicated the important role of family context in course enrollment. This pattern suggests the need for further research on interdependencies between contexts.

POSTER G 80
Doing it online: An analysis of the activities of online facilitators of learning
Johannes C. Cronjé, University of Pretoria, South Africa

Although much has been written about the qualities of online learning and of online instructors and the functioning and interactions in online learning communities, little is being said of the actual things that learners and instructors do online. Yet it is essential that, since online learners are not physically present in a classroom, they have to render some sort of product in order to indicate their presence. Building on the work of Blignaut and Trollip, this paper presents an analysis of on-line activities in which we have engaged with online learners, both in in-service
educator training and corporate training. We analyse the activities of both the learners and facilitators along a taxonomy of participation in asynchronous learning events. Activities include a virtual debate, carnival, Halloween party, an opera and even a virtual game of *Survivor*. Finally we arrive at some recommendations on retaining learner interest in Web-supported distance education.

POSTER G 81
*Instrumentation of IT tools: The case of computer algebra*
Paul Drijvers, Utrecht University, The Netherlands
Koeno Gravemeijer, Utrecht University, The Netherlands

This paper addresses the dual development of conceptual understanding and technical skills for using technological tools. In a developmental research design, students of ninth- and tenth-grade (age 14–16 years) use a computer algebra tool for the learning of algebra. The findings of the study indicate that conceptual understanding and the performance of machine techniques are intimately related. We found that student conceptions on solving equations and on substitution changed during the work in the computer algebra tool. This is in line with the claims of the theory of instrumentation. According to this theory, students build up instrumentation schemata that include technical and conceptual aspects. The instrumentation perspective proved to be useful for teaching students how to use the technological tool.

POSTER G 82
*Partner trust, teacher change: Writing project integration of web log technology at the national network and local school site levels*
Patrick Delaney, University of California, Berkeley, USA

This poster session documents a two-level, one-year collaboration between three National Writing Project affiliate sites in the use of Web log technology for the staff development and the teaching of writing. On a national network level, the three participating teacher consultants designed and implemented a pilot project providing long term Internet Service Provider (ISP) hosting and Web log application training for technology liaisons at 25 local writing project sites across the US. On a local level, the three participating teacher consultants provided ISP hosting and Web log application training for colleagues at their individual schools, universities and writing projects in San Francisco, Chicago and Huntington, West Virginia. Text and graphic poster materials will present stages of project development and initial conclusions.

POSTER G 83
*Implementing an electronic learning environment in secondary schools*
Jan F. Deinum, University of Groningen, The Netherlands

About 30 schools for secondary education in the Netherlands started in summer 2002 to implement an electronic learning environment (Blackboard) together with the University of Groningen. The university hosts the electronic learning environment for these schools, gives necessary support and trains teachers in using the electronic learning environment. The aim of this study is to describe how the electronic learning environment is implemented in these schools and what kind of problems was met in using the electronic learning environment by the school, teachers and students.
POSTER G 84
Success and failure of learning from the screen: Is screen-design a critical factor?
Isabelle De Ridder, University of Antwerp, Belgium
Luuk van Waes, University of Antwerp, Belgium

This paper reports on empirical research focussing on the impact of electronic glosses and their signalling device on second language learning. The experiment conducted revisits the basic assumption that electronic glosses have a positive influence on text comprehension and vocabulary learning. It also attempts to elucidate whether the way in which software indicates that glosses are present influences the readers’ willingness to consult glosses and the overall learning process. This assumption is based upon previous research which claims that features typically belonging to the interface (such as the use of colour) could play a part in the optimisation of reading from the screen. Two signalling devices were analysed: visible and invisible links (leading to dictionary definitions and translations). We also examined whether different learner profiles benefit from different screen-designs.

POSTER G 85
A scheme for analysis and evaluation of science problem solving in a computerized learning environment: Construction and application
Zvia Fund, Bar-Ilan University, Israel

This paper describes the construction of a ‘computerized science problem solving’ scheme, which enables analysis and evaluation of the effectiveness of science problem-solving by junior high-school students working in a computerized learning environment. The scheme was based on observations of 187 students as they solved qualitative science problems taken from a specific computerized learning environment. Students were also interviewed before and after the problem solving. The scheme is presented on two levels. The large-scale comprises 11 main categories, each sub-divided into sub-categories to yield the detailed-level. The sub-categories were based on a repertoire of activities found in the observation protocols, and were approved by external judgement and a validation process. The detailed-level scheme enables evaluation and statistical analysis of the participants’ problem-solving effectiveness, providing substantial evidence for the construct validity of the scheme, and demonstrating its potential as a valid analyzing and evaluative tool for computerized science problem solving.

POSTER G 86
Improving online learning using a communities of practice model
Mandia Mentis, Massey University, Auckland, New Zealand
Jean Annan, Massey University, Auckland, New Zealand
Ken Ryba, Massey University, Auckland, New Zealand

Flexible and online learning is an enabling technology for the realisation of social constructive approaches of learning in traditional university settings. This paper looks specifically at incorporating a community of practice model within an online teaching programme for Educational Psychology students. A community of practice model is linked to social constructivist theories of learning, where learning is seen to be a social process of acculturation into an established community of practice. Within this process, knowing, belonging and doing are essential elements. These elements are the core dimensions of the online component of the Massey University’s Educational Psychology Training programme. This paper outlines the design of the online programme - describing the tools used to promote the knowing, doing and belonging...
dimensions of the community of practice. Quantitative and qualitative data will be presented on the viability of the online community of practice model, based on an analysis of patterns of use, perceptions and interactions of participants.

POSTER G 87

_Incidence of computer mediation in interaction processes and in problem solving strategies: The case of using a spreadsheet_

Manoli Pifarré, Lleida University, Spain

The present research analyses the incidence of computer mediation in problem solving and in interaction processes among students of Secondary Education. We have designed and implemented a didactical sequence to improve dyadic interaction and problem solving strategies. This didactical sequence is carried out in two different learning contexts: a) using the computer mediation to solve problems and b) not using the computer. An evaluation of the study’s results showed the positive incidence of using spreadsheet mediation in students’ interaction and learning processes. The students that used the spreadsheet to solve the problems show co-operative interaction, present cognitive and metacognitive strategies to solve the problems and obtain better results than those who have not used this computing tool.

POSTER G 88

_What is the potential of learning in an Internet environment during early childhood?_

Ofra Nir-Gal, Achva Academic College of Education, Israel
Talia Nur, Achva Academic College of Education, Israel

The present study was designed to examine how young children utilize the Internet and what is the Internet potential for this age. The study consisted of twenty children – both from compulsory and pre-compulsory kindergarten. Two Internet learning environments were examined: (1) the “universal” environment of the Web; and (2) a “modified” Web environment, which was designed in accordance with the abilities and level of young children. When operating in a “modified” Internet environment the children manifested better control of the uses of Internet interfaces and were better oriented in the Internet environment as compared to their function in the “universal” Internet environment. It was also shown that in order for the environment to be advantageous for the children, the Internet uses must be structured in accordance with the children’s levels and needs, with the emphasis on the use of the Internet as a source of information in parallel with concrete activity and teacher/adult mediation in the children’s Internet activity.

POSTER G 89

_Assessing the instructional power of e-learning applications_

Sigmar-Olaf Tergan, Knowledge Media Research Center, Tübingen, Germany

Traditional checklists for educational software evaluation often focus on technical features and fall short in assessing the quality of learner-system-interaction processes. They are often limited to a particular type of software with a particular teaching strategy and do not adequately reflect situational conditions of learning. There is a need for comprehensive approaches which take into consideration principles of effective learning based on empirical research and instructional and learning theories. The paper presents an innovative comprehensive assessment approach which may be used for both guiding the design of e-learning environments and assessing their instructional power. The approach is based on well established models of instructional design,
particularly Cognitive Apprenticeship, Goal Based Scenarios, Constructivist Learning Environments, Problem-Based Learning, Novel Problem Solving, 4C/ID Model, Elaboration Theory and Knowledge Management. A checklist for evaluating educational software based on the outlined approach will be available online as a computerised tool (http://www.evaluationsnetz.com/eva/).

POSTER G 90
Who benefits from the integration of role-based guidance in a computer-based training
Claudia Winter, University of Mannheim, Germany
Holger Horz, University of Mannheim, Germany
Stefan Fries, University of Mannheim, Germany

Research with computer-based learning environments indicates that learners sometimes fail to gain a deeper understanding of the learning content, because they make no use of additional information found outside the “linear and fastest possible main track”. This study examines, if the level of performance with a computer-based training (CBT) for cost accounting may be optimised by inserting an element of instructional guidance and whether the level of experience in cost accounting has an effect on the learning performance. An experiment with 69 students of economics was conducted. The results display significant differences in students’ learning outcomes as well as in students’ CBT quality ratings. Graduate students rated the CBT higher, were more motivated during the learning-period and performed better on a posttest than undergraduate students. However, no significant differences were found which could be attributed to the different CBT-versions. Further results and implications for the arrangement of computer-based learning settings will be discussed.

POSTER G 91
Searching the web for medical information: Do laypersons guide their search on a metacognitive level?
Marc Stadtler, University of Muenster, Germany
Rainer Bromme, University of Muenster, Germany

The Internet has become a popular resource of medical information for both experts and laypersons. Due to the heterogeneity of these offers of information laypersons have to evaluate the information gathered in terms of relevance and credibility. Inspired by research on monitoring processes in reading print texts (Baker, 1989; Glenberg & Epstein, 1985) we assume that laypersons have to actively monitor the achieved standard of knowledge and determine whether it’s sufficient with regard to the aim of the search process when seaching the web. We present a study in which 40 laypersons search the internet for information on cholesterol. Verbal protocols ascertained through a think-aloud procedure are analysed with regard to monitoring processes, the criteria used and the amount of effort spent on evaluating information. The acquired knowledge about the topic ‘cholesterol’ is measured by knowledge tests in a pretest-posttest-design. Furthermore the results will be associated with self assessments of knowledge.
STUDIES ON THE QUALITY OF SCHOOL (BIQUA): TEACHING AND LEARNING MATHEMATICS AND SCIENCE DEPENDING ON IN-SCHOOL AND OUT-OF-SCHOOL CONTEXTS

Poster fair organised by Manfred Prenzel and Joerg Doll, University of Kiel, Germany
**Discussant**: Philip Adey, King’s College, London, United Kingdom (92-100)

**POSTER G 92**
*Teaching and learning processes in physics instruction - A videotape classroom study*
M. A. Lena Meyer, Inger Marie Dalehefte, Tina Seidel, Manfred Prenzel, Reinders Duit, Manfred Euler, Manfred Lehrke, Christoph Müller, Rolf Rimmel, Maike Tesch and Ari Widodo, University of Kiel, Germany

The study presented investigates the relation between patterns of German physics instruction and student learning. The study focuses on four research areas, which are - on the basis of current findings in instructional research - considered as potential problem areas in physics instruction: 1) Goal-orientation, structure and transparency, 2) scaffolding students learning processes, 3) consideration of students conceptions and handling of mistake situations, 4) role and function of experiments in instruction. Within the presentation results of phase I (video analysis its relation to student learning) are given. Furthermore the conception of phase II is outlined. First findings of differences between school classes of phase II are discussed.

**POSTER G 93**
*Teaching expertise and teaching scripts: Conditions for their modification*
Helmut Fischler, Free University of Berlin, Germany

In many countries the improvement of science education is a widely accepted goal. Often the enhancement of teachers competencies is regarded as an appropriate means to improve science teaching. However, the effects of in-service training courses have proven to be less effective than anticipated. Subsequently, a research project was designed and implemented to systematically identify the conditions for modifying teachers' pedagogical and psychological expertise. The research project concentrates on physics teachers in secondary schools. Elements of the cognitive behavioural modification theory are adopted and used as a basis for the construction of coaching processes. Coaching in this context is regarded as a pedagogical process of advising teachers on how to change their teaching related acting and thinking. The main research methods are: interviews and maps for identifying teachers’ conceptions of teaching and learning, videotaped lessons for identifying teaching scripts, and different treatments for changing teachers’ conceptions of teaching and learning.

**POSTER G 94**
*Teaching with worked-out examples: Reducing the gap between theory and practice*
Alexander Renkl, University of Freiburg, Germany
Silke Schworm, University of Freiburg, Germany

Learning from worked-out examples (problem - solutions steps - solution) is of major importance for initial skill acquisition in well-structured domains. In our project teacher students learn within a computer-based learning environment how to design worked-out examples. Before the learning environment is further developed, it is reasonable to examine the application of the teaching method “learning by worked-out examples” in current classroom instruction. Therefore half-
standardised interviews with teachers have been performed and textbooks have been analysed. Additionally video-taped instruction units in mathematics and physics have been analysed to find out how worked-out examples are actually used in classrooms. Results show that the employed examples are not designed effectively according to our design. To foster students’ understanding, their self-explanation activity has to be promoted, but neither teachers nor schoolbooks show any approach to do so. The results underline the necessity of training teacher students how to effectively implement worked-out examples in their instruction.

POSTER G 95
Nature of science understanding in german elementary school teachers and its advancement through teacher training
Ernst Kircher, University of Würzburg, Germany
Patricia Grygier, University of Würzburg, Germany
Johannes Günther, University of Würzburg, Germany
Claudia Thoermer, University of Munich, Germany
Beate Sodian, University of Munich, Germany

A metaconceptual understanding of the nature of scientific knowledge is an important domain-general prerequisite for science learning. To date, little research has addressed elementary school science teachers’ epistemologies of science in Germany. We report the results of an interview study of two groups of German elementary school teachers differing in professional experience. Results indicate a “knowledge unproblematic” view of the nature of science in most teachers (with a high degree of interindividual variation). Secondly, we report the results of an intervention study designed to promote teachers’ understanding of theory building and revision in science through their active participation in science curriculum development.

POSTER G 96
Enhancing self-directed learning in science-classes: The effects of teacher training
Thomas Puhl, Saarland University, Saarbruecken, Germany
Anja Baer, University of Kiel, Germany
Ilka Parchmann, University of Kiel, Germany
Cornelia Gräsel, Saarland University, Saarbruecken, Germany

The study investigates whether training of experienced science teachers has effects on their change of instructional patterns - especially on the enhancement of self-directed learning in their classes. In a field experiment, two forms of teacher training were compared with a control group. In both forms of training, teachers participated in two workshops (intervening period: three months). A self-directed and inquiry-oriented approach of teaching chemistry (Chemistry in Context) was presented and discussed in both forms of trainings. The content of the trainings - and the classroom instruction - was chemical equilibrium in the 11th grade. Half of the teachers (cooperation group) were additionally stimulated to discuss the materials and reflect their experiences in the intervening period. The results of the study contribute to the role of professional discourse on changing teaching and learning. Additionally, the results are relevant for the design of effective science teacher trainings.
POSTER G 97

Training program to improve self-regulative competence and problem solving behaviour
Susanne Bruder, Technical University Darmstadt, Germany
Franziska Perels, Technical University Darmstadt, Germany
Bernhard Schmitz, Technical University Darmstadt, Germany

The aim of the project is the development, implementation and evaluation of training programs to impart heuristics of problem solving for mathematics combined with self-regulation strategies. In this project three types of trainings are tested, two of them vary different combinations of self-regulation and problem-solving and another one centers on problem solving. To achieve a higher homogeneity of the training groups, the pupils are divided into two groups based on their problem solving competences. The study is based on a 4 (training groups) x 2 design (problem solving competence). The analysis of the problem solving test shows that a combination of problem solving strategies and domain unspecific self-regulative strategies leads to better results than solely teaching problem-solving strategies (problem solving training). The analysis of the self-regulation questionnaire shows better results for the combined training based on the processual model of self-regulation (Schmitz, 2001) than the other training types.

POSTER G 98

Palma - project for the analysis of achievement development in mathematics - First results from a longitudinal research program
M. A. Anne Zirngibl, University of Munich, Germany
Reinhard Pekrun, University of Munich, Germany
Rudolf vom Hofe, University of Regensburg, Germany
Thomas Götz, University of Munich, Germany
Michael Kleine, University of Regensburg, Germany

The goal of our longitudinal research program is to analyse causes for differences in mathematics achievement in 10- to 15-year-olds. Presently, cross-sectional data from a pilot study (N=1643) are illustrated. To assess mathematics achievement, a grade-adaptive instrument was developed aiming at measuring the students’ mental models of key mathematical constructs. As potential causes for differential mathematics achievement, theoretically relevant student characteristics including intelligence, self-referenced cognitions, affective-motivational variables and self-regulated learning are assessed via questionnaire. Most constructs are conceptualised with reference to the domain of mathematics. Particular interest is placed on the effect of emotions which are theorized to be important predictors of achievement. Analysis of the mathematics achievement test suggest that the instrument is valid and covers a broad range of difficulty. Structural linear modelling confirmed that the relationship between emotions and achievement is mediated by aspects of students’ self-regulated learning.

POSTER G 99

Adolescents’ perceptions of high-achieving peers in gender-stereotyped school subjects
Ursula Kessels, Free University of Berlin, Germany
Bettina Hannover, Free University of Berlin, Germany

In the school environment, adolescents do not only acquire subject related knowledge. They also get to know their personal status within the peer group of the classroom. We suggest that subject choices at school are used strategically in order to optimise one’s social position in class. Our study examined a) the relationship between the gender-stereotyped perceptions of prototypic peers
excelling in different school subjects and the personal liking for these subjects; and b) whether the popularity of adolescents depends on their gender-role congruent achievement at school. Results showed that the perceived similarity on gender related traits of prototypic peers excelling in different school subject and the students' self-image is a strong predictor of students' academic preferences; and that especially girls excelling in a masculine stereotyped school subject risk to be perceived as being high on masculine and low on feminine traits, and as being unpopular.

POSTER G 100
School culture, segregation of the sexes and socialization of girls - girls’ schools in Augsburg
Leonie Herwartz-Emden, University of Augsburg, Germany
Andrea Reiter, University of Augsburg, Germany
Verena Schurt, University of Augsburg, Germany

The study is intended, from a contemporary point of view, to depict the way that girls’ schools function and the quality of the educational objectives which are followed there, after thirty years of co-education in Germany. Broadly speaking, the purpose of the research can be expressed with the question of what a girls’ school does and what quality features constitute a ‘good’ girls’ school. The investigation is being carried out in two lines of research, each with specific qualitative methods. The central focus is on observations of science lessons in girls’ schools. In addition to this, the effects of the specific socialization at school on the development of interests of female pupils in connection with orientations and processes during the course of female adolescence are to be elucidated. How do girls attending girls’ schools develop?
Tools for learning
Rosamund Sutherland, University of Bristol, United Kingdom,
Steve Godwin, Federica Olivero, Richard Brawn, Linda Baggott LaVelle, Angela McFarlane, Tim Shortis, Alison Taylor, Pat Triggs, Sasha Matthewman, Peter John, Neil Todman, Marina Gall, Nick Breeze, Celia Tidmars, University of Bristol, United Kingdom

This presentation derives from the research project InterActive Education: Teaching and Learning in the Information Age (www.interactiveeducation.ac.uk), whose overall aim is to investigate the ways in which new technologies can be used in educational settings to enhance learning. To this end the project centres around the development and evaluation of subject design initiatives within the areas of English, geography, history, mathematics, modern foreign languages, music and science. These focus on key learning areas and incorporate the use of ICT as appropriate. The work is organised around subject design teams involving partnerships between teachers, teacher educators and researchers. Design initiatives are informed in an iterative way by theory, research-based evidence, teacher’s craft knowledge and the research team’s expertise. Within this context the research methods of the project are multi-layered operating at a macro, meso and micro level within schools. In particular a design experiment methodology is being used to investigate both the processes and the outcomes of learning. Digital video is being used as a tool to capture, analyse and communicate the interrelationships between teaching and learning. Given this background the overall aim of this symposium is to focus on the ways in which ICT is being used as a tool for learning within different subject areas, drawing out similarities and differences. The theoretical orientation of the project is broadly socio-cultural. From this perspective ICT can be understood as a technological tool in which the culture and context of use shape the potentials and possibilities of the tool.

Power in relations of education
Eevastiina Parikka, University of Helsinki, Finland

Power is a fundamental question when talking about moral justification and legitimization in education. Here the aim is to form a theoretical framework for the power research with help of interdisciplinary power research. This framework will be applied to practical contexts. One famous framework in power research is four dimensions of power. Power can be over conflict, covert conflict or a latent conflict. Power is also possible to see through local struggles where all are prisoners of the prevailing discourses of power. These dimensions are supplementary in talking about power in education and they were also founded in empirical research. When is power being used in positive, acceptable, empowering and ethical ways? Important factors are actor’s altruistic or egoistic intentions, legitimization of the action by wider environment and multiple outside effects. Socio-emotional, moral, intellectual and communal development limit what is possible, acceptable or legitimate in power.
From bureaucratic conception to systemic community approach: Proposals for a new organizational structuring of Jewish schools in Brussels, Paris and Geneva
Zehavit Gross, Bar-Ilan University, Ramat-Gan, Israel

School organization and contact with surrounding communities constitute the principal focus in analysis of schools as institutions with traditional or innovative/modern features. The description of these systems are not technical-procedural but are reciprocally linked with the local culture and its ethical codes, as well as the educational philosophy on which the relevant schools are based. The proposed study examined ten school principles in Paris, Brussels and Geneva inquiring about their school organization and its effect on their school style, structure and operation. The results indicated that Jewish schools in Francophone countries display a linear organizational structure, enabling school development along the narrow vertical axis but not the broad horizontal one. Consequently, schools have only limited options for exerting influence and instead focus on bureaucratic and instrumental (scholastic) aspects alone (Sarason, 1997). This situation adversely affects school attractiveness and ability to serve as a significant and central agent of Jewish socialization in shaping students’ Jewish identity.

A study of asynchronous discussion groups in distance learning courses at the open university of Israel
Avner Caspi, Open University of Israel, Israel
Eran Chajut, Open University of Israel, Israel
Paul Gorsky, Open University of Israel, Israel

At the Open University of Israel asynchronous discussion groups are part of a web-based educational environment aimed to support and to facilitate students' inquiry into the course subject matter. We sampled 50 courses that provided asynchronous discussion groups in order to study the extent of student participation and to analyze the content of the communications. We noted four significant findings: (1) Relatively few students participated in the discussion groups. (2) Most of the interactions were between one student and the course instructor. (3) Most messages referred to instructional tasks such as what topics to learn and when to learn them. (4) Very few messages included a critical analysis of subject matter or a discussion the meaning and/or implications of the topics being learned. Participation in these discussion groups is not mandatory and this fact may account for the limited use of this resource.

Predictors of adaptive help-seeking behaviours among Malaysian adolescents
Rosna Awang-Hashim, Northern University of Malaysia
Jahara Hashim, Northern University of Malaysia

The study examined the relationship between implicit belief about intelligence, academic goals orientations, perception of social and cognitive competence, classroom goal orientations, threat to self-worth, and adaptive help seeking behaviour in learning Mathematics. Surveys were administered to 1849 secondary school students (1449 malays and 400 non-malays; 900 males and 949 females), aged between 14 and 16 years old. Correlation analyses indicated that help seeking is
positively related to all variables except for three: peer threat, teacher threat, and a fixed belief about the nature of intelligence. A stepwise regression analysis indicated that students who learned for mastery and who perceived their classroom as reinforcing mastery learning, and who adopted a performance approach goals would be more likely to seek help when needed. Discussion will center on these cognitive motivational factors that have implications for teaching and learning of mathematics at secondary school level.

Designing post-modern preprimary learning materials for the implementation of individually configured education
Cheung Kwok-cheung, University of Macau, China

Curriculum design at the pre-primary level advanced a lot during the past decades. Main characteristics were: (1) use children’s everyday experiences to design learning activities, (2) integrate teaching contents into thematic units, (3) practice child-centered, activity-based teaching to develop quality all-round education. Many textbooks are written with these concepts in mind. At the turn of the new century, curriculum development is increasingly influenced by proposals of life-long education. In this post-modern era, curriculum designers re-conceptualized the main aims of education as: (1) ascertain that every individual’s inner potential to have good chances to grow and glow; (2) empower children to grasp firmly their fate for positive living. They research into using Gardner’s Theory of Multiple Intelligences to design learning materials to realize the ideal of Individually Configured Education. This paper seeks to summarize the main characteristics of this post-modern approach of curriculum design by examining one set of pre-primary textbooks and learning materials recently published in Hong Kong.

Matches and mismatches: Academics and students’ orientations to PhD supervision
Noela Murphy, Nanyang Technological University, Singapore

Supervisors and their PhD candidates in an engineering faculty were interviewed individually about their beliefs about supervision, research, teaching and learning. Interview scripts were analysed relationally using the constant comparative method. Four global orientations to supervision were identified. Individuals’ placement in the global orientations were analysed using the two major defining characteristics of the orientations to seek differences, if any, between supervisors and candidates. Overall more candidates hold pedagogic than andragogic beliefs and more supervisors hold andragogic, rather than pedagogic beliefs. Second, candidates tend to hold accumulative beliefs while academics tend to hold beliefs that are more developmental in nature. When the supervisor-candidate dyads were considered, supervisors and candidates were found to have different orientations to supervision in over half the number of pairs. Excerpts from the interviews show how much more rewarding the doctoral experience is perceived by both when supervisor and candidate hold similar orientations.

“Opening doors “: When a teacher education program meets organizational learning
Bobbie Turniansky, Kaye College of Education, Beer Sheva, Israel
Dina Friling, Kaye College of Education, Beer Sheva, Israel
In this presentation a case study of a program team will be used to illustrate how an educational institution can begin to develop into a learning organization. The team is involved in the development and running of a program designed to train holders of BA degrees to become teachers. Using meeting protocols and reflective processes, the culture the team is developing and the difficulties they have encountered on their journey will be examined in light of an organizational learning framework. Suggestions relating to improving the learning process will also be offered where necessary. It is hoped that in this way we can help develop teacher training programs in which the organization not only expects the students to learn, but expects itself to learn as well.

Round Table G 9 Room PSY 3 I

Interaction of social practice and individual learners in the communities constructing professional identities
Anneli Eteläpelto, University of Helsinki, Finland

In discussion about the relationships and interactions between social practice and individual learners, twin hazards of individual constructivism and/or social determinism has been criticized. However, the complexity of relations between individuals and social practice is generally acknowledged. Beyond acknowledging that individuals develop identities in which they relate to prevailing standards in a complex variety of ways, researchers agree that no satisfactory analysis of the relationships between social practices and individual learner is provided. This paper critically elaborates the mainstream paradigms addressing the question of interactions between social practice and individual learner, especially in the construction of professional identities. Limitations of the notions developed in connection of classroom learning are discussed and evaluated in realation to the notion of community metaphor suggested by Wenger.

Round Table G 10 Room PSY 3 G

Formative assessment within an electronic learning system: Efficiency and sufficiency
Uriël Schuurs, ITP De AanZet, The Netherlands

One of the most neglected advantages of these electronic learning tools is that the learning activities and assessing can be fully intertwined. This will be demonstrated by discussing an electronic learning system that is developed for the benefit of second language learners in the vocational training. Within this system an adaptive algorithm is used in order to designate the level at which the individual student can do exercises best. This indication of the exercise levels is based upon the number of times feedback has to be provided in order to find the right answers. It is argued that simultaneous formative assessment makes it possible to design efficient training procedures. However, attained proficiency levels should be demonstrated on the basis of independent summative assessment procedures.
“It always happens to me” or “that’s typical micros…” – Learners’ reactions; if computer errors occur
Holger Horz, University of Mannheim, Germany

Only some research focused on errors in Human-Computer-Interaction. In our work the influence of errors in computer-based learning situations on psychological variables (learning outcome, self-efficiency, self-concept, causal computer-related attributions - cognitions and emotions) is captured in a situation model. On the basis of the results of Dickhaeuser (2001) and Rozell and Gardner (2000), it was hypothesized that inexperienced computer users show more negative reactions (than experienced) in a computer based learning scenario, if errors occur, especially, if a tutor monitors it. An experiment with 96 participants was conducted. During the learning period the computer produced two errors. In condition A the tutor apologized for the errors, in condition B he did not give a hint for the reason of the error and in condition C he remarks implicitly, that the learner caused the errors. As expected, especially in condition C, computer-inexperienced learners showed more negative reactions on most variables.

Lessons learned from working on European projects
Margaret Brady, Anglia Polytechnic University, United Kingdom

This paper presents a case study of a multi-site-European research project, which aimed to support an innovation in pedagogical practice and also to promote pan-Europeanism. The case is chosen as an illustration of what can happen to laudable aims between the time of their theoretical beginnings when they seed a research proposal and their time of expected successful integration into practice. The present study seeks to draw lessons from the case so as to improve practice in the area of managing cross-cultural projects. It also has a professional development aim. By exploring aspects of the author’s professional practice it is intended to help her develop her role as a researcher participating in the process of implementing educational innovation.

Changing teachers’ beliefs of learning and philosophy of subject matter through discourse communities
Anja Fey, Saarland University, Saarbruecken, Germany
Thessa Ebel, Institute for Science Education, Kiel, Germany
Ilka Parchmann, Institute for Science Education, Kiel, Germany
Cornelia Gräsel, Saarland University, Saarbruecken, Germany

The present study examines whether the participation in discourse communities has an effect on the change of experienced teachers’ beliefs of learning and the philosophy of subject matter. Based on the theory of situated learning, it is assumed that discourse communities play a central role in shaping the way teachers view their work and reflect on it. 89 teachers of chemistry participated in a professional development program for one school year. Core of the programme was the participation in small groups (8-10), supported by a facilitator. These groups developed a context-oriented approach of teaching chemistry (Chemistry in Context). To analyse the change in the teachers’ beliefs of learning and philosophy of subject matter, they were given a questionnaire
each at the beginning and the end of the school year. The results of the study give hints for building effective forms of supporting experienced teachers in changing their teaching.

Round Table G 14 Room BIO G C

*What importance is attached to thinking skills in the post-16 sector?*
David Moseley, Newcastle University, United Kingdom
Julian Elliott, Sunderland University, United Kingdom

Having compiled a representative if not comprehensive list of thinking skills from conceptual frameworks and taxonomies developed over the last fifty years, we carried out two exploratory studies. In the first study we classified knowledge objectives contained in the national Key Skills requirements using the process categories in Anderson and Krathwohl’s Taxonomy for Learning, Teaching and Assessing. We found minimal emphasis on recall, moderate emphasis on understanding and evaluation, and high emphasis (except at Level 4) on application. The ‘create’ category was little used at lower levels, but more often at Level 4. In the second study we asked community college teachers to judge the importance of 69 thinking skill in the courses they taught, as well as their general appeal to learners. Across a wide range of courses we found that ‘value-informed metacognition’ was seen as very important while the uses of imagination were seen as unimportant.

Round Table G 15 Room BIO 1 C

*Teacher competence for multicultural classrooms*
Theo Wubbels, Perry Den Brok, Jan van Tartwijk, Ietje Veldman and Yvonne De Jong, Utrecht University, The Netherlands

In the Netherlands, as in many European countries, classrooms become more and more cultural diverse. Teacher education institutes do not have sufficient empirically supported data on the competencies teachers need in these classroom to build their programs on. This paper reports on an in-depth case study of one expert teacher in a multicultural classroom. We use this study to answer the question to what degree this teacher displays competencies (teaching behaviours, knowledge and attitudes) specific for teaching in multicultural classrooms by comparing this teacher’s competence with the literature on generic teaching competencies. The first results indicate that many of this teacher’s competencies in teaching a multicultural class can be considered aspects of generic teaching competencies. It seems that the multicultural classroom puts heavier demands on these competencies than a less diverse classroom. This teacher seems to be aware of special needs of students from different cultures and to use this knowledge to apply specific teaching strategies and interpersonal cues to create a positive classroom atmosphere and to cater for needs of these students.

Round Table G 16 Room BIO 1 D

*How does the degree of freedom in interactive simulations attach the learning success?*
Timo Ehmke, University of Kiel, Germany
Thilo Wünscher, University of Kiel, Germany

This study focuses on learning with interactive simulations using different levels of interactivity. The main objective is to identify which role the degree of freedom in simulations plays in learning
success. For the examination two versions of a computer-based learning environment about the theorem of leverage were compared (simulations with a high vs. a low degree of freedom). In the study 114 students participated from three German schools. The treatment consisted of working with the specific learning environment. The post-test results showed a significantly better performance of the simulation group with a high degree of freedom. This result shows that decreasing the degree of freedom in simulations can increase the cognitive load. The learning material becomes less interconnected and is a detriment to construct an adequate schema of the complex learning task. In the qualitative post-hoc analysis of video recordings, several interaction strategies could be identified which supports successful learning.

Round Table   G 17   Room   BIO 1 F

The science teacher as an epistemological resource in students learning processes
Eva Lundqvist, Uppsala University, Sweden
Malena Persson, Uppsala University, Sweden
Leif Östman, Uppsala University, Sweden

The aim of this paper is to shed light on the importance of the epistemological dimension for students learning of science and the way teachers, by delivering epistemological aid in their interaction with students, affect students meaning making process. Our studies are specifically oriented towards the meaning making processes. In the learning process students have to make decisions regarding for example which interaction with the environment are appropriate, when solutions are satisfactory and which questions are relevant. These decisions can be perceived as epistemological judgement, i.e. they concern questions about what is true, correct, appropriate and relevant. By analysing which decisions the students take in the meaning making process one can describe the epistemology that students practice. The methodological approach we use is an elaboration of Dewey’s transactional perspective on meaning making. The empirical material consists of recordings made in science classes in two Swedish compulsory schools during three years.

Round Table   G 18   Room   BIO G A

Conceptualizing epistemological beliefs by tracking their development
Cornel De Brabander, Leiden University, The Netherlands
Jeroen S. Rozendaal, Leiden University, The Netherlands
Tove Dahl, University of Tromsø, Sweden

Recently it was established that phenomena that are studied in the context of theory of mind can be understood as the first steps in the development of personal epistemology. The conceptual basis of personal epistemology still is rather sketchy. Starting from the better understood theory of mind phenomena, tracking its developmental course might proof helpful to further our theoretical understanding of the concept of epistemological beliefs. Input for this round table is a cross-sectional study of the emergence of an interpretive theory of mind in comparison to an expansion of its measurement approach into the realm of epistemological beliefs. The results of this study question the outcomes of earlier research. Questions that are central to this round table, are for instance: What does it mean to understand the interpretive nature of knowledge? How are epistemological beliefs conceptually different from an interpretive theory of mind?
The personal and social effects of peer-tutoring on child tutors
Paul Naylor, University of Nottingham, United Kingdom
Julia Findlay, University of Surrey Roehampton, United Kingdom

The aim of the study was to investigate the psychological effects of peer-tutoring and gender on child tutors. Opportunity samples of child peer tutors and non-peer tutors were post-tested using Likert-type questionnaires to measure locus of control, social interaction and self-esteem. All of the children were 10-years-old and were in four Scottish primary schools matched for their socio-economic status. Two of these schools used a peer-tutoring programme whilst the other two did not. Contrary to the findings based largely on teacher reports of other published studies, no significant differences between the peer-tutoring and non-peer-tutoring children were found for any of the dependent variables investigated. However, a significant positive correlation was found between self-esteem and social interaction. This study has found no evidence that peer-tutoring enhances child tutor’s internal locus of control, self-esteem or social interactions. It is argued, however, that peer-supporting may encourage greater internal locus of control and positive self-esteem in child tutors in non-academic contexts.

Scope and limitation of teacher teamwork and joint planning in education reform
Franziska Vogt, Pädagogische Hochschule St. Gallen, Switzerland

Teachers’ teamwork is seen as crucial within school improvement strategies and in recent educational reforms. The paper explores the scope of teamwork in enabling school development, reflection on teaching practice and the role of a supportive organisational culture. The limitations inherent in teacher teamwork are also drawn out. It is argued, that coercive policies within recent new managerial reform, although initiating more teacher teamwork, could also lead to teacher deprofessionalisation. Where teaching is reduced to a standardised process, where teachers teach from someone else’s sheet conforming to policy, the professional competence needed for school improvement remains undeveloped. The paper draws on ethnographic research on the enactment of new managerial policies in primary schools in England and Switzerland, with a particular focus on teachers’ teamwork. Differences between recent reforms in both countries are examined in relation to their understanding of teacher teamwork.

Different types of teachers and new media in schools
Martin Senkbeil, University of Kiel, Germany
Timo Ehmke, University of Kiel, Germany

This contribution focus on which variables are relevant for the implementation of new media in schools. In an empirical investigation 184 teachers in Germany completed a questionnaire about the use of new media in their lessons, e.g. “control beliefs” or “fun and interest in new media”. The test instrument also contains scales about common engagement, cooperation, stress, further training, beliefs regarding the use of computers, and role understanding. With the help of probabilistic test models (Latent Class Analysis) five classes could be identified. These classes could be interpreted as five types of teachers. Each class has a specific profile regarding the scales
of the questionnaire and how this group of teachers uses new media in schools. On the base of such a typological classification and knowledge about the specific class sizes, specific recommendations can be given for each type to enhance the use of new media in schools.

CIT Presentations 28th Aug 11:00 – 11:40

G 22 Room PSY 2 A

MILE-Flanders: A video-based learning environment as a powerful tool for learner-oriented construction of expertise by pre-service primary school teachers
Raf Canters, Peter Op ’t Eynde, Lieven Verschaffel, Jan Elen and Steven Janssens, University of Leuven, Belgium

This contribution adds to the discussion of the possibilities, limitations, and challenges of modern video technology as a tool for teacher education, which has recently gained popularity and interest for its potential for professional development. We describe the ongoing research, development and implementation project MILE-Flanders. Central in this project is MILE, a video-based software environment developed by the Freudenthal Institute (the Netherlands) containing authentic primary mathematics lessons and additional materials that can be used by student-teachers to develop a better understanding of (mathematics) teaching and classroom practice. Based upon a number of recently conducted case studies, we elaborate on how the MILE software and the developed ‘courseware’ can jointly constitute the building blocks for a powerful learning environment. More specifically, we focus on how MILE can be conceived as a tool for guided independent learning by these student-teachers.

G 23 Room PSY 4 S

A metacognitive support during the process of problem solving in a computerized environment
Esther Kapa, Talpiot College, Israel

A new computerized environment enabling a variety of metacognitive supports in different phases of the problem-solving process was designed to influence students’ metacognition during word problem-solving and its effect has been examined in the present research. 441 students (aged 13-14) from eighth-grade integrative classes participated in this study. The pupils were randomly assigned to one of four computerized learning environments, each having a different kind of metacognitive support according to the phase of the problem-solving process: 1) during the solution process and after the completion of the problem-solving process, 2) during the problem-solving process, 3) at the end of the solution process and 4) no metacognitive support. Results indicated that learning environments which provide metacognitive support during the solution process in each of its phases was significantly more effective than learning environments which provide metacognitive support only at the end of the process. Moreover, students with low previous knowledge were more significantly influenced by metacognitive supports than students with high previous knowledge.

G 24 Room PSY 4 R

Who is the fastest runner in the world? Kinematics and sports
Yaron Lehavi, Hebrew University, Jerusalem, Israel
Yaron Schur, International Center for the Enhancement of Learning Potential, Jerusalem, Israel
The experimental “Seeing Motion” program shows an interesting way to teach kinematics. The program as a whole and most of its mediated interactions are based on the idea of “dynamic learning”. The kinematics principles are developed in a way that enables students to observe motion in various everyday contexts. The learning process emphasizes the idea of “reality observation – concept formation” (ROCF) space. The program contains pictures and films of sporting events, a computerized program for analyzing motion in video films and an experimental device that enables the simulation of races. The teacher can use the various materials in a way that can give her the opportunity to show different aspects of kinematics in a variety of contexts.

**Special Session**  
28th Aug 11:00 – 12:20

G 25  Room  BIO G Aula Magna

**Meeting of some Journal Editors with the audience**
Organiser: Filip Dochy, University of Leuven, Belgium and University of Maastricht, The Netherlands

Introduction: Patricia A. Alexander, “Instructional Science”  
Wolfgang Schnotz, “Learning & Instruction”

Panelists:
Gavriel Salomon, “Educational Psychologist”
David Nevo, “Studies in Educational Evaluation”
Greta Morine-Dershimer, “Teaching and Teacher Education”
Dai Hounsell, “Higher Education”
Felice Carugati, “European Journal for Psychology of Education”
Sergio Salvatore and Beatrice Ligorio, “European Journal for School Psychology”
Julie Dockrell, “British Journal of Educational Psychology”
Donna Alvermann, “Reading Research Quarterly”
Geoffrey Underwood, “Computers in Education”

This panel discussion gives EARLI members the opportunity to discuss with some journal editors about publishing and review procedures. Three editors will first give a short introduction about some data such as number of submissions, rejection rates, the review process, and about Do’s and Don’ts. The goal is to make clear ‘what is going on behind’, to make clear what the criteria are, that there is no mystery why some papers were rejected whereas others were accepted, and that it “is” possible to meet the criteria. After that, the audience will get opportunities to ask questions and to discuss with the editors.
**Emergent versus commonsense causal processes: how misconceptions in science arise and how they can be overcome**

**Michelene T.H. Chi**, LRDC, University of Pittsburgh, USA

Numerous science and everyday concepts that middle and high school students encounter in their curriculum (such as electricity, heat flow, natural selection) are particularly troublesome for them to learn with deep understanding. Their pre- or alternative conceptions are naive, intuitive, and scientifically incorrect. Having these alternative conceptions seems to make it much more difficult for students to learn the scientifically correct ones. This paper provides a theoretical analysis that explains this difficulty in learning. The analysis essentially suggests that students misrepresent these concepts as a Commonsense kind of causal processes, rather than an emergent kind. Several features of Commonsense and Emergent causal explanatory mechanisms are identified, and these features constitute a preliminary specification of the ontologies underlying Emergent and Commonsense causal processes. Emergent processes are often misunderstood because students attribute a Commonsense rather than an Emergent causal explanatory mechanism to the relationship between the behavior at the component level, and the behavior at the pattern level. Reasons for why students commit such misattribution will be discussed. The implication of this theory is that teaching students how to recognize an emergent explanatory mechanism underlying Emergent processes will help them differentiate Emergent from Commonsense processes. By doing so, students may improve their understanding of a variety of Emergent processes, including concepts in electricity, heat and temperature, and evolution.

**Motivation in technology-based learning context**

**Sanna Jarvela**, University of Oulu, Finland

Over the last few years, information and communication technology has opened up new avenues for designing learning and instruction. Technology-based environments provide arenas for social, interactive, shared and collaborative activity as well as new tools for individual learning. At the same time, these new and more open environments are characteristic of modern society, i.e. they are complex, dynamic, less-structured with mixed-motive situations and complicated arrays of stimuli and multiple competing or even contradictory adaptive demands. Technology not only challenges the learner to restructure the learning process but it also provides new opportunities for investigating students’ goals, motivational meanings, emotions and processes related to learning. Motivation to learn is increasingly conceptualised as dynamic and contextually situated. This recognition has led researchers to investigate motivation in authentic learning contexts, over time, and across different learning environments. It has also led to a greater emphasis on qualitative and mixed methods of investigation, and the use of multiple data sources. Together with a group of Finnish colleagues, we have been developing a process-oriented “on-line” methodology to undertake research on student motivation in technology-based learning environments. In this presentation, I will introduce the methods used for our investigations as well as review the results of our studies. The empirical findings illustrate how new collaborative practices, with and without technology, challenge student’s motivation. Students’ goals and engagement are located in the
dynamic activities of social systems or communities of learners. In such environments, individuals mutually influence each other and construct motivational meanings that reflect individuals’ motivational beliefs, prior experience and subjective interpretations of the situation.

Room BASSI 3 F

Information search and learning
Jean-Francois Rouet, CNRS and University of Poitiers, France

In this talk, I will discuss the role and processes of information search in the context of learning activities. Information search may be defined as what students do when they need a piece of information in order to answer a question, solve a problem or write an essay. With the advent of computerized information systems (e.g., the Web) information search is becoming a widespread means to acquire knowledge. This type of learning situation raises many new issues for psychologists and instructional scientists. First is the issue of the cognitive prerequisites needed to be an efficient searcher. Both young and older students experience difficulties when they search printed or electronic documents, even though they may be good readers. Information search appears to be a skill distinct from reading and text comprehension. Next is the type of relationship that may exist between information search, comprehension, and learning from texts and multimedia documents. Some, but not all search activities may promote deep comprehension and knowledge acquisition. Finally, I will raise the issue of whether how information search skills should be trained and practiced in school settings. I will argue that in a world filled with complex information systems, helping students become skilled information searchers is a core objective for education.
We assume that Flow experience fosters learning via (at least) two paths – a motivational and a functional one. Flow during learning makes this activity more joyful and thus increases the frequency of this learning activity (motivational path). Moreover, flow during learning causes deeper task involvement and therefore learners are more focused on the learning material (functional path). In this symposium we present new results on Flow experience that are applicable to learning situations. Engeser’s data show that students’ Flow experience during learning for statistics is an important and significant predictor for the final exam, even if the variance of all other relevant predictors (e.g., ability, age) is controlled. Bassi and Delle Fave’s data indicate that students have optimal experience (flow) primarily in leisure activities but only rarely while studying. Guidelines are proposed how to develop educational strategies to increase optimal experience during learning. Rheinberg and Manig studied the incentives of students’ Graffiti-spraying and found very high flow-scores for this kind of writing letters on walls. Is Flow always a positive experience? Aellig’s ESM-data show that under extreme conditions of rock climbing Flow and negative arousal can be felt at the same time. Worry does not necessarily stop flow. This conclusion could be an important finding for learning situations, too. Vollmeyer and Rheinberg developed a technique to manipulate Flow under experimentally controlled conditions. This technique creates the possibility to investigate Flow experience in a more reliable way – keeping all situational variables and the activity itself constant.

*Learning elementary statistics – Does flow help?*

Stefan Engeser, University of Potsdam, Germany

Being in Flow during learning is regarded as a positive state which can facilitate further learning activities and knowledge acquisition. In two studies at the University of Potsdam and the Technical University of Berlin (N=252) we measured students learning activities and emotional state while preparing their final examination in elementary statistics. During this preparation we also measured the current learning motivation and Flow while the students were working at a given statistical task. We expected that distant motivational and cognitive variables, such as math grades, the achievement motive and the commitment for learning statistics affect Flow. Further, current motivation has an impact on Flow which finally influences current learning motivation and, most important, the final grades in elementary statistics. The results show, that about 20 % of the variance in Flow could be predicted by the distant variables. More impressive, the current learning motivation (probability of success, challenge, interest, anxiety) could explain more than 50 % of the experienced Flow during learning. Flow was further related to better grades at the final examination (r=.28). The implication of these findings, that is that flow fosters learning processes, will be discussed.
This research focused on the role and educational implications of optimal experience in studying. Optimal experience is characterized by involvement, concentration, enjoyment, intrinsic motivation, and high environmental challenges balanced with high personal skills. Individuals preferentially select activities associated with optimal experience as part of their life themes, namely the sets of goals and interests that uniquely define their lives. Ninety-six high-school students (61 girls, 35 boys), aged between 16 and 20, were administered Flow Questionnaire (FQ) and Life Theme Questionnaire (LT). FQ investigated the activities associated with optimal experience, their experiential profile, as well as the experience associated with daily tasks such as studying. LT investigated, among other things, participants’ current challenges, and the influence exerted by school on their lives. Optimal experience was primarily associated with leisure activities, and only rarely with studying. However, the experience associated with studying was described as engaging, characterized by high involvement, clear goals and ideas, high challenges and skills. In addition, participants reported studying as their most frequent current challenge, and emphasized the positive impact of school on their personal development and attitude towards studying. Because studying is a pervasive activity in adolescents’ everyday life, these data shed light on the meaning and personal reward attached to it. They can also provide guidelines for devising effective educational strategies focused on students’ commitment as well as personal enjoyment and intrinsic motivation.

Towards an affect based definition of flow. A study with the Experience Sampling Method (ESM) using the example of rock climbing
Steff Aellig, University of Zurich, Switzerland

Learning whilst in the state of flow is assumed to be more effective and pleasant. But what exactly is flow, and how can it be measured? The study addresses open questions regarding Csikszentmihalyi’s (1975) flow theory by investigating a paradigmatic flow activity like rock climbing. Using the Experience Sampling Method (ESM), Sport climbers (21 men, 14 women) completed a questionnaire (flow state scale and PANAVA, based on the circumplex model of affect) while rock climbing (two days) and during their normal working day routine (four days). Cluster analyzing the ESM data collected during climbing leads to an affect based definition of flow. Thus, flow moments can be detected in any ESM time sample without the sole use of the traditional operationalisation through the challenge-skill-balance. The study of Flow and its conditions in learning situations can now be based directly on the quality of experience and affect.

Task difficulty and flow
Regina Vollmeyer, University of Potsdam, Germany
Falko Rheinberg, University of Potsdam, Germany

Csikszentmihalyi (1975) defined flow as a positive state in which the following characteristics occur: (1) a challenge-skill balance, (2) merging of action and awareness, (3) unambiguous feedback, (4) concentration on the task at hand, (5) time transformation and (6) fluency of action. Although Csikszentmihalyi postulated several characteristics of flow, in many studies researchers only measured the challenge-skill balance. In addition, it is often not clear whether the challenge-skill balance is a predictor for flow or whether it is a flow characteristic. Therefore in an experiment we wanted to manipulate the challenge-skill balance and measure flow with its
characteristics. The study presents a technique how to manipulate flow experience via the computer game Roboguard. We manipulated flow through the difficulty level (low, optimal, high) the participants had to play on. Flow was assessed with the Flow Short Scale (FKS, Rheinberg et al., 2002) which measures all postulated flow characteristics. Factor analyses indicate that the FKS-flow characteristics can be separated into two factors: Fluency and absorption. Results demonstrated that under the combination of both factors we received the highest flow score on the optimal level (i.e., challenge-skill balance) in comparison with an easy and difficult level ($d > 1.0$). When both factors were analyzed separately we found that participants perceived their activity in an easy task as fluent, but they were not absorbed. Learning-goal but also performance-goal orientation were positively correlated with flow (absorption). We will discuss implications for fostering flow in learning situations.

*Flow experience during Graffiti spraying*

Falko Rheinberg, University of Potsdam, Germany
Yvette Manig, University of Potsdam, Germany

Which incentives make Graffiti spraying so attractive for young people? In order to answer this question we collected in a pre-phase 138 descriptions of incentives and transformed them in a questionnaire with 50 items that was answered by (N=294) young graffiti sprayers. With a factor analysis we found seven dimensions of incentives: (1) Expertise/competence orientation, (2) positive emotions/flow, (3) creativity, (4) group identity, (5) fame/performance orientation, (6) sense of life, and (7) sensation seeking. Participants answered the Flow-Short- Scale (FKS) for a typical graffiti action. The FKS-mean score was unusually high. However, there are considerable differences between legal and illegal sprayers. Among illegal sprayers it is the factor Sensation seeking that proved to be the best predictor for Flow experience whereas among legal sprayers the factor fame/performance orientation was the best to predict Flow experience. Type analysis revealed different types of legal and illegal sprayers. We analyzed the influence age might have on the motivational basis of Graffiti. Within legal sprayers we found no significant relationship between age and incentives to spray Graffiti. Regarding illegal spraying, however, especially the importance of sensation seeking and achievement orientation decreases significantly with growing age. As these are the most important incentives for illegal spraying this might explain why there are hardly any illegal sprayers older than 21 years.

H 2  28\textsuperscript{th} Aug  14:30 - 16:30  Room BIO Aula Magna

EARLI Invited Expert Panel

**THE GENERALITY-SPECIFICITY ISSUE ON CONCEPTUAL CHANGE:**
**INFLUENCE OF DOMAIN EPISTEMOLOGY IN CONCEPTUAL CHANGE RESEARCH**

Organiser: Margarita Limón, Autonomous University of Madrid, Spain
Chair: Lucia Mason, University of Padova, Italy
Discussant: Matti Sintonen, University of Helsinki, Finland

The aim of this expert panel discussion is to explore and debate the influence of domain epistemology in conceptual change research and its implications for learning and instruction. Particularly, the following issues and questions will be dealt: (a) How domain epistemology may influence how novice representations are developed? Which is the domain influence in students’
Learning about biological evolution involves epistemic conceptual change
Gale M. Sinatra, University of Nevada, Las Vegas, USA

In our work on epistemological beliefs and acceptance of biological evolution (Sinatra, Southerland, McConaughy, & Demastes, in press; Sinatra & Southerland, 2002; Southerland, Sinatra, & Matthews, 2001) we have argued that learning about evolution involves epistemic conceptual change. That is, students must compare two ways of knowing about the world: science and religion. Conceptual change then, involves a change in students’ beliefs about the domain-specific nature of knowledge. We argue that instruction can help students understand how these ways of knowing ask and answer different questions. Science hypothesizes about empirical evidence, while religious views are held “on faith” and accepted without evidence. Students must come to understand what questions to ask of science (i.e., What is the age of earth?) and what questions are outside the realm of scientific inquiry (i.e., Is there a God?). In the same manner, there are questions appropriate to ask of religion (i.e., Can belief in a higher power give my life meaning?) and questions that should not be asked of religion (i.e., How can religion be used to determine the age of a fossil?). The appropriateness of a question within a domain should be judged by the epistemological assumptions of that domain including how knowledge is warranted and sourced (Sinatra, Reynolds, & Jacobson, in preparation). Thus, science and religion can be described as ontologically different epistemologies. Our research suggests that students who are relatively open-minded and are invited to explore the epistemological assumptions of these domains are more likely to experience conceptual change.

Is domain specificity of epistemological beliefs a matter of degree: The case of mathematics?
Erik De Corte, University of Leuven, Belgium
Peter Op ‘t Eynde, University of Leuven, Belgium

Research has shown that students often have naïve, incorrect, and/or negative beliefs related to mathematics and mathematics education. Moreover, there is initial evidence showing that such beliefs have substantial impact on students’ learning and achievement in mathematics. Consequently, positive mathematics-related beliefs are now rather generally considered as an equally important component of mathematical competence as knowledge, cognitive and metacognitive skills. Answering the question how mathematics-related beliefs influence the
development of students’ representations of mathematical concepts and their approaches to mathematical problem solving, is at present thwarted by the lack of conceptual clarity in and the fragmented nature of past research on those beliefs: indeed, different kinds of beliefs (e.g., about math as a domain and about the self as a math learner) were investigated in isolation from each other, resulting in a partial understanding of their role in mathematics learning. In this contribution an initial research-based attempt at developing a more comprehensive and conceptually coherent framework about mathematics-related beliefs will be presented. This framework involves three categories of beliefs, namely beliefs about mathematics and mathematics learning, beliefs about the self as a learner of mathematics (also called motivational beliefs), and beliefs about the social context (i.e. the specific classroom setting) in which learning mathematics takes place. Starting from this framework and against the background of the available theoretical an empirical literature, the issue of generality versus specificity of beliefs will be addressed.

Can epistemological beliefs affect conceptual change?
Stella Vosniadou, University of Athens, Greece
Christina Stathopoulou, University of Athens, Greece

The presentation will explore various ways in which epistemological beliefs, namely beliefs about knowledge and knowing, can be related to conceptual change. It will also report the results of a preliminary empirical study that investigated the epistemological beliefs of Greek high school students (10th graders) in the area of physics. Different instruments were used, first to probe the hypothesized dimensionality of epistemological beliefs and second, to examine how the construct is related to students’ conceptual knowledge of physics. The preliminary results suggest that naïve epistemological beliefs, particularly those regarding the simplicity and certainty of knowledge, can be negatively related to conceptual change by influencing students’ tolerance for complexity, ambiguity and contingency. It appears that epistemological beliefs may also affect conceptual change by influencing student’s strategies of information processing and/or regulation of learning.

The influence of domain epistemology for conceptual change: The case of history
Margarita Limón, Autonomous University of Madrid, Spain

The main question raised in this presentation will be to what extent domain epistemology may influence conceptual change. Particularly, history epistemology and its influence for conceptual change will be explored. Three main assumptions will be discussed. Firstly, history as a discipline has some peculiar characteristics that should be taken into account to promote an adequate understanding of history. Depending on the historiographic school historians belong to, history is defined in a different way and thus goals of history, contents studied or methodology used by historiographic schools are not the same either. These different approaches involve different conceptualizations and epistemologies of history. Expertise in history involves to develop a particular epistemology of which the historian is aware. A second assumption is that, if it is stated that history experts develop an epistemology of history that manages their building of historical knowledge, the goals of history teaching would be: a) To identify students’ epistemological beliefs about history and how they are linked to their domain knowledge, b) to make students aware of their beliefs, and c) to promote the development of an epistemology of history that allows students noticing that different interpretations are possible. Therefore, a strong restructuring of students’ knowledge in history may involve changing students’ epistemology about history. The third assumption is that one function of historical knowledge is to allow individuals to develop their identity as part of a group and a collective identity. This may involve differences between how scientific and historical knowledge is acquired. It is necessary to clarify: a) What are the concrete
differences between social and scientific knowledge acquisition, b) if these differences may lead to
different initial representations, and c) what epistemological beliefs are developed together with
these initial representations. Some implications of these assumptions for history learning and
teaching will be developed.

*The influence of domain epistemology within the framework of developing expertise*
Patricia A. Alexander, University of Maryland, USA

It is difficult to unravel the relation between conceptual change and epistemological beliefs
without weighing both from a developmental perspective. For instance, are the conceptual changes
experienced by those new to an academic domain similar to the changes experienced by those who
are competent or expert in that field of study? Does the casting of epistemological beliefs as either
naive or sophisticated mask the process by which beliefs about knowledge change over time? My
research in developing expertise in academic domains will provide the theoretical framework for
exploring these critical questions. Certainly, there are many forms of change that can occur in
one’s conceptual knowledge, from simple accretion of an existing concept to radical transfor-
mation. Further, the frequency of such changes would be understandably related to the depth and
breadth of one’s existing knowledge within a domain and the principled nature of that body of
knowledge. Thus, we would expect that certain forms of conceptual change would be more likely
within the initial stages of domain-specific learning than others. Moreover, it would appear that
some level of epistemological sophistication would be required of radical conceptual transfor-
mations, but unnecessary with others. However, both changes in conceptual understanding and
epistemological beliefs are influenced by other factors, including learners’ personal investment in
the domain and their problem-solving capabilities. The role of these concomitant factors in
understanding the relation of conceptual change and epistemological beliefs will thus be
introduced.

**H 3  28th Aug  14:30 - 16:30  Room BIO G C**

**Symposium**

**RESEARCH ON LEARNING AS A NATIONAL INVESTMENT AND INTERNATIONAL RESOURCE**

Organiser:  Hannele Niemi, University of Helsinki, Finland
Chair:  Hannele Niemi, University of Helsinki, Finland
Discussant:  Roger Säljö, Göteborg University, Sweden

The aim on the symposium will introduce how national research programs on learning have
reacted to urgent needs of learning in four countries: In Great Britain, Norway, Netherlands and
Finland. Trends in society, especially the extension of information technologies to many human
activities, the increasing complexity of work and social challenges, the changing nature of work
and globalization are combining to stress the importance of learning as a strategic social
instrument. There is broad agreement that improving the effectiveness of learning, knowledge
creation, knowledge transfer and building up individual competencies are core challenges of the
society of this century. The national programs will be analysed from the following perspectives:
(1) What are the main objectives of the programs, (2) what are the main themes of the programs
and how these themes are covered by the projects and by which research methods, (3) how is a
concept of life-long-learning is defined or conceptualised in the programs, (4) what are the main
societal functions and how cross-disciplinary is emerged in the programs. The presentations will give also contextual information about research programs’ position within the national field of educational research, their history and near future, the process of programming, assessment procedures, and how the programs are organised (e.g. different phases, co-ordination and its function and, international connections etc). The symposium will raise the important question how national research programs can co-operate and create additional value at global level.

The UK's Teaching and Learning Research Programme (TLRP)
Andrew Pollard, University of Cambridge, United Kingdom

TLRP was established in 1999 with support from the Higher Education Funding Council for England, the English Department for Education and Skills, the Scottish Executive, the National Assembly for Wales and the Northern Ireland Executive. It is managed by the UK’s Economic and Social Research Council. Total Programme funds are almost £27m, to December 2008. Some 300 researchers across the UK are working on approximately 30 projects, organised in three phases. The overall aim of the Programme is to enhance learning outcomes. These are broadly conceived and include: the development of positive learner identities; the acquisition of skill, understanding and bodies of knowledge; the acquisition of qualifications; the development of attitudes and values relevant to a learning society and civic concern. The Programme supports research projects and related activities at many ages and stages of the life-course and throughout the UK. Programme teams, in strong partnership with users, also aim to transform research knowledge about teaching and learning to establish its relevance and value. They aspire to promote the practical application of new knowledge and its appropriation by practitioners and policy-makers. The Programme is also trying to enhance the UK’s capacity for all forms of high quality research on teaching and learning. This is supported within most projects and through cross-programme thematic work. Such work addresses many other issues too, and is designed to add value to projects, to draw on expertise beyond the Programme and to focus on key cross-programme issues. The Programme aspires to have a major impact on policy and practice concerning teaching and learning in the UK.

The Norwegian research programme Knowledge, Education and Learning
Kirsti Klette, University of Oslo, Norway

In Norway a new research programme “Knowledge, Education and Learning” is initiated by the Norwegian Research Council and will run for 5 years (2003-2007). The aim of the research programme is to strengthen the quality of research, to support the long term accumulation of knowledge, to strengthen the knowledge base for policy and to contribute to the public debate. It should also have an international orientation, give an overview of the knowledge status, provide a long term perspective and stimulate concentrated efforts on specific areas. The main topics are related to the (1) interplay between system, home, work place and the voluntary sector as arenas for lifelong learning, (2) leadership, organization and management in education, and (3) learning processes and areas of knowledge. The programme will support the development of integrated research groups, balance between depth and breath or surveys and case studies. It will involve both thematic multidisciplinary and disciplinary groups and promote internationalisation: Applications in English, international reviewers, and mobilisation of international networks.
Dutch Educational Research Programming Council, (PROO) - The research programme in The Netherlands
Hetty Dekkers, Dutch Educational Research Programming Council, The Netherlands
Annet van der Veen, Dutch Educational Research Programming Council, The Netherlands

The Dutch Educational Research Programming Council started its work in 1997. At this moment there is a programme for a period of four years: 2003 – 2007. Focus subjects of the present PROO programme are: Pre-primary and early primary education, innovative learning arrangements, didactics for vocational education, development of the competencies of educational staff, the school as a learning context, social cohesion and social capital. In 2003 new requests for subsidies will be assessed; the projects will start in 2004. The PROO task assignment consists of four elements: (1) To program educational research (fundamental-strategic research, application-oriented medium and long-term research, evaluation research, and international comparative research); (2) to stimulate an open, independent research infrastructure; (3) to deepen and to improve the quality and new knowledge by multidisciplinary research and internationalisation; (4) to evaluate its own research projects and to disseminate the knowledge generated by them, for use by educational scientists, educational policy makers, and educational and school practitioners. The symposium presentation will provide more information about the research projects that have started in 1997 and onwards. Some themes were: learning and instruction, management and organisation of the educational system, education within the context of society, vocational education and human capital, ICT and education, accessibility of the educational system, the teacher, the pedagogical function of education, decentralization of the national educational policy, two longitudinal data collections both in primary and in secondary education, and finally, international comparative research.

Life as Learning (Learn) – The research program on learning in Finland
Hannele Niemi, University of Helsinki, Finland
Raija Latva-Karjanmaa, University of Helsinki, Finland

A National Research Programme “Life as Learning” (LEARN) is funded by the Academy of Finland, 2002-2006 (EUR 5.1). The aim of the research programme is to create (1) a new research culture and new research partnerships, (2) interdisciplinary and international research projects around the problems of learning, (3) lifelong and lifewide learning in order to avoid a new kind of exclusion (4) interdisciplinary research base for developing teaching and learning in different educational and working-life contexts; and (5) to anticipate future learning needs from the point of view of society, culture and the individual. The main themes of the program are: Redefining the concept of learning, The social and cultural contexts of learning, The knowledge creation, New working environments, and New teachership. These themes are covered by 23 projects, of which about one third is focused on new challenges of learning in working life, one third on new learning environments in school systems and institutional settings and one third on knowledge creation in different contexts. The projects have started their work in late September 2002 and their methodological approaches will be described in symposium. The LEARN program has emphasized the importance of cross-disciplinary and cross-national co-operation from its initiative stage. The symposium presentation will also describe how these principles are implemented or designed at the project level and in coordination.
The aim of this symposium is to bring together research on collaborative learning and knowledge construction from various perspectives. The studies were carried out in different contexts. One study examined collaborative knowledge creation in a university course designed according to principles of progressive inquiry learning. Another study sought to improve students’ elaboration processes in face-to-face problem-based learning through the use of study teams. A third study compared student preferences for small group work versus individual work and was carried out in an environment that combined face-to-face and virtual collaboration (blended learning). The fourth study investigated how asynchronous computer conferencing affords a powerful learning environment supporting knowledge building. The last paper studied the role of social affordances in cross-national online learning with students in different countries. Because of the variation in contexts and perspectives of the different studies, the symposium will provide a valuable opportunity to discuss the value of, conditions for, and outcomes of collaborative learning in relation to knowledge building in various learning environments.

**Analyzing the pedagogical implementation of progressive inquiry in a university course**

Minna Lakkala, University of Helsinki, Finland
Hanni Muukkonen, University of Helsinki, Finland
Jirí Lallimo, University of Helsinki, Finland
Kai Hakkarainen, University of Helsinki, Finland

Collaborative technologies, if embedded in appropriate epistemological, social and pedagogical infrastructures, may have substantial effects on promoting change in higher education. For this purpose, the present investigators have developed a model of **progressive inquiry** to facilitate collaborative knowledge creation practices in schools and university-level education. The idea of progressive inquiry is to provide pedagogical guidelines for teachers and students in the critical epistemological activities of knowledge-advancing inquiry. A special challenge in implementing progressive inquiry in university education is the cultivation of pedagogical design and scaffolding practices to effectively promote students’ collective knowledge creation and development of epistemic agency. In analysing the pedagogical organisation of such practices, the unit of analysis is the whole collective process, rather than the contribution and advancement of individual students. In order to challenge the prevailing ways to use collaborative technologies in higher education, we need a framework to describe the relevant dimension of collaborative inquiry learning, based on the newest advancements in learning research. In the presentation, we introduce a framework for analysing the pedagogical arrangements of the collaborative inquiry in procedural, social, epistemological and technical dimensions, which we think are critical from the point of view of higher-level goals of changing the learning culture towards advanced knowledge creation practices. In addition, we present results of an analysis of a university course in
“Psychology of modern learning environments”, in which the students’ activity was organised according to the principles of progressive inquiry and collaborative knowledge creation. The pedagogical arrangements in the course were analysed in detail by the above-mentioned dimensions.

*Improving elaboration in problem based student learning through study teams*
Herma Roebertsen, University of Maastricht, The Netherlands
Jos Moust, University of Maastricht, The Netherlands

In Problem-based learning (PBL) students work in small groups at trying to understand and explain real-life problems. Although PBL claims to stimulate self-directed and meaningful learning, the unchanging nature of the method throughout the curriculum is not always stimulating. Therefore in 2001 experiments were started to explore different teaching methods within the context of PBL. In a second year block, self-directed study teams were introduced. Problems were made more complex, one tutorial meeting a week was replaced by study team meetings. The study teams had to document their progress and approach in a group portfolio. Results showed that students had spent more time on this block than on previous, classical PBL blocks. However, despite the intentions to stimulate self-regulated learning, students felt that external regulation had actually increased. In 2002 a second experiment was started. This time specific roles within the study teams were skipped. Measurements were conducted with regard to time spent, achievements, appreciation of the course etc. Results showed that students appreciated this way of working. They spend more time on self study and discussion in the study teams and tutorials. Still it is not clear whether the introduction of study teams increases self-directed learning. It is, however, obvious that students achievements were higher and students gained deeper understanding. Further experiments are done to explore what learning processes are conducted in the study teams and what ways of elaboration are used.

*Effects of collaborative and individual learning in a blended learning environment*
Pierre van Eijl, Utrecht University, The Netherlands
Albert Pilot, Utrecht University, The Netherlands
Peter de Voogd, Utrecht University, The Netherlands
Bart Thoolen, Utrecht University, The Netherlands

Some students like to work together and some not, in a course with a virtual learning environment (VLE). If students can choose for either teamwork or individual study, in which way does this affect their marks and the appraisal of the course? This question has been investigated in the context of a course in English Literature at the University of Utrecht. In this course students work intensive with a VLE and receive lectures: a blended learning environment. Previous research showed the educational design used, to be a powerful learning environment. This time students had the choice to work in small groups (2 – 4 students) or to work individually on the assignments. Both groups were compared on basis of their study results and the outcomes of a questionnaire. Students valued the choice to work either in groups or individual. Mostly students with a high mark on a previous course with nearly the same educational design preferred collaboration. Statistical analysis showed that collaboration resulted in significant better marks.
Knowledge-building in asynchronous computer conferencing environments in higher education
Sarah Schrire, Centre for Educational Technology and Kibbutzim College, Israel

The question examined in this paper is how asynchronous computer conferencing affords a powerful learning environment supporting knowledge-building in higher education. From a perspective that views the teaching-learning process as a dialogical activity, the interactive, cognitive and discourse dimensions of this process were investigated in three doctoral level asynchronous computer conferences. The conferences were part of the computing technology in education programme at Nova Southeastern University in the United States. Using a multiple-case study design, knowledge-building was analyzed in terms of the conference interaction patterns, the quality of cognition, and the exchanges and moves underlying the discourse. Cognition in all three conferences was characterized by higher-order thinking. Synergistic interaction was associated with higher levels of cognition than other types of interaction, pointing to the importance of the collaborative element in learning. Discourse analysis of the conference threads enabled a characterization of learner-learner and instructor-learner exchange patterns associated with synergistic interaction and increased occurrence of higher-order thinking. By triangulating the findings from the dimensions investigated and using Garrison, Anderson and Archer’s Practical Inquiry Model of Cognitive Presence as a basis, it was possible to propose a content analysis scheme for assessing the quality of learning in asynchronous computer conferencing. The research has practical implications for instructional management in online higher education environments and for the assessment of learning in such environments. On a broader level, the research affirms the importance of the collaborative and dialogical elements in learning and teaching and points to elements of instruction that promote higher-order thinking.

Cross-national online learning in higher education: The role of social affordances
Marold Wosnitza, University of Koblenz-Landau, Germany
Simone Volet, Murdoch University, Western Australia

Social interactions, social cognitive activity, distributed cognition, collaborative learning environments, cognitive apprenticeship and communities of learners have become major research topics in the field of learning and instruction in recent years. Many studies have revealed that the degree to which a person is prepared to engage in a learning activity may depend on their motivational and emotional appraisal of the immediate social learning environment. Whether individuals have positive feelings towards the group, have a sense of belonging and social relatedness, of being valued and socially supported play a critical part in that appraisal. In turn, the perceived quality of ‘student’-‘class’ relations contributes to heightened motivation and productive engagement in learning. What appears to be a significant positive factor in face-to-face learning presents major challenges in online learning. In a virtual learning environment, the opportunities for social interactions are potentially rich but due to limitations in social-contextual facilitators, university students’ attitudes towards online learning is often poor. It may be one of the reasons why the concepts of social presence, teacher presence and the building up of social affordances have received increased attention in research on online learning. With the fast development of international education and increased cross-national online learning in the field of higher education, it is critical to develop a better understanding of the social conditions for productive online learning. This paper will discuss the role of social affordances in a cross-national online learning study aimed at enriching German and Australian university students’ understanding of cultural diversity and intercultural education.
PROFESSIONS AND ITS MORALITY (Part 1)

Organiser: Fritz Oser, University of Fribourg, Switzerland
Chair: Fritz Oser, University of Fribourg, Switzerland
Discussant: Fritz Oser, University of Fribourg, Switzerland

In this Symposium we try to present different concepts of professional morality with respect to different professions, either from a theoretical or from an empirical point of view. The main question is: How can success (high quality and high outcome) be connected with social responsibility? The moral sensitivity will be shown either from an educational/interventional or from a descriptive standpoint and it will address different professional fields, a) journalism, b) teaching, c) economy, d) academic leading, and e) sports. There will also be two sorts of professional moral concepts, which connect to each other, namely on one hand conceptual morality (f.ex. according to Kohlberg), and b) procedural morality where a balance between the different claims (effectiveness and justice) can be worked out. The different authors of this symposium will claim that the effect of morality is not inhibiting success; but that the authentic engagement of a person if he/she takes morality into consideration must be high and intrinsically motivated.

Promoting purpose in professional development: A “good-work” program in journalism
William Damon, Stanford University, USA

This presentation describes the results of a mid-career training program designed to foster good work in journalism. The program was based upon research from a large study on the subject of “good work” in contemporary professional life (Principal Investigators: William Damon, Howard Gardner, Mihaly Csikszentmihalyi). The research focuses on the question of how people manage to do “good work”, work that is both excellent in quality and socially responsible - in a age when market forces are extremely powerful, there are few if any comparable controlling forces, and our sense of time and space is being altered in our technologically oriented global society. In-depth interviews with leading professionals revealed a number of strategies and moral perspectives that enable professionals to accomplish good work despite all these pressures. The training program in journalism drew upon the strategies and moral orientations that were revealed in the research interviews to create a “traveling curriculum” for working journalists in their own newsrooms. The curriculum emphasizes the mission or the domain and the purpose of the individual’s work. In addition, the curriculum presents case material highlights the ethical standards of the field, and it engages participants in exercises and dilemmas that require them to reflect upon these standards in the context of their own work. Results from assessments of the curriculum’s impact have shown a high degree of positive influence upon participants, awareness of the strategies and moral orientations that facilitate good work in journalism and a significant increase in participants, dedication to the mission of journalism and personal sense of purpose in their own work.
Normative professionality of teachers
Wiel Veugelers, University of Amsterdam and Utrecht University, The Netherlands

Teachers do not have a choice whether to work on moral education or not to do so. Education is constantly concerned with value development among students. Many authors, coming from different theoretical perspectives, see education as a fully value-linked activity (Giroux, 1989; Goodlad, Soder, & Sirotnik, 1990; Jackson, Boostrom, & Hansen, 1993; Oser, 1994; Strike & Ternasky, 1993; Sockett, 1992). Teachers in all subjects constantly embody values in their behavior, in their selection of teaching material, in their personal views and in their reactions to students (Gudmundsdottir, 1990). Values are embedded in the personal constructed curriculum, the lived school culture and the teacher as moral exemplar (Veugelers & Vedder, in press). The study focus on the normative professionality of teachers, the cultural-pedagogical project they are working on, the concrete pedagogical actions they undertake in school practice and the effects teachers are aware of. All teachers’ pedagogical action is inspired by their philosophy of life or their life stance, even if this cultural pedagogical project mostly implicit embedded in their teaching. What are differences in pedagogical professionalism in relation to religion or worldview? In particular we will focus on what inspires teachers in public schools and other schools not based on a religion? Teachers who are not working from a religious background often have a kind of humanistic inspiration. Humanistic ideas emphasize the autonomy of the subject, the empowering of the subject (Nussbaum, 1997). Within modern humanistic thought one needs however to balance between autonomy and social concern (caring), the balance between the individual and society. This social concern can be articulated differently. Thinking about preparation for society is at present lumped together as ‘education for citizenship’ (Giroux, 1989). Several types of citizenship may be distinguished: the adaptive type, the calculating citizen, and a critical democratic citizenship. A critical democratic citizenship implies autonomy, social concern, critical thinking and acting (Veugelers, 2000). The theoretical analysis will be confronted with empirical data of teachers in primary and secondary education. The data are both quantitative and qualitative. The data are about what inspires teachers, what is their cultural-pedagogical project, and how they work on it.

Preparing teachers as moral educators
Ann Power, University of Notre Dame, USA
Clark Power, University of Notre Dame, USA
Vladimir Khmelkov, University of Notre Dame, USA

Although much has been written about the need for teachers to take up the task of moral education in the schools, there is not much empirical information on the ways in which teachers view themselves as moral educators. Teacher education programs in the United States offer little or no systematic preparation for teachers to be function as moral educators in spite of the fact that moral education is typically recognized as a primary goal of education. This study is based on the responses to “The Teacher Professionalism Survey” of 99 student-teachers enrolled in an MEd Program at the University of Notre Dame. To determine their sense of responsibility and their sense of efficacy in promoting academic achievement, socio-moral development, and discipline, respondents completed several Likert scales in the survey. Teachers were also asked to respond to the following three open-ended questions asking them to identify obstacles and opportunities for moral education inside and outside of the curriculum. The results show that teachers report a higher sense of responsibility for promoting socio-moral development among their students than for promoting academic achievement. Although teachers feel more responsible for socio-moral development than for academic achievement, they feel less efficacious in promoting socio-moral
development and discipline than in promoting academic achievement. Most teachers identify a narrow range of opportunities for moral education pointing to such indirect processes as modeling and the disciplinary code. Few teachers find that schools offer opportunities to promote students' moral reasoning through the curriculum or moral deliberation through participation in decision-making. This study suggests not only that teachers be given systematic preparation for their role as moral educators, but that the school curriculum and administrative structure offer teachers a meaningful opportunity to practice what they have learned.

Morals for merchants – Desirable, reasonable, feasible?
Klaus Beck, University of Mainz, Germany

No doubt, looking at the everyday economic process the lots of events cannot be overlooked which give reason to activate moral scruples. It is not only the spectacular deals of weapons into warring countries or the huge accidents of oil tankers that cause us to get indignant about the actors involved. There are also the many less sensational occurrences of unacceptable acts of tax frauds, overreachings, mobbing, environmental pollution and so forth. So, to feel that economy has to be more moral seems to be a desire, which needs not to be explained in further detail. There are in principle two ways to get along with that problem: Either to establish more and strict regulations supplemented with additional surveillance and with paining penalties, i.e. with really high cost for violation or to try to make the acting merchants more morally, i.e. to educate, to appeal to, to persuade them in the direction of becoming more self-respecting. From a longitudinal study of young insurance clerks we have data saying that the second alternative above seems not to work in a sufficiently and remarkable way (and that is also the story we know from a long history of unavailing attempts of education). It turned out that merchants act in contexts and under conditions which develop their own “moral fortitude of facts” in relation to variation of situations (e.g. internal with colleagues or outplant with clients). Results of that study will be reported and consequences will be discussed in the light of Kohlberg’s theory of moral judgment.

H 6 28th Aug 14:30 - 16:30 Room PSY 2 B

Symposium

COGNITIVE LOAD THEORY: INSTRUCTIONAL IMPLICATIONS OF THE INTERACTION BETWEEN INFORMATION STRUCTURES AND COGNITIVE ARCHITECTURE (Part 2)

Organisers: Fred Paas, Open University, The Netherlands
            Alexander Renkl, University of Freiburg, Germany

Chairs: Fred Paas, Open University, The Netherlands
        Alexander Renkl, University of Freiburg, Germany
        John Sweller, University of New South Wales, Sydney, Australia

Discussant: Remy Rikers, Erasmus University, Rotterdam, The Netherlands

By considering the interaction between information structures and cognitive architecture, cognitive load theorists have been able to generate a unique variety of instructional designs and procedures. The papers of this double symposium discuss some of the recent theoretical and empirical advances regarding the management of cognitive load in multimedia learning environments (Part 1) and the relation between worked-out examples (WEs) and cognitive load (Part 2). Part 2 is opened by Tuovinen, who shows how the comparative cognitive demands of course components
can be used to guide the prioritization of revisions and innovations in teaching. Then, Renkl, Atkinson, and Günther present a study showing that the positive transfer effects of gradually fading out worked-out steps from examples are due to a reduction in unproductive load and an increase in productive load. Next, Gerjets, Scheiter, and Catrambone show the benefits of understanding-based WEs as compared to conventionally used schema-oriented WEs, for transfer and the cognitive load during learning. Finally, Van Gog, Paas, and Van Merriënboer present a combined technique of think-aloud protocols and eye tracking to obtain the information that is needed to construct effective process-oriented WEs.

Relative cognitive learning analysis for strategic educational resource development planning
Juhani Tuovinen, Charles Sturt University, Australia

The analysis of priority allocation for revisions and innovations in teaching, such as the development of educational multimedia to support teaching programs, is often based on ad hoc methods. In this set of studies systematic methodologies were tested about their value for prioritising learning resource developments. In these early studies information was sought about the learning difficulty (element interactivity) and the students’ level of expertise and schema development to help guide improved priority allocations for educational resource developments. Survey methods were used with teaching staff and students who had taught or studied the relevant courses previously to obtain the learning effort and prior knowledge data. These components were then displayed in graphical format and some aspects amalgamated leading to comparison of the relative cognitive demand of course components. The comparative cognitive demand results can be used to guide the prioritisation of revision and innovation. The current studies on comparative cognitive demand of course components has shown that these estimates may be obtained from staff and students at university and school, and analysed to provide a guide to prioritizing multimedia development. However, some important differences arise between how this method may be applied at primary school and tertiary education levels. But given that we understand these differences, it appears that the method is easy to use, and provides all educators at various levels a new cognition research-based method for systematically improving the organisation of educational innovations.

Fading worked-out solution steps in cognitive skill acquisition: Implications for productive and unproductive cognitive load
Alexander Renkl, University of Freiburg, Germany
Robert K. Atkinson, Arizone State University, USA
Cornelia S. Grosse, University of Freiburg, Germany

Cognitive load research has shown that cognitive skills are effectively acquired by employing worked-out examples first and then problems to-be solved. Furthermore, gradually fading out worked-out steps from examples until all of the steps must be determined by the learner is an effective procedure. It was hypothesized that fading procedure’s effectiveness was due to a reduction of extraneous (unproductive) load and an increase of germane (productive) load. The present study tested this assumption by assessing indicators of germane load (e.g., self-explanations) and of extraneous load (e.g. errors during learning) under a fading condition and a control (example-problem pairs) condition. Participants were 54 students of psychology who were asked to learn a set of elementary principles of probability. Learning outcomes were assessed by transfer problems. The previously reported effectiveness of fading was replicated. In addition, the effect of fading on learning outcomes was primarily mediated by reducing extraneous load. Surprisingly, germane load was low across both conditions. Although it was related to learning
outcomes, germane load contributed little to the mediation of the fading effect. The findings deepen our understanding of relevant processes in cognitive skill acquisition. From a practical point of view, the results imply that fading must be combined with additional instructional procedures designed to foster germane load in order to optimize skill acquisition processes.

Acquiring problem-type schemas versus understanding individual solution steps: Comparing learning outcomes and cognitive load for two formats of worked-out examples
Peter Gerjets, Knowledge Media Research Center, Tübingen, Germany
Katharina Scheiter, University of Tübingen, Germany
Richard Catrambone, Georgia Institute of Technology, Atlanta, USA

The efficiency of worked-out examples for teaching problem-solving procedures is usually explained by their potential to foster the acquisition of problem-type schemas. For instance, it has been argued that learning from worked-out examples is superior to learning by doing because cognitive resources are freed that may be deployed for schema abstraction. Problem-type schemas represent problem categories, their defining structural features, and their associated solution procedures. Designing instructional examples to promote schema acquisition implies to focus on these three components of problem-type schemas. However, schema-oriented examples also have disadvantages: First, most problem categories require to consider multiple structural problem features simultaneously for problem categorization, resulting in substantial cognitive load. Second, a poor understanding of relations below the schema level that hold irrespective of category membership may occur, e.g., relations between individual structural features and individual solution steps. If learners do not understand the goals of individual solution steps and the justification of these steps in terms of structural problem features they may fail to recognize important features of problems and to adapt solution procedures to novel problems beyond the known problem categories. In three experiments in the domain of probability theory we compared a schema-oriented example format to an example format designed to foster the understanding of relations between individual structural problem features and individual solution steps across the boundaries of problem categories. Our results confirm the superiority of this understanding-based example format with regard to transfer performance and time demands as well as with regard to cognitive load during learning.

The development of process-oriented worked-out examples
Tamara A. J. M. van Gog, Open University, The Netherlands
Fred Paas, Open University, The Netherlands
Jeroen J. G. van Merriënboer, Open University, The Netherlands

The research on worked-out examples, which is strongly guided by Cognitive Load Theory, has to date been restricted to product-oriented worked-out examples, i.e. worked-out examples containing a given state, a goal state and the solution steps required to reach that goal state. Presenting students with process-oriented worked-out examples, i.e. including problem-solving process information in the form of “why-to” information and heuristics/systematic approaches to problem solving, is expected to lead to deeper understanding of the domain and better performance on transfer tasks. This presentation will elaborate on the concept of process-oriented worked-out examples and describe a technique to obtain process-based information from experts and advanced students in the domain of Computer Numerical Controlled programming. While they are working on a number of programming tasks at different levels of complexity, they will be asked to think aloud and simultaneously their eye-movements will be tracked, to provide a measure of attention to different parts of the task. The combination of both measures is expected to reveal – more
completely and accurately than either method alone – the “why-to” information and heuristics that are needed to construct effective process-oriented worked-out examples.

H 7 28th Aug 14:30 - 16:30 Room PSY 4 P

Symposium

COMPUTERS AND TEACHING THINKING: A COMMUNICATIVE APPROACH

Organiser: Rupert Wegerif, Open University, United Kingdom
Chair: Gavriel Salomon, University of Haifa, Israel
Discussant: Gavriel Salomon, University of Haifa, Israel

The relationship between computers and teaching thinking skills has been conceptualised in various ways. The papers in this symposium are united in exploring the role of computer-based technologies as a support and resource for dialogues in which thinking skills, or the tools for conceptual understanding, are taught, applied and learnt. This approach inevitably raises the question of the distinctive role, if any, of computer-based technology within pedagogy. Using a range of settings and a variety of methodologies, these papers reflect on the affordances of computer-based technology as a support for the kind of teaching and learning dialogues that generate conceptual understanding and transferable thinking skills.

Using computer-based activities to bridge the teaching of general thinking skills in the form of dialogic reason, and specific learning within the curriculum
Rupert Wegerif, Open University, United Kingdom

Establishing a bridge between the general skills, or higher order thinking, and the achievement of specific learning goals within curriculum areas is a common problem for general thinking skills programmes within education. In this talk I argue for the distinctive educational role of computer-supported collaborative learning activities in making that bridge. I begin with research evidence that it is possible to characterise the interpersonal orientations and ground rules that underlie generally intelligent conversations. I claim that this provides us with a model of reason in general understood as a type of situated dialogue. I go on to provide evidence that it is possible to teach or, at least, to promote the occurrence of such generally intelligent conversations in classrooms. I then argue, with evidence drawn from recent studies, that computer-based activities can be designed to elicit such general collective thinking and, at the same time, to direct this general thinking, or dialogic reason, towards the achievement of specific individual learning goals within the curriculum. Statistical evidence from reasoning test scores and subject area attainment scores is offered to support the argument that this approach can be made to work in practice. Qualitative evidence from discourse analysis, protocol analysis and interview transcripts is offered to support the claim that computer-based activities can be designed in such a way that they act as a bridge between general collective thinking ability and specific individual learning gains.

Conceptual thinking as mediated action: A sociocultural analysis of children’s explanations in an early years classroom
Kristiina Kumpulainen, University of Oulu, Finland
Marjatta Kangassalo, University of Tampere, Finland
This study investigates the sociocultural trajectories of children’s explanations during early years science learning activities. While examining and comparing the nature of children’s explanations during adult-child interviews and during children’s spontaneous exploration of a multimedia science learning tool, the study aims at highlighting the mediated nature of children’s conceptual thinking. In specific, it attempts to show how cultural contexts and available tools provide affordances and constrains for explanation construction. The theoretical and methodological foundations of the study are laid by theories and set of concepts derived from sociocultural theories (Wertsch, 1998) as well as from studies of discourse (Bakhtin, 1981,1986; Wortham, 2001). The empirical data of the study is situated in a Finnish day care centre. Twenty-three children aged between six to seven years old participated in the study. The data collection was conducted in a four-week period during which the children took part in a learning unit focusing on their living environment, earth, time and space. The learning activities and tools in the unit consisted of child-initiated, exploratory activities during which the children had versatile tools in their use, including a multimedia learning tool, PICCO. The data of the research project consist of video-recordings of children’s interviews between an adult and of their self-initiated activities within the social context of the multimedia science learning tool. Children’s exploration paths during the use of the multimedia have also been recorded. In all, the study portraits children’s conceptual thinking and learning from the sociocultural perspective. Moreover, it furthers understanding of the affordances and constraints interactive contexts and multimedia learning tools can offer for early years science learning.

Developing dialogue with digital resources
Steve Higgins, University of Newcastle upon Tyne, United Kingdom

12 schools in the North-East of England are investigating the use of digital media to support children’s awareness of their learning. The project draws on the work of the Thinking Skills Research Centre on using pedagogical strategies and King’s formative assessment projects as well as work using ICT to develop learners’ thinking and understanding of what they have learned. Classroom activities are recorded with digital photographs or video or by scanning work so that the learner and teacher can discuss and record their thinking about the learning that has taken place by annotating or adding to the digital resources. These individual ‘snapshots’ of learning can then be combined into an electronic portfolio or ‘learning album’ which records aspects of learning over the course of an academic year for both the teacher and the learner. This paper reports on the preliminary stages of the project and some of the activities that the schools involved have developed such as the use of video to record 6 year olds sorting in Science and digital photographs in Design Technology across the primary age range (5-11) or in structured play in early years settings.

The effects of communication medium on the development critical thinking in developmental psychology
Richard Joiner, University of Bath, United Kingdom
Sarah Jones, University of Bath, United Kingdom

Kuhn, Shaw and Felton (1997) found that face-to-face discussion facilitates critical thinking. A number of writers have long suggested that CMC has a number of advantages over face-to-face in discussion when it comes to discussion. The aim of this paper is to compare the effects of different communication medium on the development of critical thinking. The study employed the standard three step experimental paradigm with a pre-test, an intervention session, where they either had an asynchronous online discussion or face-to-face discussion and a post-test. The participants (N=71)
were all undergraduate students at the University of Bath who were taking a second year undergraduate course in developmental psychology. The pre-test consisted of mini essay on their opinion of smacking and a 21 point smacking scale, where they indicated how much they agreed or disagreed with smacking. Approximately a week later, they had a seminar discussion that lasted two weeks for the online group and an hour for the face-to-face group. The seminar was a discussion of the detrimental effects of smacking on children’s development. This topic was an assessed part of the course. The post-test was identical to the pre-test, but it also had a self report measure of their opinion changed. We used Felton and Kuhn’s (2001) analysis of arguments to analyse the face-to-face discussion and the online discussions. In this analysis, they distinguished between transactive questions; transactive statements and non-transactive statements. We found no difference between face-to-face and CMC on students critical thinking but we did find that the quality of the argumentation used in face to face was higher than that used in the CMC. The implications of these findings for the role of CMC in supporting critical thinking are discussed.

H 8  28th Aug  14:30 - 16:30  Room BIO 1 L

Symposium

IMPROVEMENTS IN STUDENT’S SELF-CONCEPT MOTIVATION AND MORAL DEVELOPMENT

Organiser: Anna Laura Comunian, University of Padova, Italy
Chair: Anna Laura Comunian, University of Padova, Italy
Discussant: Dennis McInerney, University of Western Sydney, Australia

The purpose of this symposium is to explore improvements in student’s self-concept, motivation and moral development. We have four presentations from three countries: Australia, Japan and Italy. Each presentation provides a theme studied in the Self Research Centre. The SELF Centre seeks to identify strategies to optimise self-concept and facilitate the attainment and understanding of other valued outcomes in a variety of settings. The study from Australia presents the outcomes of peer support programs. The effectiveness of an Australian designed peer support program on both seventh-grade students and their peer leaders is evaluated. This study serve to increase our understanding of the key strengths of peer support programs and their benefits in easing the transition to secondary school. Academic achievement motivation, academic self-concept and academic achievement in Australia are examined in the second presentation. Such research has used measures of academic achievement motivation and self-concept which attempt to measure the combined effects of motivation and self-concept on students’ academic achievement. The study from Japan explores the motivational and non-motivational features of English as a Foreign Language (EFL) study for female Japanese. An instrument which can be used to measure and compare motivation to study EFL across cultural contexts was adapted and validated. The Italian study adds the extent to which the Kohlberg’s moral judgement stages of kindness was able to account for data gathered across Italy and Australia. The symposium provides a forum to discuss on programs and research instruments by exploring them in different contexts.

A longitudinal study of the effects of a school-based peer support program
Louise A. Ellis, University of Western Sydney, Australia
Herbert W. Marsh, University of Western Sydney, Australia
Rhonda G. Craven, University of Western Sydney, Australia
This study evaluated the effectiveness of participation in a peer support program on Grade 7 students and their peer leaders. The program was designed to smooth the transition to adolescence and secondary school for seventh-grade students. Participants in the study were students from a secondary school in western Sydney. One hundred and thirty Grade 7 students participated in weekly groups facilitated by Year 10 students, and served as the experimental group. 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 found significant improvements in student’s self-concepts, open thinking, self-confidence, leadership ability, coping strategies, enjoyment of school and bullying.

Assessment of achievement motivation and academic self-concept: Results from longitudinal data
Katrina Barker, University of Western Sydney, Australia
Dennis McInerney, University of Western Sydney, Australia
Martin Dowson, Institute of Christian Tertiary Education, Australia

Research has been conducted on relations between (a) academic achievement motivation and academic achievement and (b) academic self-concept and academic achievement. Such research has typically used measures of academic achievement motivation and self-concept which have been drawn from a variety of psychometric instruments. However, these studies have not typically investigated the psychometric properties of these measures (items and scales) drawn from their original instruments - particularly with regard to the independence of scales when used in the one instrument. Moreover, when students multiple goal orientations (mastery, performance, and social goals) are used as the measure of students’ academic achievement motivation, we are aware of no instruments that have tested for the independence of academic achievement motivation and academic self-concept. Specifically, the present study tests the ability of a hypothesised first-order measurement model, comprising goal orientation and academic self-concept variables, drawn from the Self-Description Questionnaire II (Marsh, 1990) and General Achievement Goal Orientation Scale (McInerney, 1997), to fit two waves of data collected from 1 499 high school students, and to test the model’s invariance across sex groups.

The motivation of female Japanese university students towards the study of English as a foreign language and at university in general
Dexter Da Silva, Keisen University, Japan
Dennis McInerney, University of Western Sydney, Australia

The motivation of first-year female Japanese university students was examined using an inventory of university motivation, based on Maehr’s multiple goal model of Personal Investment. Two forms of the inventory were used: one referring to the study of English as a Foreign Language (EFL), the other to general university study. The results of exploratory Principal Components Analysis (PCA) provided support for the applicability of the Personal Investment Model, as well as for the validity of both forms of the measurement instrument in this sociocultural context. General descriptive statistics showed the relative importance of intrinsic motivational goals, and conversely the unimportance of extrinsic rewards. In general, the results of multiple regression analyses suggested that some components of the derived Scales were most effective in predicting academic English proficiency, as measured by TOEFL (Test of English as a Foreign Language) scores, and somewhat effective in predicting grades on some English classes.
Similarities and differences in students related to kindness and moral development in Australia and Italy

Anna Laura Comunian, University of Padova, Italy
Katrine Simpson, University of Western Sydney, Australia
Katrine Baker, University of Western Sydney, Australia

In this study three questionnaires which focus on kindness, moral judgment and coping style were used. Data are collected from two countries: Australia (N=150) and Italy (N=150). Using the Kindness Scale (Comunian, 2000), the first objective was to examine the extent to which the Kohlberg’s moral judgment stages of kindness model was able to account for data gathered across the two countries. In previous studies, confirmatory factor analyses showed that the structures postulated could be applied across multiple cultures. The second objective was to study possible variations in coping style related to kindness and moral development stages. The hypotheses were that a) factors involving high active coping levels and relational coping levels would be largely free of cultural influences and correlated with higher stages of kindness and moral development; b) factors involving defense coping levels and high passive coping levels would be dependent on cultural influences and correlated with lower stages of kindness and moral development. Each of these hypotheses was well supported by the data. Mostly invariant factor structures were obtained across cultures. Results showed that the kindness and moral development constructs emphasized in Italy were mostly overlapping in both cultures. The relationships among stage person need to be further explored to see whether kindness develops in a manner consistent with person’s moral stages in everyday actions.

H 9 28th Aug 14:30 - 16:30 Room PSY 3 H

Symposium

THE DEVELOPMENT AND ENHANCEMENT OF EARLY MATHEMATICAL SKILLS

Organisers: Lieven Verschaffel, University of Leuven, Belgium
Erno Lehtinen, University of Turku, Finland
Chair: Lieven Verschaffel, University of Leuven, Belgium
Discussant: Elsbeth Stern, Max Planck Institute for Human Development, Berlin, Germany

This symposium deals with research on the development and enhancement of mathematical thinking in pre-school and beginning elementary school children. The four papers cover different topics within this field, namely: 1) children’s focusing on and perception of numerosity, 2) the transition from counting strategies to back-up and retrieval strategies in simple addition and subtraction, and 3) the linkage between children’s intuitive knowledge and informal skills related to these two operations, on the one hand, and the formal mathematical symbolism in the context of word problem solving. Whereas all papers reflect the focus on young children’s competence in early mathematics that is so characteristic of much of the modern research on mathematical thinking (Ginsburg, 1998), they document at the same time the serious cognitive obstacles that many young children experience in their attempts to conceptualize number and addition and subtraction. Furthermore, while all papers are influenced by the (traditional) cognitive psychological approach to mathematical thinking and learning, there is also serious consideration of the socio-cultural context of children’s early mathematical development. Finally, all contributors to this symposium do not only pay attention to the development of the above-mentioned early mathematical concepts and skills, but also to the role of instructional factors on
this development. As such, they lead to implications for the improvement of the practice of mathematics education in the crucial transition period from pre-school to elementary school.

Spontaneous focusing on numerosity in the development of early mathematical skills
Minna M. Hannula, University of Turku, Finland
Erno Lehtinen, University of Turku, Finland

The aim of this paper is to show the main findings of our research projects on spontaneous focusing on numerosity. The goal of these studies was to study whether there were differences in children’s spontaneous focusing on numerosity, and whether these differences were related to the development of early mathematical skills. Two projects, tapping separate phases in the development of cardinality related skills, are introduced. The first, longitudinal project included three years follow-up of 39 3-year-old children in spontaneous focusing on numerosity and early mathematical skills. The participants of the second study were 183 6,5-year-old preschool children, whose spontaneous focusing on numerosity and mathematical skills were assessed. Theoretically spontaneous focusing on numerosity is thought to be a sub-process of quantifying acts: subitizing, counting or estimating. Before one can enumerate set of objects or incidents, one has to focus on number of them as a quality of a set, just like other aspects: colours, shapes or sizes of objects. This is to say that quantifying is not an automatic process (Trick & Pylyshyn, 1994) in a sense it would happen without person’s focusing on how many objects or incidents there are. Infant’s numerical discrimination and reasoning skills form the basis of mathematical development (for a review, see e.g. Wynn, 1998). In the development of early mathematical skills, like for instance in counting of objects, plenty of practice is needed for a child to become competent. The child’s own, spontaneous focusing on numerosity leads to remarkable amount of practice in quantifying in familiar, everyday meaningful contexts of the child, which serves as a necessary building block of early mathematical thinking. If the child focuses on numerosity very seldom, possibly only when explicitly guided to, the amount of practice in recognising numerosity is minimal. The results of the two projects clearly show that there are remarkable differences in children’s spontaneous focusing on numerosity. The groups of children focusing less on numerosity seem frequently not as skilled in early mathematical skills as those groups of children who more often spontaneously focus on numerosity.

Enhancing spontaneous focusing on numerosity in 3-year-old children
Aino Mattinen, University of Turku, Finland
Minna M. Hannula, University of Turku, Finland
Erno Lehtinen, University of Turku, Finland

The goal of this study was to investigate, whether it is possible to enhance 3-year-old children’s spontaneous focusing on numerosity. Earlier studies of Hannula and Lehtinen (2000, 2001a, 2001b, 2002) have shown that there were remarkable differences in children’s spontaneous focusing on numerosity, and these differences were related to the development of early mathematical skills. In the age from three to four year, the development of cardinality related skills was faster in children, who focused more on numerosity. The participants of the study were 34 3-year-old children in seven day care centres from which 17 children from three day care centres formed the intervention group. The control group of 17 children was selected by matching their scores of spontaneous focusing on numerosity and cardinality related skills with the pre-test results of the intervention group. The researchers offered guidance for day care personnel in recognising, and promoting moments when a child focus on numerosity. The four weeks intervention was conducted by day care personnel and it included special material for children’s play. The parents
of intervention group filled a questionnaire before, immediately after, and six months after the intervention took place. The pre-, post-, and delayed post-tests were made on spontaneous focusing on numerosity and cardinality related skills. Preliminary results show that increase in spontaneous focusing on numerosity was equal in intervention and control groups in easier tasks but in the most demanding task children of the intervention group outperformed their controls. The improvement observed in control group indicates that already repeating assessments of spontaneous focusing on numerosity can increase children’s spontaneous focusing on numerosity in specific tasks. The improvement in measured spontaneous focusing on numerosity seemed to have an effect on the amount of children’s subsequent practice in recognizing numerosity only among the children of the intervention group. This conclusion is based on the results of parents’ questionnaire and the results of the delayed post-test comparing the two groups’ performance in the test for cardinality related skills six months later. The intervention group outperformed their controls in transfer task in which the children had to recognize and produce small numbers of objects.

The development of simple addition and subtraction strategies in mathematically weak children
Joke Torbeyns, University of Leuven, Belgium
Lieven Verschaffel, University of Leuven, Belgium
Pol Ghesquière, University of Leuven, Belgium

The goal of this study was to investigate the development of the strategies that children are formally taught to apply on additions and subtractions with the bridge over 10 (e.g. 8+3 or 11-3). More specifically, we aimed to examine whether the strategy development of mathematically weak children is marked by a delay or a more fundamental deficit. Taking into account the methodological weaknesses of previous studies on the topic, strategy development was examined using both the combined chronological-age/ability-level match design (Ellis, McDougall, & Monk, 1996) and the choice/no-choice method (Siegler & Lemaire, 1997). Three groups of children participated to the study: (a) Strong second-graders, i.e. 26 second-graders with strong mathematical abilities (MA); (b) weak second-graders, i.e. 25 children with weak MA, matched in chronological age with the strong second-graders; and (c) matched third-graders, i.e. 20 third-graders, matched in MA with the strong second-graders. All children solved 36 additions and subtractions with the bridge over 10 in four conditions. In the choice condition, they could choose between retrieval, decomposition to 10, and counting on to solve each problem. In the retrieval, decomposition, and counting condition, they had to solve all problems with respectively retrieval, decomposition to 10, and counting on. Using Lemaire and Siegler’s “model of strategic change” as the guiding principle for the data analysis, we found clear differences in the frequency, efficiency, and adaptiveness of strategy use between strong and weak second-graders (chronological-age match), but not between strong second-graders and matched third-graders (ability-level match). Our results thus indicate that the strategy development of mathematically weak children is marked by a delay, rather than a more fundamental deficit. Theoretical, methodological, and educational implications of the study will be discussed in detail.

The use of mathematical symbolism in word problem solving: An analysis through “children profile”
Annick Fagnant, University of Liege, Belgium

In the past, there were a lot of studies that focused on the informal solving strategies developed by young children when they were faced with word problems. The results have shown that they have strong competencies in this domain. Otherwise, some researches revealed that children have
difficulties in using more formal mathematical skills. This paper aims at enlightening this issue. The methodology consisted in individual interviews with 25 first graders. The children were asked to solve different types of problems by developing informal solving strategies. When the problem was solved, they had to write down a number sentence, which was linked to the story problem and/or to the strategy they developed to solve it. The first graders involved in this study did not receive any teaching related to word problem solving but mathematical symbolism was introduced at the very beginning of the school year with the aim of training them for computation techniques. The focus of the study was to observe whether they were able to create links between the mathematical symbolism learnt at school, on the one hand, and the intuitive and informal knowledge they developed when they were faced with word problems, on the other hand. This paper presents some results based on an analysis through “children profile”. By observing which type of number sentence each child is able to produce in a given type of problem, I established five levels of “understanding” of mathematical symbolism. These five levels try to show which concrete meaning the children can attribute to mathematical symbolism.

H 10   28th Aug  14:30 - 16:30   Room PSY 4 R

Expert Panel

STANDARDS OF TEACHING PERFORMANCE AND TEACHERS' TESTS: WHERE DO THEY LEAD US

Organisers: Ruth Zuzowsky, Tel Aviv University, Israel
            Harm Tillema, Leiden University, The Netherlands

Chairs:    Ruth Zuzowsky, Tel Aviv University, Israel
            Harm Tillema, Leiden University, The Netherlands

The discourse on teaching standards is often justified, not only as a key to improve student learning, but also as contributing to the professionalism of teachers. Standards are also regarded as a tool for professionalization of the teaching profession. The opponents of the teaching standards movement argue that the assumed link between standards reform (changing the content of teacher preparation programs, licensure and certification criteria) and student learning is weak and that standards do not contribute to the professionalism of teachers. Most of the arguments for or against using teacher tests, (besides validity arguments) such as narrowing the diversity of teachers pool, causing a shortage of qualified teachers and threatening to legitimate variability in teacher education programs and diverting these programs away from areas in teacher preparation are not in line with the required standards. In light of this hot debate on teaching standards and teacher tests, this symposium intends to discuss and provide evidence related to the standard movement from representative countries located on a continuum of experiencing this type of reform - in Israel, where the standards movement is not yet an agreed upon policy; the Netherlands - where this reform is still in an initial phase, and from the UK and the USA where the teachings standards movement acquired some empirical results as for its worth and consequences.

Standards of teaching and teacher tests: Where do they lead us?
Ruth Zuzowsky, Tel Aviv University, Israel
Zipi Libman, Kibbutzim College of Education, Israel

During the last ten years two interconnected trends have occurred: the development of content and performance standards of achievement and the development of standards-based assessment
Recognizing competence: Evaluation of an alternative teacher licensing assessment
Harm Tillema, Leiden University, The Netherlands

The shortage of teachers and the rise of new policies for their selection and recruitment have paved the way for alternative licensing methods as well as the urgency to assess these alternatives. The emergence of such alternatives is not without debate in the profession, and it is imperative that newly implemented assessment procedures for alternative licensing of teachers are carefully scrutinized in order to become accepted as valid tools of assessment with their high consequences for hiring and recruiting of teachers. An audit using a discrepancy evaluation design was conducted to gauge how newly recruited teachers who underwent the alternative licensing assessment program viewed the procedure. The assessment program was evaluated for clarity, quality, and trustworthiness. The impact of the assessment for accountability purposes and furthering professional development is discussed.

Standards alone are not enough
Ruth Heilbron, University of London, United Kingdom

The paper briefly outlines the political and educational context in which standards based assessment followed the 1988 Education Reform Act in England. This grew out of the competency movement and work on general vocational qualifications (GNVQ). Standards based assessment of teachers at all levels of professional development now exists in England. The paper will next describe and evaluate this development. It will survey and assess the debate around competencies and their development as standards, and the argument that this form of assessment cannot comprehend the complex aspects of competence manifest in teaching and is based on a technicist view of practice and on economic and political goals. The government has recently issued a policy for professional development based on a wider view of pedagogical knowledge and understanding. Two agendas appear to run through the policy, professional development and accountability and balancing them is problematic. The paper will argue that the school context is the key arena for teachers’ professional development and that working in a “learning community” can enable teachers to ‘pass’ the standardised assessment. The paper will end by attempting to identify key factors which lead to these teachers’ success, drawing on examples from a successful initial teacher education programme, a recent national research project on the induction of newly qualified teachers and work in progress on an innovative Masters of Teaching programme for practising and serving teachers.
The role of standards and testing in a new conception of the teaching profession
Robert J. Yinger, Baylor University, USA

In the United States, professional standards and high-stakes testing has long been a way of life for the teaching profession. Nearly every state requires standards-based assessment for teacher licensure, and teacher testing has recently become the sole basis for grading and ranking teacher preparation institutions nation-wide. A growing shortage of qualified teachers has lead to the creation of numerous alternative teacher preparation pathways, which have flourished in a policy environment that looks only to performance outcomes (test passing) as a prerequisite to entering the profession. These developments are causing some educational scholars to question the viability of a widely accepted notion of the professionalization of teaching. This current strategy, based largely on the way in which medicine and law grew as professions in the U.S., has relied upon the role of the universities in creating a scientific knowledge-base for teaching and upon creating independent professional bodies that would control licensure, accreditation, and advanced certification. Recent attacks by policy makers and some academics on this “internal control strategy” have lead to serious public questioning of the importance of formal pedagogical education and licensure for teachers. The purpose of this paper is to analyze further the policy environment for teaching in the United States and to propose an alternative conception of teaching as a “public profession”. This new conception of teaching will suggest a new strategy for developing teaching as a profession. Within this conception, new roles for professional standards and for knowledge and performance assessments will be explored.

H 11  28th Aug  14:30 - 16:30  Room BIO 1 C

Symposium

THE FORMATION OF THEORETICAL THINKING IN PRIMARY SCHOOL PUPILS

Organiser: Bert van Oers, Free University, Amsterdam, The Netherlands
Chair: Bert van Oers, Free University, Amsterdam, The Netherlands
Discussant: Falk Seeger, Bielefeld University, Germany

This symposium puts together different investigations regarding the formation of theoretical thinking in pupils. We aim at contributing to a deeper and coherent understanding of this development of theoretical thinking by integrating research that focusses on different aspects of this development. Complex scientific knowledge increasingly penetrates into the lives of people. Therefore it is important that pupils can learn the basics of theoretical understandings in different areas. This is sometimes called “scientific literacy”. We assume that the formation of scientific literacy starts already at primary school. The works of Vygotsky and Davydov can be seen as early proponents of this position and their ideas are still expanded in present day discussions (see e.g. Wells, 1999). The work of Davydov articulates different aspects of the formation of theoretical thinking, such as reflection and analysis on the basis of abstract models that originate in the contents of the sciences. Meaningful appropriation of such abstract models calls for collaborative learning. In the research of this symposium we present empirical investigations that address the issues of cooperative learning, reflection and personal sense as key elements in the dynamics of theoretical thinking. All investigations relate to specific educational arrangements that are deemed to promote (aspects of) theoretical thinking. The plenary discussion will be introduced by a discussant who will critically evaluate the papers in the light of the progress of our understanding of the development of theoretical thinking.
Reflective learning as a result of school activity
Maria Serena Veggetti, University of Rome “La Sapienza”, Italy

The research in the psychology of school learning has stressed the connection among the teacher's style of teaching and the pupil's style of learning (Dunn & Dunn, 1977). Traits of the whole personality contribute in defining the quality of the educational activity at school. There is growing evidence, in psychological research, of the close relation among the organization of the school activities and the attainment of higher levels of thinking abilities resulting from an entire personality involvement. A peculiar trait of personality seems to be addressed by the most disseminated conceptions of learning. G. Zuckermann (2000), a co-worker of V. Davydov, obtained evidence of major reflective learning in school boys trained in joint problem solving (see also Rubtzov, 1995). All these ideas stem from a shared frame of reference considered as a non classical trend in psychology (Asmolov, 2000). Davydov (1972, 1988, 1996) has considered joint activity among teachers and pupils at school as an optimal way for obtaining meaningful learning. The latter generates higher forms of thinking abilities, like reflective thinking, as a result of the mediation of the whole personality. This can be considered both as the pre-requisite and the result of the quality of the interaction among pupils, pairs and teachers at school. The author intend to present and discuss recent research data obtained in different school settings, working both with teachers and pupils.

Cooperative learning and theoretical thinking: An experimental study in primary school
Vera Marzi, University of Rome “La Sapienza”, Italy

In the framework of cooperative learning activity, we analysed in a previous study the features of a learning situation where subjects were engaged together in knowledge construction. Following Rubtsov (1991), we tried to understand how the teacher can make children be aware of their problem solving method through interaction. Following Davydov’s work (1972), that considered intellectual development and learning as a passage from empirical to theoretical thinking, now we aim at analysing the role of dyadic cooperation in the formation of theoretical thinking – at the levels of analysis, planning and reflection - in school setting. The attempt is to find out if a learning experience, managed through collaborative work, is up to enhance theoretical thinking development in children. Through a quasi-experimental design procedure, two groups of pupils of a primary school were compared in solving a test that requires to analyse a problematic situation (“Balance”) presented in individual versus collective administration, and in writing/drawing on a protocol the way they solved it. The findings show that the pupils of the group involved in a deep cooperation are able to better explain their strategy in terms of accuracy, clarity, abstraction and correctness.

Didactical contracts and the personal meaning of mathematical learning
Bert van Oers, Free University, Amsterdam, The Netherlands
Chantal Kessels, Free University, Amsterdam, The Netherlands

Many studies show that didactical arrangements can have significant effects of pupils’ learning outcomes. Applied to everyday school practices, these arrangements have a number of psychological consequences for the actions and attitudes of both teachers and pupils, especially with regard to the presumptions of the pupils concerning what is expected and acceptable in the lessons. This is sometimes referred to as the didactical contract that is (implicitly or explicitly) established among pupils and teacher. Research of DeCorte et al. (2000) revealed that this didactical contract might explain some of the peculiarities of mathematical learning outcomes.
Particularly the pupils’ tendency to give unrealistic answers to mathematical problems might be a consequence of a limited and distorting didactical contract. Psychologically, unrealistic answers can be conceived of as answers with a low grade of personal sense. We hypothesized that optimizing the didactical contract might show less unrealistic answers. In our investigations we studied the performances of pupils on mathematics tasks (similar to those of DeCorte et al.) on schools that were committed to a sociocultural (Vygotskian) concept of education. The daily classroom practices of these schools were based on discursive activity-based learning, in meaningful contexts. We argued that the didactical contract within these schools would promote personally meaningful responses in school tasks. In our comparative study we found that these pupils showed less unrealistic answers than children at schools with an expository teaching style.

H 12 28th Aug 14:30 - 16:30 Room BIO G D

Symposium

PROFESSIONAL LEARNING: NEW PERSPECTIVES

Organisers: Hans Gruber, University of Regensburg, Germany
Henny P.A. Boshuizen, Open University, The Netherlands
Chairs: Hans Gruber, University of Regensburg, Germany
Henny P.A. Boshuizen, Open University, The Netherlands
Discussant: Tina Hascher, University of Bern, Switzerland

A basic objective of SIG 15 (“Learning and Professional Development”) is to bring together researchers with a common research focus on development of professional expertise in various domains (e.g., medicine, business management, consultation). The research paradigms in this area are wide-spread and need a common basis for scientific discourse. Studies of professional learning present complex combinations of possible determinants of professional learning. One problem for the construction of a theoretical framework clarifying the crucial determinants arise in the variety of professional domains considered. In this symposium, authors from different European countries (Germany, Finland, and the Netherlands) present results of empirical studies referring to various concepts of professional learning and attempt to find a common framework. The purpose of this symposium is to outline the common shared and varying aspects of professional learning in various aspects and contexts. A second aim is to analyse to what extent a broader frame of reference of learning is taken into account in contemporary empirical studies of professional learning.

Exploring teachers’ will to learn
Ilse M. van Eekelen, Maastricht University, The Netherlands
Henny P.A. Boshuizen, Open University, The Netherlands
Jan Vermunt, Leiden University, The Netherlands

Although many external factors influencing teachers professional development at work, we assume that teachers themselves (can) influence their own learning and development process, if they want to. In order to study this volition aspect of (workplace) learning, we conducted a small-scale qualitative study by using a phenomenographic analysis based on interview and observation data. The results gave more insight into what behavior foster (and reversibly inhibit) teachers’ workplace learning and hence indicate the presence (or absence) of the will to learn. These behaviors are: having the ambition to discover new practices, being open to experiences and
others, being pro-active, attributing successes and mistakes to internal causes, asking questions after performing, undertaking action in order to learn, recognizing learning processes and results. Secondly, the findings suggest that there are four different types of teachers’ will to learn. A differentiation could be made between: yearning to learn, eager to learn, wondering how to learn and not seeing why to learn. With these results, this study contributes to the field of both workplace learning and motivational aspects of learning. From a practical perspective, the study gives insight into what teacher behavior could be encouraged by school directors and/or advisors in order to foster teacher learning.

*Failure culture in enterprises – A critical indicator for "learning organizations"*
Johannes Bauer, Christian Harteis, Dagmar Festner, Hans Gruber and Helmut Heid, University of Regensburg, Germany

Programmatic concepts like the “learning organization” suggest that continuous learning is an instrument of continuous adjustment on rapidly changing markets. This implies the necessity to give employees the chance to develop necessary competencies. Unfortunately there is little empirical evidence about the realization of the concept of learning organizations or competence supporting working conditions. One indicator for an organizational culture that supports learning is its failure culture: It consists of (1) the appraisal of the importance of failures in the enterprise and (2) of the conditions in handling their occurrence. The present study aims to assess failure culture in various industrial and service companies. The theoretical and practical significance of the study is the contribution to an empirical base for the discussion of “learning organizations”. The question was, whether employees and executives differ in scales measuring error orientation. It was hypothesized that significant differences occur between groups in their appraisal of learning from errors, error risk taking, covering up errors and error communication and that employees to a larger extent have a negative error orientation. A sample of 52 executives and 108 employees without leading function from German industrial and service enterprises were investigated. As independent variable was defined the hierarchy, as dependent variables certain error orientation scales. As instrument the Error Orientation Questionnaire was used (45 items; 8 scales: error competence; learning from errors; error risk taking; error strain; error anticipation; covering up errors; error communication; thinking about errors). Significant group differences could be found in two scales (learning from errors; error risk taking). In both scales executives scored better. The results indicate disadvantageous differences in aspect (1) of the failure culture: Executives see more chances to learn from failures in their work than employees do and they are more ready to risk failures. This means partly insufficient prerequisites for learning from failures in the surveyed enterprises. The first study gets complemented by two following studies: (1) In half-standardized interviews objects, criteria and handling of failures are assessed. (2) On an individual level processes of blame attribution, reasoning about a failure and drawing of consequences are surveyed.

*Artifacts and talk: Developing understanding of who knows what in a multi-professional team*
Hanni Muukkonen, University of Helsinki, Finland
Lasse Lipponen, University of Helsinki, Finland
Jiri Lallimo, University of Helsinki, Finland
Kai Hakkarainen, University of Helsinki, Finland

Organizations are putting together multi-professional teams in order to create formal practices of sharing the knowledge and expertise within the organization. This study is a part of a larger project aiming to provide research-based insights about the new possibilities of facilitating knowledge
sharing and innovation by collaborative technology. At present, the project is identifying the obstacles and constraints involved in the process of creating shared understanding in a multi-professional team. According to our present understanding, expertise relies on tacit knowledge embedded in skills, i.e., rules, procedures, and know how that may be difficult to verbally explicate. Experts’ tacit knowledge encapsulates theoretical knowledge organized around problems and cases as well as formal scientific knowledge, the combination of which is likely to promote effectiveness and flexibility in problem solving. Tacit knowledge is transmitted only through participating in social communities and shared activities rather than by directly transferring information. However, multi-professional teams may not have such shared activities naturally in their work. The research described in this study examines the constraints posed by minimal overlap of expertise on developing the practices of multi-professional teams. The data consists of two workshop meetings in a middle-sized IT-intensive company, where multi-professional teams are being created. The analysis aims at understanding the process of sharing expertise and developing artifacts, which can be used as mediating tools in collaboration.

Changes of knowledge structures in the transition from novice to expert. Results from the domain of counseling
Josef Strasser, University of Regensburg, Germany
Hans Gruber, University of Regensburg, Germany

Professional counseling is based on different kinds of knowledge. To adequately deal with specific problems and difficulties of clients, counselors have to be able to refer to valid declarative knowledge. This fundamental (theoretical) knowledge base is usually acquired in the first, theoretical phase of counselor training. During the transition from counseling novice to counseling expert, this knowledge base is object to changes in its nature (e.g., encapsulation theory). Such changes of knowledge structures depend on specific experiences in the individual counselor’s everyday practice. Declarative knowledge is re-structured and enriched after facing episodes of meaningful knowledge application. A study is reported in which 38 counselors at different levels of experience (novice, intermediate, expert) were investigated. In a prompting task they were confronted with a variety of domain-specific categories of clients’ difficulties and had to explain their knowledge of these problems. Protocol analyses of subjects’ statements resulted in quantitative (protocol length, number of theoretical and experiential propositions) and qualitative (nature of theoretical and experiential propositions, reflexivity) indicators of their knowledge structures. The results highlight the progressive narrative enrichment of counselors’ professional knowledge. Novices rarely refer to their practical experiences in explaining the different problem categories, but define and explain them in a “textbook manner”. The importance of dealing with a variety of different cases for evolving coherent and applicable knowledge structures, is indicated by the performance of counselors at intermediate levels of professional experience. Referring to personally meaningful episodes helps them to integrate or re-integrate their declarative knowledge. Counselors with at least ten years of experience often refer to some sort of generalized cases, their knowledge base is more coherent, integrating a wide range of contextual and experiential information, which allows some of them to take a meta-perspective and to reflect extensively upon their work and the different conditions for its outcomes. There are differences in the extent a (scientifically) validated knowledge base is used for these reflections. These results promote the discussion on the nature and function of counseling experience as they also imply consequences for designing training programs, that take into account the need for dealing with a variety of real life cases and the importance of narrative reflection.
Learning from errors and failures as crucial aspect of organizational development
Dagmar Festner, University of Regensburg, Germany
Christian Harteis, University of Regensburg, Germany
Johannes Bauer, University of Regensburg, Germany
Hans Gruber, University of Regensburg, Germany

Organizational learning is defined as a process to promote the ongoing adaption of the organization, which directly leads to following two questions: Adaption in which direction? And why? Today enterprises interact with their market partners under rapidly and permanently changing market conditions. Therefore, deviances from an intended or planned nominal status (like business plans) frequently occur. If an error is defined as deviance from a nominal status, modern enterprises unavoidably have to develop strategies how to integrate errors in their own culture in order to benefit from their occurrence. However, neither business nor organizational nor educational literature gives much regard to errors as a condition of organizational learning. The present contribution aims to develop such an approach for investigating errors as learning opportunities during daily work in business practice on the basis of the Fribourg-approach. That approach demands feedback-loops, reflection and personal concernment as inevitable prerequisites for learning from errors and failures. Business practice is an highly complex field, so that the first question arising concerns on the attributes of possible errors (resp. what usually is called an error). Things and processes can fail on varying levels of business organization, so that it has to be checked, what kinds of incidents are called to be an error or failure, and to what organizational level employees do refer when talking about errors. Prerequisite for that is the development of a theoretical pattern. That leads to the first question: What different levels can theoretically be distinguished when talking about errors? The second question concerns the consequences drawn from errors and failures, which has to be examined empirically: How do employees handle errors and failures? Do they utilize errors and failures as chances for learning? Referring to the first question a theoretical method has to be implemented. The theoretical pattern evolves from a critical analysis of management and organizational literature. For the second question an empirical-explorative method was chosen by conducting half-standardized interviews. A 2-factorial research design was used: A distinction between two hierarchical levels of profession (superiors vs. inferiors) has been made. The group of superiors consists of $n_1 = 10$ persons, the group of inferiors covers $n_2 = 10$ persons. All test persons are employees in industrial or in service enterprises (e.g. BMW, Infineon, Siemens, Telekom). The main results ad question 1 are: When talking about errors, three differing levels of argumentation have to be considered: (1) The level of the error-object, (2) The criterion-level for ascertaining errors, (3) The level of consequences resulting from errors. Level (1) and (2) indicate that errors are judgement-categories depending on normative scales. They define the inner-firm culture of handling errors and failures. So, they are one part of the determination of opportunities for learning from errors and failures. Level (3) focuses the crucial aspect for successful learning from errors. The main results ad question 2 are: A first analysis of the interviews shows following results: Reflecting errors, superiors tend significantly more to focus results and figures, whereas inferiors think about processes, which went wrong (level 1). Neither superiors nor inferiors see themselves influencing the definition of criteria for ascertaining errors and failures (level 2). The organizational consequences drawn from errors comply with basic requirements of learning processes by arranging feedback-loops (level 3).
Educational practice is being shaped by new technologies which can create new intellectual environments for structuring new learning opportunities. Increasingly, curriculum statements emphasise problem solving, creativity, and communication skills. Together with new intellectual tools, and changes in educational goals, new insights into learning processes are available from the learning sciences, and new assessment methods are made possible by ICT. Assessment practices must keep up with all of these new developments if they are not to become a dead hand on the education system. E-learning environments are new, and are evolving fast, so our understanding of e-assessment will be in a state of constant development for several years. This symposium will provide examples of current e-based assessment practices, and will explore threats, challenges, and opportunities associated with e-assessment, in order to help shape future research. Pead and Ridgway describe ways to assess problem solving via the creation of microworlds and simulations; Cascallar and Cascallar describe the opportunities provided by distributed testing systems, and the implications for changes in testing practices; Dysthe and Tolo report on gains in student performance associated with a digital portfolio system introduced into undergraduate history teaching; Kirschner, Frans and Sluijsmans describe the effects of peer assessment support in a computer supported collaborative learning environment. Speakers will be encouraged to report on barriers faced and overcome, and on the problems associated with e-assessment, as well as current successes. We anticipate a stimulating debate on future directions for this exciting field.

*World class arena – Delivering rich and diverse tasks in a computer-mediated test*

Daniel Pead, University of Nottingham, United Kingdom  
Jim Ridgway, University of Durham, United Kingdom

The Mathematics Assessment Resource Service at the Universities of Durham and Nottingham is currently designing the Problem Solving in Mathematics, Science and Technology strand of the UK government funded World Class Tests project. These tests are designed to identify gifted and talented students at ages 9 and 13. Each test comprises a pencil and paper component plus a computer moderated component. A key goal of the project has been to use the computer to enrich and extend the range of activities that can be presented in a formal testing environment - for example, presenting substantial data sets to explore, and using microworld simulations to support problem solving in realistic contexts. Capturing rich responses and resisting administrative pressure to restrict student responses to easily marked short or multiple-choice answers is also a challenge. World Class Tests went “live” in late 2001 and there have already been 5 international testing sessions. The talk will describe the opportunities, threats and challenges of taking an ambitious e-Assessment project into production: We will discuss our solutions, illustrated with examples of tasks and students’ responses to them. The session will describe practical issues of task design, task production and task delivery, and will show how rich responses are scored using

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an innovative computer-assisted marking system. We will examine possible future developments, and discuss the critical issue of whether the human element can ever be removed from the marking process without impoverishing the tasks.

_Distributed performance assessment for an international e-learning environment: Issues and methodologies_
Eduardo C. Cascallar, American Institutes for Research, Washington, USA
Alicia S. Cascallar, Assessment Group International Ltd., London, United Kingdom

New technology-driven infrastructures have contributed to the quality of assessment systems in recent years. The availability and reduced cost of computing power together with the introduction of high-speed data networks has dramatically changed the design and the delivery of assessment instruments in complex, cross-national programmes. New applications have been introduced which influence all aspects of the assessment process: training of human markers, knowledge base management, and development of test items, computer delivery, and automated scoring. This presentation will discuss a new application using a distributed system, which enables the computer administration of a high-stakes professional performance assessment battery. Novel technical and conceptual contributions have merged to achieve a complex evaluation of higher-order skills and strategies, which has expanded the ability to assess at a distance and in an automated fashion test-taker performance, resulting in an integrated design of greater validity, efficacy and utility. These new capabilities have needed the redesign of processes involved in test development, test administration, marker training, marking, standard setting, and reporting. In addition, this new e-Assessment implementation creates new demands for test security, test design and psychometric methods that lead to reliable, valid and fair assessments. The discussion will also address new techniques that had to be developed for the e-Training and re-centering of markers utilizing computer-based teleconferencing, distribution and joint discussion of level-anchors, and reliability testing of distance marking. The implication and impact on e-Learning assessment, and ultimately on education and stakeholders will be addressed, as they relate to European educational goals.

_Digital portfolios and feedback practices in an undergraduate university course_
Olga Dysthe, University of Bergen, Norway
Astrid Tolo, University of Bergen, Norway

The paper reports on an empirical study of a development project in assessment at the History Department at the University of Bergen based on semistructured interviews with teachers and on document analysis of student papers as well as teacher and peer feedback. The aim is first to investigate the effect of two ICT-based portfolio models on student grades, and second to analyse student and teacher responses, the relationship between the two and how students used the feedback when rewriting their essays in order to discuss the learning potential. Our study is based on sociocultural perspectives on assessment and learning. The students in the ICT-based portfolio experiment got significantly higher grades than students who had written the same amount of essays, but who were assessed on a sit down essay exam. We find that ICT was a necessary prerequisite for organizing and administering a portfolio exam for a large student group, and also that the learning potential is particularly related to the systematic use of peer and teacher feedback which was built into the digital portfolio process.
The effects of peer assessment support in a computer supported collaborative learning environment

Paul A. Kirschner, Open University, The Netherlands
Frans Prins, Open University, The Netherlands
Dominique Sluijsmans, Open University, The Netherlands

This contribution will focus on electronic (peer) assessment tools for assisting student learning. The paper pays special attention to the training of skills needed for assessment, its effect on individual and group performance, and its ultimate effect on self-regulative processes (i.e. self-assessment). The aim of the research is to investigate the added value of assessing, being assessed, and assessment support for knowledge acquisition and construction. Participants in our study were students taking part in the European Virtual Seminar, a distance education, case based university course. Students worked in groups on a report in which they integrated different disciplinary views of a problem. Students had to first write a research proposal, then write a first draft of the report, and finally revise the first draft into a final report. Student groups in the bare-assessment condition were: encouraged to discuss performance criteria; had to write an assessment report on the first draft of a different group; had their own first draft assessed by a different group, and had to respond to the assessment report they received. The rich-assessment condition was equivalent to the bare-assessment condition except that the student groups were also provided with assessment tools to support the assessment process. Examples of the tools provided are a mini-course on (peer) assessment, scoring rubrics, and guidelines for giving feedback. Groups in the control condition received neither assessment assignments nor assessment tools. The research examined the effect of the assessment support on the quality of both the end products and the group processes. Preliminary results show that student groups in the assessment conditions scored significantly better on their reports and that the tools supported them in the organisation of the collaborative learning process more than was the case for the control groups.

Symposium

RECONCEPTUALIZING LEARNING SCIENCE: LINGUISTIC, PHILOSOPHICAL, PSYCHOLOGICAL AND SOCIOCULTURAL PERSPECTIVES

Organiser: Vaughan Prain, La Trobe University, Australia
Chair: Vaughan Prain, La Trobe University, Australia
Discussant: Tytler Russell, Deakin University, Australia

This international symposium addresses the recent emergence of complementary perspectives for understanding science learning. One perspective focuses on the sociocultural basis of learning, where learning science is understood as the effects on learners’ subjectivities of engagement with the specific practices and discourses of science classrooms. Another perspective focuses on the role of language in learning and doing science, constructing science understandings, and communicating inquiries to others. A further perspective, from cognitive and philosophical orientations, focuses on the centrality of argument and reasoning in the development of science understanding, while recent psychological studies have focussed on analysing learners’ mental processes as they use language to learn in science. This symposium presents research findings from each perspective and explores theoretical and practical links between each orientation.
A small girl walking backward: Of cultural histories, social context, and learning science
Donna Alvermann, University of Georgia, USA

Martha Rapp Ruddell as part of her presidential address at the National Reading Conference read “A Small Girl Walking Backward” (Carrol, 1993). This piece recalled how kids are natural experimenters who take great delight in unexplained results. This story forms the backdrop against which I explore how learning science cannot be disentangled from cultural histories and the social context in which such learning occurs. The paper begins with a brief overview of the literature illustrating that although our cultural histories do not determine how we experience or respond to texts, these histories do in fact channel or help to frame our responses. The very idea that learning science is a socially constructed practice draws on some of the most basic assumptions from cultural anthropology and sociolinguistics. I analysed data from two published studies of learning science in secondary classrooms and use the concept of the complex self to draw attention to how students are not merely constructed as science learners, but rather actively participate in the making of their own subjectivities and the identities they assume.

Scientists’ and engineers’ views of science, using writing to do science, and the compatibility of their epistemic and language views
Vaughan Prain, La Trobe University, Australia
Larry Yore, University of Victoria, Canada
Brian Hand, Iowa State University, USA

This presentation reports on a series of case studies of scientists’ and engineers’ use of language in their research. The first is a survey of 37 scientists and engineers, the second a 6-month study of two scientists, and the third is a follow-up case study of the two scientists involved in both earlier studies. The central issues of this study were whether these scientists believe that the review-react-revise process of publishing a peer-reviewed research report simply improves the quality of the language or actually shapes the science contained in the report, and how their metacognitive awareness and executive control are demonstrated in their science inquiry and writing. Findings indicated both scientists believed that writing and revising research reports improved the science as well as the clarity of the text, that their use of absolutist language related to their beliefs about inquiry and not science knowledge, and that addressing reviewers’ comments forced them to assess, monitor and regulate their inquiries and reporting.

The language of argumentation in science
Jonathan Osborne, King’s College, London, United Kingdom

Contemporary perspectives on science recognise that argument is a central process in the development of scientific ideas and thinking. Science arguments involve which data to collect, whether these data fit or not with current theories, and the implications and meaning for current theories. In this way, claims, concepts and theories are open to challenge and refutation. In short, argument is a discourse activity which is constitutive of the practice of science itself. Hence, if science education is to provide insights into the processes and practices of science, then opportunities to engage in reflexive and deliberative argumentation are essential to develop the ability to think critically, develop criteria for arguments, and evaluate the arguments of others. This presentation reports on a case study of 12 secondary science teachers over a period of two years as they developed their abilities to implement argumentation. This work has developed materials and approaches to teaching argumentation. Using Toulmin’s (1963) analytic framework, methodological tools have been developed to analyse the discourse of both teachers and their
students and evaluate the quality of argumentation. The findings have shown positive developments in their ability to construct and evaluate argument and suggest pedagogical implications and questions for future research.

_Psychological analysis of the processes of using language for learning_  
David Galbraith, Staffordshire University, United Kingdom  
Gert Rijlaarsdam, University of Amsterdam, The Netherlands

This paper will focus primarily on the processes involved in producing written text, but will also consider similarities and differences with spoken language production. We will begin by considering the different ways in which ideas are generated during text production and the ways in which these processes interact (van den Bergh & Rijlaarsdam, 1999). We will characterise these in terms of two different types of processing: (i) A knowledge-constituting process, in which implicit understanding is formulated discursively, and (ii) a knowledge-transforming process, in which explicit propositions are manipulated to satisfy goals and external constraints (Galbraith, 1999). We will argue that, although both types of processing can lead to developments of understanding (learning), the conditions under which they do so often come into conflict. In particular, conflicts between the implicit organisation of content and the organisation embodied in scientific genre can sometimes prevent both the articulation of understanding and the internalisation of the practices embodied in scientific genre. We will then examine ways in which these two types of processing can be co-ordinated during different forms of drafting and how these relate to developments in writers’ understanding (Galbraith and Torrance, in press). Finally, we will consider ways in which different kinds of feedback, provided in authentic communicative contexts, can be used to develop writers’ understanding of content and of the functions of scientific genre (Couzijn & Rijlaarsdam, 2002).
We argue, however, that the principles outlined above are relevant in the analysis of all these environments, and that there can be a fruitful comparison between them.

**Situating openness in Swedish secondary school**
Patrik Lilja, Linköping University, Sweden

In this paper, student’s activity in a theoretically oriented social science educational programme in a Swedish secondary school is analysed. The programme combines the study of different subjects into themes that are supposed to cut across traditional boundaries. Moreover, the pedagogical form is problem-based learning, and the students are involved in searching information on the Internet and in data-bases. The students work in base groups, and to a large extent it is up to them how to use available time and plan their own activity. The teachers on the programme are encouraging a high degree of independence in searching and using information when solving the examination tasks. The students are supposed to learn to find and analyse information, as well as become more independent and responsible as learners. The analysis focus on the student’s ways of managing the intended openness in practice. This is performed by studying their conversations and use of various resources (instructions, various kinds of media, previous experiences and habits etc) in framing and managing the activity. An important aspect of the analysis deals with the goals and paradoxes the students perceive within the institutional setting of the school, and in what ways the attempt to change the form of education alters its content within this context. The empirical material consists of field notes and audio-recordings of base-group activity collected during two themes, lasting five and seven weeks.

**Openness and closure with digital representations: Reasoning and the “canons of representation”**
Jonas Ivarsson, Göteborg University, Sweden

The general interest for this study is the use of graphical representational in science education. An important aspect of educational practises is learning how to coordinate talk and action with specific representational technologies. Today, digital technology has rendered graphical representations manipulable in manners previously limited to symbolic representation and when children are confronted with unfamiliar and dynamic representations of this kind, the question is how such openness is dealt with. The theoretical background to the analysis is mainly taken from the 'historical epistemology' developed by Marx Wartofsky; the general argument being that our modes of perception change historically, in accordance with changes in the modes of our social or cultural practice. Furthermore, it is argued that seeing itself is not a physiological, but a social and cultural activity, that seeing is guided by our adopted modes of representation. Nineteen children, aged six to eleven, took part in interviews/discussions where a specially designed computer program was used. The program mainly consisted of a large picture of the earth and the issue scrutinized in this study was about the movements of an aeroplane on this display. Based on how the graphical representation was incorporated in the argumentations, three analytically distinguished forms of reasoning are illustrated in the analysis. It is argued that the differences in reasoning are related to differences in perception of the graphical representation. The discussion focuses on these differences with relation to culturally adopted modes of representation, and furthermore, how closure, with regard to the technology, can be made through the adoption of such ‘canons of representation’.
Representations of knowledge in infrastructures for learning  
Frode Guribuyi, University of Bergen, Norway

In work organisations the use of Learning management systems (LMS) are becoming an increasingly popular way to organise learning and training activities. Along with these systems come great promises of making training and knowledge management more efficient. Nevertheless, every computerised system designed for learning or training activities contain overt or covert assumptions about pedagogical issues – certain ways of representing knowledge and skills. When implementing and deploying such systems these assumptions have an impact on the learning activities and the way they are organised. In this study I look at an example of how such representations are translated and utilised for various purposes in a work organisation. In order to explore this issue an empirical study from a major enterprise in Norway is presented. The enterprise implemented a LMS to facilitate the training necessary to deploy the new work space when moving into a new building with over 7000 thousand employees. The LMS gave access to seventeen different learning modules, designed as multimedia applications. The empirical studies were carried out as a field work over a period of 9 months. In this analysis focus is set at the representations of knowledge and how they are inscribed in the infrastructure for learning. These representations are manifested through logs of each user’s progress with the assigned tasks and, at an aggregate level, as statistics and an overview of different units’ accumulated progress. The analysis trace how these representations of skills and knowledge are used for various purposes throughout the organisation.

Problem-solving in simulation-based learning environments as a boundary crossing activity  
Hans Rystedt, Göteborg University, Sweden  
Berner Lindström, Göteborg University, Sweden

This study focus on how the use of a desktop computer-simulation can contribute to bridging the gap between formal education and work practice. The analysis is based on video-data obtained from nine training sessions, the purpose of which was to educate registered nurses in anaesthesia care. The results show how the students, in their efforts to maintain normal heart rate and blood pressure levels in simulated patient scenarios, draw upon both experiences from anaesthesia practice and theory-based frameworks in order to arrive at useful explanations. One conclusion is that simulations afford unique opportunities for students to grapple with central problems in the practice of nurse anaesthetists, such as balancing life-sustaining physiological functions and preventing indications of discomfort. Another conclusion is that the students’ familiarity both with procedural aspects of work and theoretical approaches, contributed to the formation of the boundary crossing characteristics of the activity. Finally, guidance is shown to be essential for students’ opportunities to create many of the potential connections between nurse anaesthetists’ work tasks and relevant theoretical disciplines as physiology and pharmacology. Used in this way, simulations can afford learning environments in which students can learn to define and solve a broader range of problems of central importance for their future profession.
Approaching interactive-engagement tasks
Oskar Lindwall, Linköping University, Sweden
Jonte Bernhard, Linköping University, Sweden

In previous studies, we have showed that the teacher’s formulation of tasks in Microcomputer-based laboratories (MBL) is decisive for the students’ understanding. Interactive-engagement tasks led to better results on post-tests than cookbook tasks. However, it is never possible to completely specify the enacted object of learning or the students’ courses of action in the labs. In this study, we have used videotaped material of sixteen groups of students to investigate how they orient to, interpret, and participate in MBL designed for the understanding of kinematics. Although all sixteen groups used the same technology and participated in the same tasks, they solved these tasks in quite different ways, thereby constituting different activities and enacting different learning objects. The courses of action, taken by the students, could broadly be divided in three categories: (a) sometimes the relation between different phenomena and their representations were the centre of attention, creating an activity in line with the teachers intention with the task; (b) at other times, most of the students attention were directed towards the production of good lab reports; (c) at still other times, the students tried to solve the tasks with the least effort possible, using strategies disconnected from both the representations and the phenomena. After demonstrating the students’ different orientations, we will show that these orientations, although creating differences between groups, were not stable over time. Certain encounters with the instructions, the technology, the teacher, and other peers, made an orientation towards understanding phenomena and representations prominent most of the times.

H 16 28th Aug 14:30 - 16:30 Room BIO 1D

SIG Invited Symposium

YOUNG AT-RISK STUDENTS: A METHODOLOGICAL CHALLENGE TO INVESTIGATE HOW OPPORTUNITIES TO THEIR EDUCATIONAL NEEDS CAN BE PROVIDED OPTIMALLY

Organisers: Carol Aubrey, University of Warwick, United Kingdom
            Geerdina van der Aalsvoort, Leiden University, The Netherlands
Chair: Carol Aubrey, University of Warwick, United Kingdom
Discussant: Andrew Sutton, The National Institute for Conductive Education, United Kingdom

The symposium presented here includes studies that address young at-risk students. They are children “who manifest characteristics such as difficulty in using language fluently and effectively in a range of situations, inability to attend to and persevere with tasks and activities, lack of purposefulness, imagination and variety in play, lack of initiative, and lack of ‘normal’ social and emotional maturity” (Elliott & Hall, 1997, p.198). Although the definition suggests that being at-risk is a child related characteristic the symposium draws attention to the circumstances in which young students are expected to perform in academic tasks, such as acquiring reading, writing and arithmetic skills. The presenters address either the academic skills in a longitudinal study to reveal how at-risk development actually turns out from the preschool to grade 1 (Kirby and colleagues) and from preschool to beyond (Kajamies and colleagues), focus specific attention to preschool (Aubrey) or later grades (Kajamies and colleagues). Moreover, the methods used in addressing at-risk development show a rich variety. Kirby and colleagues relate student performance with letter
knowledge and real reading skills to family literacy. Kavkler and colleagues address arithmetic performance with both quantitative and qualitative methods. Aubrey uses interviews, observation and document analysis, and Kalamies and colleagues present findings based on single subject studies with multiple-baseline across subjects. A different perspective is provided by Freire and César. They discuss what it means to provide instruction with students special educational needs in inclusive education.

Children at risk of developing reading disabilities: The roles of naming speed and phonological awareness
John R. Kirby, Queen’s University, Ontario, Canada
Rauno Parrila, University of Alberta, Canada
Jennifer Curry, Queen’s University, Ontario, Canada
Robindra Sidhu, Queen’s University, Ontario, Canada

The Double-Deficit hypothesis indicates that deficits in both phonological awareness and naming speed are associated with reading disabilities. This paper reports results from the first 2 years of a longitudinal, prospective study of children selected to fit the four double-deficit categories. Our goals are to (a) observe the development of reading disabilities in these children, and (b) investigate the relationships between these deficits and other factors, such as home background and literacy activities, print exposure, and orthographic processing. We screened 550 kindergarten children (aged 5 years) on measures of phonological awareness (Word Blending) and naming speed (Object Naming), and selected 200 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 Grade 1, we are assessing further early reading and spelling skills (regular, irregular and pseudo word reading, orthographic processing, and regular and irregular word spelling). Kindergarten 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. Family literacy activities were related to higher phonological awareness scores, and less so to faster naming speed. Measures of print exposure did not differentiate among the groups. Reading and spelling achievement data are being collected in late 2002 and will be presented in the paper.

Longitudinal study of children with very low mathematical competence in preschool years
Marija Kavkler, Counselling Centre for Children, Adolescents and Parents, Ljubljana, Slovenija
Simona Tancig, University of Ljubljana, Slovenija
Lidija Magajna, Counselling Centre for Children, Adolescents and Parents, Ljubljana, Slovenija

Basic arithmetic skills are learned before the formal schooling. Arithmetic learning difficulties can be attributed to insufficient development of the basic arithmetic skills in preschool years. This requires follow up studies with children who lag in attainment to plan interventions in the development of the early numeracy. The aim of the present study was to follow up a small sample of children with exceptionally low achievements on the Early Numeracy Test (ENT) in the preschool years when they were approximately 5 to 6 years old, through a period of the first 3 years in the school. The Early Numeracy Test (Van Luit, Van de Rijt & Pennings, 1994) was used to assess the early numeracy competence. The test is based on 8 components that encompass the early numerical competence. The test AAZ (Automatization of Arithmetic Facts and Procedures; Aubrey, Tancig, Magajna, & Kavkler, 1998) and word problems were used for assessing the
### Instructing at-risk students in mathematical problem solving with a computer supported adventure game

Anu Kajamies, University of Turku, Finland  
Riitta Kinnunen, University of Turku, Finland  
Marja Vauras, University of Turku, Finland

In this intervention study, our aim is to find effective ways of helping motivationally vulnerable students, whose self-regulation skills are poorly developed, to respond to training in mathematical problem solving skills with growing self-control and competence. We attempt to find out how much the at-risk students benefit from training in word problems if the training is backed with an explicit focus on motivation and meta cognition. We assume that the first successful step requires innovative task environments, for instance games, where many motivationally vulnerable children overcome their anxiety, and become intellectually more involved in tasks. A single-subject study...
with multiple-baseline-across-subjects design and pre-, post-and follow up test design with control groups was used. 4 boys and 4 girls, who took part in intervention, were selected from 445 fourth graders (10 years old). Inclusion criteria were poor mathematical problem solving skills, low self-regulation and task orientation, high social dependence and/or ego-defensive orientation, and average decoding and arithmetic skills. In the intervention, two peers solved mathematical problems in the computer supported mathematics adventure game and received guidance from the computer wizard, each other, and the teacher. The training lasted 16 hours, one hour twice a week, including explanation, modeling, discussion, and practicing of cognitive, meta cognitive and motivational aspects of thinking and behavior. The training motivated the at-risk students to engage in mathematical problem solving and improved their performance. The group-level results from pre-, post- and follow-up test comparisons indicated significant training effects for mathematical problem solving.

Poets’ dreams, hard realities and several doubts: Illuminating the process of inclusion
Ana Sofia Freire, University of Lisbon, Portugal
Margarida César, University of Lisbon, Portugal

Nowadays, it is acknowledged that the inclusive school approach is the best means to provide each child a quality education (Salamanca Statement, 1999). This approach recognizes that every child has the right to develop him/herself according to his/her potentialities, to participate in the activities of the educative community, to share the same curriculum with his/her peers and to have the same opportunities of success (Ainscow, 1999; Bénard da Costa, 1999; Porter, 1995; Wang, 1995). This is one of the greatest achievements of the last years. However, from ideals to reality there is no easy way. By discussing two case studies of profoundly deaf children from a primary regular school (6 to 10 years old) we are going to illuminate the process of inclusion. We interviewed both children and the educational agents involved with their education. Other data were gathered through participant observation of different school contexts – playground, regular class, special class where they learn written Portuguese and also Portuguese Sign Language (LGP). Both children attended the same special class for learning Portuguese and LGP, but each one was in a different regular class. Each regular teacher held a different view about inclusion and had different in-class practices. When we analyse the educational experience of each child, we wonder if any of them is appropriating knowledge and developing the competencies Portuguese law states as essential for any child living nowadays in our society and we can also reflect upon what is still missing in order to achieve an inclusion process.

H 17  28 Aug  14:30 - 16:30  Room PSY 2 A

Symposium

NEW ENCOUNTERS FOR EDUCATIONAL PSYCHOLOGY

Organiser: Maria Beatrice Ligorio, University of Bari, Italy
Chair: Clotilde Pontecorvo, University of Rome “La Sapienza”, Italy
Discussant: Clotilde Pontecorvo, University of Rome “La Sapienza”, Italy

Educational Psychology is still unable to explain many of the phenomena taking place into school settings. Issues such as implicit learning, learning difficulties, bully students, interconnections with families, personal, moral and cognitive development, seem to call for an enrichment of current theories. In the light of this reflection the more overall problem emerges of how to define the
nature of school intervention and of what roles school psychology should cover. In the attempt to answer to these issues Educational Psychology has already encountered many areas of study and of theoretical reflection which are, in various and different ways, interested in understanding the learning process. Contributions are taken from anthropology, history, philosophy, ethno-methodology, ethnography, symbolic interactionism, phenomenological sociology, semiotics, literary theory, art history, pedagogy, psychiatry, law. Dynamic psychology is basically absent from those encounters, in particular that area of reflection on theoretical and clinical inquiry into the unconscious mode of functioning of the mind. This symposium is an attempt to analyse possibilities, enrichments, advantages, and disadvantages coming from this new encounter.

_Educational psychology and dynamic psychology: A dialectic space within the socio-constructivism framework_

Sergio Salvatore, University of Lecce, Italy
Maria Beatrice Ligorio, University of Bari, Italy

In a recent work (Salvatore et al, 2003) we already shown how educational psychology and dynamic psychology are missing the opportunity to encounter each other. We also underlined how this encounter could take place within the socio-constructivism debate, based on a series of studies about the _symbolic order_ and the various forms of subjectivity and meaning making. This missed encounter is not fortuitous. The theoretical core of dynamic psychology and psychoanalysis has raises and develops as an individualistic model. Furthermore, during the last forty years there has been a systematic ward off from the positivist psychodynamic approach and a concentration on the clinic field. At the same time, educational psychology has been too embedded into the cognitive vision and it has been searching for the rational dimension of learning. We believe that now time is mature enough to sustain this encounter. The socio-constructivism approach allowed a re-framing of dynamic psychology, that sees now the mind as a process of shared meaning-making, situated and contextualised within human relationships. At the same time, educational psychology is becoming more and more a psychology of situated learning and sense making, where the intertwines between social dimensions and self development are in the foreground. A possible dialectical encounter between these two psychologies would allow a richer and more useful conceptualisation of relevant concepts such as mind, unconscious, identity, even culture. A set of possible methods to analyze the modalities of the new encounter will be discussed during the presentation.

_Going to no-where: The role of diagnosis in educational practice_

Emily Abbey, Clark University, Worcester, USA
Jaan Valsiner, Clark University, Worcester, USA

Being at school can be mind-shattering experience for a child who does not adjust to the behavioral regime that the cultural setting demands. As a result, a child can become labeled as having a disorder. Superimposing a diagnostic label on a child leads to a new trajectory of meaning-making, where the diagnostic label operates as a semiotic mediating device in the child’s identity processes. In U.S. school systems, the current use of the DSM-IV to diagnose school children with disorders, such as ADHD, is challenged on the grounds that the scope of these tools is non-systemic, looking only at the child. To adequately understand children’s social development and behavior, one must consider the many different arenas to which the child is trying to adapt socially, as these too are agents behind the child’s behavior. Areas that need to be considered include parents and siblings, peers, teachers, educational philosophy of the school system, culturally emphasized values and practices. It is here argued that a systemic consideration of the
relations of the child with these settings reveals a pattern of incompatible messages from many of these outlets. Current diagnostic practices that do not acknowledge the child as acting in the middle of a slew of contradictory expectations provide nothing more than a “road to no where” for the child.

*Is education ready for the “new knowledge” challenge?*
Marlene Scardamalia, University of Toronto, Canada
Carl Bereiter, University of Toronto, Canada

The ability of a society to generate new knowledge is coming to be seen as a major determinant of the health and wealth of nations and education as the foundation of that ability. Knowledge building is the term used to focus on the ‘new knowledge’ challenge. Traditionally educational programs have been designed to ensure that students’ ideas grow closer in substance to established bodies of knowledge so that our cultural heritage can be passed from one generation to the next. Throughout most of history working with available knowledge constituted an adequate objective for education, because knowledge was not thought of as advancing; it was thought to be in greater danger of deteriorating or getting lost. Perhaps not until the curriculum reforms of the 1950s did the idea become firmly established that knowledge is continually advancing and that the schools accordingly have a responsibility to keep students abreast of it. The knowledge age adds a new requirement: students must learn how to contribute to the production of new knowledge. This is a radically different challenge for education — different from both the ancient challenge of cultural transmission and the more recent challenge of lifelong learning. The challenge of creating shared intellectual property and continually improving it is what goes on in knowledge building communities. This process is elaborated in this talk, with implications for the design of new pedagogues, practices and technologies for education.

*Theories of unconscious learning confronted*
Robert-Jan Simons, Utrecht University, The Netherlands

Recently, there is a renewed interest in theories of unconscious learning processes and outcomes. Both implicit learning processes and outcomes receive new emphasis. People learn while working without even calling this learning (implicit processes). Moreover, they know things and are able to act without knowing that they are able to. Some of these unconscious processes and outcomes can be brought to consciousness, some others probably not. Important questions refer to issues such as: which processes and outcomes can be brought to consciousness, and which cannot? How can we help people to become aware of learning processes and outcomes? (How) can we influence implicit learning? Theories that help to interpret these implicit ways to learn, come from Nonaka and colleagues, Argyris and Schöon, Claxton and activity theory (Engeström and colleagues). These theories are reviewed in the paper. What are their agreements and differences? Then, these theories are compared with psychodynamic perspectives. Some main principles of Freudian and neo-Freudian theories are sketched from a “learning perspective”. How can these (ancient) theories add to the ideas about implicit learning processes and outcomes? How is unconsciousness blocking learning? How can we distinguish subconscious and unconsciousness? How about defence mechanisms?
Symposium

**VYGOTSKY’S THEORY IN THE CLASSROOM**

Organiser: Alex Kozulin, International Center for the Enhancement of Learning Potential and Hebrew University, Israel
Chair: Alex Kozulin, International Center for the Enhancement of Learning Potential and Hebrew University, Israel
Discussant: Felice Carugati, University of Bologna, Italy

The goal of the proposed symposium is to compare and evaluate the current classroom applications of Vygotskian theory. Such a comparison will help to elucidate the following important theoretical issues: 1) Cultural specificity of the application of Vygotskian theory in different countries and different educational frameworks; 2) Relationships between Vygotskian theoretical perspective and constructivist paradigm; 3) Elaboration of the notion of psychological tools in the contexts of technology-assisted instruction. Symposium presentations will cover such topics as fostering of metacognition and reflection in elementary school students, use of Davydov’s program for teaching mathematics in American schools, integration of hyper-media modules into the Vygotskian-based program for teaching science in Germany, and application of the concept of learning potential for the assessment of third language literacy in immigrant students from Ethiopia.

*Development of reflection through learning activity*
Galina Zuckerman, Psychological Institute of Russian Academy of Education, Russia

What kind of developmental potential is present in elementary schoolchildren but hindered by the traditional type of education? Half a century ago Daniel El’konin and Vasili Davydov - the leaders of Russian Vygotskian educational psychology – started answering this question. They suggested that **reflection** is a basic human ability and it can be developed in younger students. Reflection includes thinking about one’s own actions and thoughts, taking other people’s point of view, and understanding oneself. In this paper I present results of the design experiments conducted in Russian schools that deliberately scaffold students’ reflection. In these schools the majority of children achieve high levels of reflection previously attributed only to the gifted students. The evidence from the on-going longitudinal study illustrates the multidimensional development of students’ abilities for reflection through recurrent reconstruction of the instruction in the zone of proximal development of the community of learners. One aspect of reflection will be given special attention, the ability of the student to take the perspective of another person. The comparative microanalysis of learning discourse in the first and the fourth grades demonstrated a significant growth of this ability through the first three years of schooling and made evident limitations, imposed by the existing structure of the classroom cooperation. Building new forms of learning interaction opens a possibility for a majority of students to critically address the viewpoints of their partners and to reach, through this practice, a higher level of reflective development.
Vygotskian theory and mathematics education: Resolving the conceptual-procedural dichotomy
Jean Schmittau, State University of New York, Binghamton, USA

The aim of this paper is to demonstrate that in spite of some superficial similarities the current mathematics reform in the US based on constructivist principles differs substantially from mathematical education based on Vygotskian cultural-historical theory (V.V. Davydov’s mathematics program), and to illustrate the manner in which Davydov’s program virtually obliterates the conceptual-procedural division that has fueled the current “math wars”. Both constructivism and Davydov’s approach emphasize the active character of students’ acquisition of mathematical concepts. Constructivists, however, begin the instructional process from the children’s pre-existent concepts while Vygotskians reorient it toward acquisition of what Vygotsky defined as “scientific” rather than “spontaneous, everyday” concepts. The two approaches differ in: development of the concept of number, as emanating from measurement (Davydov) vs. counting (constructivism); development of the algorithm as a fully conceptual cultural historical product (Davydov) rather than a computational rule that may be consigned to a calculator (constructivism); and inclusion of schematic models (absent in constructivist approaches) that function as psychological tools in Davydov’s curriculum. A three-year study of the implementation of Davydov’s elementary mathematics program in a school setting in the US found that the American children overcame the initial challenges of the program, consistently resolved computational errors conceptually, and finally demonstrated the ability to solve high school level mathematics problems. The curriculum appeared to foster the development of theoretical thinking, an explicit goal of Davydov’s program, which constitutes its major value and educational significance.

Ascending from the abstract to the concrete – Seeking new ways for learning science
Hartmut Giest, University of Potsdam, Germany

Large-scale international studies (TIMSS, PISA) conducted in a number of advanced technological countries demonstrated a lack of available and applicable science knowledge in their school children. A considerable number of students in German universities do not complete their studies due to the failure in scientific subjects. Our research is aimed at improving science education by developing adequate and efficient learning activity in school, with a strong focus on the students’ acquisition of scientific thinking. We characterize the activity theory elaborated in the framework of Vygotsky’s cultural-historical theory as one of the constructivist approaches. Activity theory includes the development of learning activity, ascending from the abstract to the concrete, meaningful introduction into the subject of study, relevance of instructional ways and means, social interaction, cooperation and communication. On the basis of these principles we developed hyper-media modules of ecological education oriented toward self-regulated learning, interdisciplinary interaction (unity of science and aesthetics), theoretical thinking and systemic education. Using these modules, we conducted learning experiments. The empirical results show that through self-regulated and distance learning using the hyper-media modules, students reached a new level of cognitive development characterized by the growing ability of complex and dialectical thinking and the generation of new perspectives on the relation between nature and humanity. The investigation proposes new ways for developing learning activity in an interdisciplinary classroom using modern educational media.
The aim of this paper is to present research which evaluates the applicability of Vygotsky’s sociocultural theory and the concept of dynamic assessment (R. Feuerstein) to the problem of assessing reading comprehension in English as a third language (L3). These theories view the acquisition of literacy as a dynamic process, not all aspects of which can be identified through standard achievement tests. The study was conducted with immigrant students from Ethiopia studying at pre-academic centres in Israel. The assessment procedure included a pre-test, mediation, and post-test. The pre-test was based on a standard reading comprehension placement exam. Based upon the pre-test material, a very detailed analysis of the required pre-existing knowledge and necessary strategies was then mediated to the students. The post-test was identical to the pre-test regarding structure, requirements in terms of pre-existing knowledge and strategies, length, etc., but with different content. The results demonstrated: 1) A dynamic assessment procedure that includes strategy training significantly improved the text comprehension performance of L3 students; 2) The dynamic assessment procedure added information regarding students’ learning potential over and beyond their initial performance level; 3) The learning potential profile of immigrants from Ethiopia is somewhat different from that of non-immigrant Israeli students. We will thus argue that a dynamic assessment procedure has some advantages that are absent in more conventional approaches when it comes both to assessing the status of English as L3, and drafting an educational framework for culturally different students.
processes are involved in reading and interpreting literary texts? Five research presentations from different regions, focussing on different languages (L1, L2), on literary narratives or poetry, with different methodologies, try to shed light on this question.

Implications of a meaning-based theory of reading for the literature curriculum
Peter Smagorinsky, University of Georgia, USA

In an essay published in the *Review of Educational Research* in 2001 (If Meaning is Constructed, What is it made from? Toward a Cultural Theory of Reading), I explore the notion of meaning, particularly as applied to acts of producing and reading texts. I ground my analysis in principles of activity theory and cultural semiotics, focusing on the ways in which reading takes place among readers and texts in a culturally mediated, codified experience that I characterize as the transactional zone. I build on Vygotsky’s work - particularly the zones of meaning that Vygotsky describes as *smysl* (translated as *sense*) and *znachenie* (which I translate as *articulation*) - to argue that meaning comes through a reader’s generation of new texts in response to the text being read. To account for this phenomenon, I give examples from studies illustrating Vygotsky’s zones of meaning, the dialogic role of composing during a reading transaction, the necessity of culturally constructed subjectivity in meaning construction, the role of intertextuality and intercontextuality in the construction of meaning, and the depths and dynamics of context in readers’ engagement with texts. In this paper I will briefly review this work and then consider implications for the teaching and learning of literature. Possible implications include attention to the mediational role of different instructional approaches on students’ experiences with literature, the role of readers’ emplotment of personal narratives through which they encode literary texts, and so on.

Local incoherence detection and interest in literary texts
Lucia Lumbelli, University of Trieste, Italy
Chiara Odorico, University of Trieste, Italy

The purpose of this study was to examine the feasibility of an educational project focussed on the detection of local incoherence occurrences and the search for the information necessary to draw inferences suitable to restore it in literary narrative texts. A positive answer would indirectly confirm Kintsch (1980) and Schank (1979) assumptions about the experience of inconsistent or unexpected information triggering situational interest (Hidi & Baird, 1986) in literature reading. Is it also feasible an educational software which makes the project compatible with the constraints of classroom activity? Are both project versions effective in improving reading comprehension ability? Three conditions (face-to-face project, computer version, control one) were compared with gain scores on a reading comprehension test as dependent measure. The participants were 60 students about 12-year-old, divided into 3 groups matched on reading comprehension ability. In both experimental conditions the texts were 6 stories from Italo Calvino’s *Marcovaldo*. All face-to-face sessions were audio-recorded in order to obtain qualitative data about the relationship between interest clues and steps in text processing. Both experimental groups outperformed the control group. No significant difference between experimental groups was found.

Poetry: Prima Vista – The foreign language learner reading poetry
Signe Mari Wiland, Agder University College, Norway

Finding out how young people read and interpret literary texts is dependent on the method used. My doctoral research project aims at winning greater insight into young people’s potential to create meaning in a poem in English. It is based on an experimental method to the reading process
motivated by some selected response theorists whose concepts are also applied in the assessment of the protocols. The assessment part is divided into a) reader awareness and reader identity, b) the intellectual/affective dichotomy and c) linguistic competence. In this paper I focus on a) and b). I study what reader awareness and reader identities emerge in the protocols, including reactions to the method. Parameters used are identification potential, competence awareness, age and gender as they either explicitly or implicitly emerge in the protocols. The discourses in the protocols reveal personal preferences for reading and exhibit varying degrees of cognitive and affective reactions, which to a certain extent are dependent on the nature of the poem but also on self-awareness as readers. The emotional impact the poem had on the readers is expressed in different ways, including their ability to approach poetry as either art (aesthetic reading attitude) or a piece of information (efferent reading attitude). I study what discourses include emotional reactions and whether it is the theme of the poem or the choice of words and expressions that triggers emotional reactions in the readers.

Reading practices in the L2 Italian literature classroom: Promoting awareness and change
Piera Carroli, Australian National University, Australia

Although most second language educators and researchers agree that literary texts should be included as early as possible in the second language curriculum, hardly any studies have been carried out to investigate the variation in the quality of students’ understanding of L2 literary texts. The study reported in this paper investigated students' reading processes and strategies, over repeated readings - some individual and some collective - of literary texts in Italian. Then, it incorporated the strategies of successful students into the class to contribute to a pedagogy of change. The study was conducted over six weeks of semester 2, 2000 with 17 students of Continuing Italian 2 (4th semester) at the Australian National University. The theoretical framework underpinning the study is based on a mixed perspective, integrating key elements of phenomenography, hermeneutics, L2 reading approaches, and reader response and reception theory. A crucial aspect emerging from the analysis of the findings is why and how students’ processes changed or did not change, through the cycle of individual reading and writing followed by classroom comparison of students’ responses, text re-reading and re-writing. This paper will focus especially on the factors that contributed to change in students’ levels of understanding by the end of the 6-week learning process.

The three friends by Winterson: A study of students’ interpretation processes related to the quality of literary response
Tanja Janssen, University of Amsterdam, The Netherlands
Martine Braaksma, University of Amsterdam, The Netherlands

To get insight into students’ literary reading strategies, we conducted a ‘known group study’. Participants were 19 tenth graders, who were either low or high achievers according to their literature teachers. We studied and compared the reading processes of both groups, in relationship to the quality of their written responses. Each student read five stories. The stories were presented to them fragment by fragment on a computerscreen, and students were asked to verbalize their thoughts while reading. Afterwards, they wrote a literary critique, answered open-ended questions, and filled in a questionnaire about their general reading attitudes and response preferences. Think alouds were audiotaped and transcribed into protocols. The protocols were divided into utterances, and the reading process in each utterance was determined (e.g. reading aloud, predicting, paraphrasing, evaluating, responding emotionally or metacognitively, questioning). In addition, the main subject of each utterance was determined (e.g. story characters, events, setting, style,
structure, theme). Between low and high achievers significant differences were found in reading processes, the quality of their written responses and general response preferences. Low achievers, for instance, more often limited themselves to retelling story events, they responded less evaluatively during reading and used less criteria in their critiques than did high achievers. In this presentation we will discuss the main differences, using students’ processing of “The three friends”, a story written by Jeanette Winterson, as an example.

H 20 28th Aug 14:30 - 16:30 Room BIO 1 1

Expert Panel

PROBLEM-BASED LEARNING THROUGHOUT THE WORLD: WHEN DOES IT WORK, WHEN DOES IT FAIL

Organiser: David Gijbels, University of Maastricht, The Netherlands
Chair: Filip Dochy, University of Leuven, Belgium and University of Maastricht, The Netherlands
Panelists: Mark Newman, Middlesex University, United Kingdom
Giovanni De Virgilio, National Institute of Health, Rome, Italy
Arie Nieuwenhuijzen Kruseman, Piet van den Bossche, Mien Segers and David Gijbels, University of Maastricht, The Netherlands

The expert panel discussion starts with four short presentations elaborating the effectiveness of PBL in different contexts. While Newman and colleagues find no or negative effects in their study, De Virgilio and Pernisco report results that encourages them to continue to spread the use of PBL. If results from different studies go in antithetical directions, how can we have ‘save’ knowledge on the effectiveness of PBL? Systematic reviews can be seen as a valid means to overcome this. An international panel of practitioners and researchers carried out a systematic review in order pilot a protocol and data extraction tool and to assess the level of current ‘robust’ knowledge on the effects of PBL. The results are presented by Van den Bossche. Finally, Gijbels and colleagues present their results from a statistical meta-analysis concluding that the implications of assessment measures must be considered when examining the effects of PBL. In a second part, the panel members will present their solutions and statements to the audience and argue about their points of view. The panel discussion will focus on the question when PBL works and when it fails.

Problem based learning and its effectiveness in continuing nursing education: Result from a randomized trial
Mark Newman, Kate Ambrose, Phyl Morris-Vincent, Shella Quinn, Lesley Vernon, Sarah Walls and Corner Trevor, Middlesex University, United Kingdom

Problem Based Learning (PBL) has been adopted around the world as a philosophy and method for teaching and learning in professional education in particular. There is however, evidence of substantial variation in its implementation and little robust empirical evidence to support claims made that PBL is more effective than other teaching and learning strategies. This presentation will discuss the methodology and results of a field trial of PBL in a continuing education programme for nurses. Randomised field trial comparing the effectiveness of a PBL curriculum with a standard ‘current practice’ curriculum in a continuing professional education programme for nurses. Qualified Nurses from 6 London Hospitals undertaking Advanced Diplomas in Medical and Surgical Nursing at one North London University. The intervention PBL curriculum is based
on the principles of ‘Authentic PBL’. The control Small Group Learning (SGL) Curriculum is delivered (if not designed) at the ‘Instructor Centred’ end of the teaching styles continuum. Multi-method approach including observation and analysis of a random sample of teaching sessions, measuring students attainment, satisfaction, workload, learning styles, teamwork skills, and impact on practice. Impact on teachers workload and satisfaction was also explored. 67 students were randomised to either the intervention of control groups. Results suggests that there is no difference in student attainment as measured using course assignments and that PBL students were more dissatisfied with their programme on a range of indicators.

Problem-based learning for improving the quality of environmental hygiene services in Tuscany region
Giovanni De Virgilio, National Institute of Health, Rome, Italy
F. G. Pernisco, National Institute of Health, Rome, Italy

The Italian National Health Service (NHS) in the Region of Tuscany provides services related to environmental health through the Department of Prevention (DP) of twelve Regional Local Health Units (LHUs). The Section of Environmental Zoology (SEZ) of LHU Grosseto functions as specialised structure. To increase its utilisation and promote networking among the LHUs, two initiatives were organised in 1998 and 2001. They consisted in residential short courses for the different professionals working in DPs. Problem-based Learning (PBL) was selected as instructional method. The National Institute of Health (Istituto Superiore di Sanità, ISS), utilising PBL since the late 80ies, provided the methodological support. Both courses consisted of three modules of three days each. Each module was addressing one main issue (e.g.: mosquitos’ control) through one PBL “seven steps” cycle. A satisfaction questionnaire was administered at the end of the first course (Respondent Rate: 96%) and after one year (RR: 92%). Participants rated positively, in both rounds, the effectiveness of the didactic method, the acquisition of new concepts and skills. On the operational side: the number of LHU collaborating with SEZ increased from 4 to 10; the type of collaboration changed from erratic consultations to structured projects and links among 4 LHU and SEZ produced the “Integrated West-Nile Control Project”. While waiting for educational research to shed more light on PBL effectiveness, the positive results collected by ISS in different occasions, as described above, are encouraging to continue to spread its use in the CE of NHS professionals.

The effectiveness of problem based learning: Results of a pilot Campbell collaboration systematic review
Mark Newman, Middlesex University, United Kingdom
Jean McKendree, University of Newcastle, United Kingdom
Tony Roberts, University of Durham, United Kingdom
Isobel Rolfe, University of Newcastle, Australia
John Smucny, State University of New York Upstate Medical University, USA
Giovanni De Virgilio, National Institute of Health, Rome, Italy
Piet van den Bossche, University of Maastricht, The Netherlands
David Gijbels, University of Maastricht, The Netherlands
Charles Engel, University of London, United Kingdom

PBL represents a major development and change in educational practice that continues to have a large impact across subjects and disciplines worldwide. It is not always clear what exactly has been taken up in the name of PBL. Despite the volume of literature on PBL it is not at all clear that we have safe knowledge about the effects of PBL in different learning contexts and in different
modes of operation. Whilst the principle of research reviews is well established in education the appropriate process and purpose of such exercises is contested. Systematic reviews can be a valid and reliable means of avoiding the bias that comes from the fact that single studies are specific to a time, sample and contexts are may be of questionable methodological quality. They attempt to discover the consistencies and account for the variability in similar appearing studies. This paper will report on the process and results of a systematic review pilot carried by an international panel of practitioners and researchers as part of the Campbell collaboration. The purpose of the study is to pilot a protocol and data extraction tool and to assess the level of current ‘robust’ knowledge of the effects of PBL. The protocol and extraction tools were developed using the approach that has been successfully used in the field of Healthcare by the Cochrane Effective Practice and Organisation of Care Group. Inclusion criteria are both methodological and topic related. The sample is 91 studies cited as providing evidence of the effect of PBL in 5 previous ‘reviews’.

The relation between assessment practices and outcomes of studies: The case of problem-based learning
David Gijbels, University of Maastricht, The Netherlands
Filip Dochy, University of Leuven, Belgium and University of Maastricht, The Netherlands
Piet van den Bossche, University of Maastricht, The Netherlands
Mien Segers, University of Maastricht, The Netherlands

Studies on the effects of problem-based learning (PBL) always find positive effects concerning the problem-solving ability of students. Nevertheless positive effects as far as the acquisition of knowledge is concerned, are rarely found. This seems to be in contradiction with the vast amount of research showing knowledge acquisition as a prerequisite for successful problem solving. In the present study, we investigate the influence of the type of assessment on the reported effects of PBL as the main independent variable. Hereto we used Sugrue’s (1995) model of problem solving. The model is translated into specifications for the assessment of the main cognitive components of problem solving: knowledge structure, cognitive components and motivation. The three aspects of the knowledge structure that can be targeted by assessment of problem solving were used as main independent variable: understanding of concepts, understanding of the principles that link concepts, and linking of concepts and principles to application conditions and procedures. A statistical meta-analysis was conducted, supplemented by more inclusive vote counts and the associated sign test. Results show that there is a difference in the reported effects of PBL between each of the three aspects in the knowledge structure. The most positive effects are found with assessment-methods measuring the linking of concepts and principles to application conditions and procedures. Negative effects are found with studies measuring on the concept level of the knowledge structure. It is concluded that in educational research the implications of assessment measures must be considered when examining the effects of PBL.
The aim of this symposium is to inform the theory of variation (Marton & Booth, 1997; Bowden and Marton, 1998; Marton & Morris, 2002; Marton, Tsui et al, in press) and deepen our knowledge on learning. The type of learning discussed here is learning seen as a qualitative change between different ways of seeing, understanding or experiencing aspects of the world around us (see Marton & Booth, 1997). By contrasting and discussing three empirical studies positioned by one introductive and more theoretical presentation we hope to gain further insights in relationships between teaching and learning in different dimensions. (a) On the theoretical level, the ways in which we can describe and explain learning and teaching (Marton & Runesson). (b) As a cross-cultural phenomenon. We hope to improve our understanding of learning and instruction by contrasting teaching of the same topic in different countries (Runesson & Mok). (c) As relationships between sensuous experience and learning exemplified by the learning of Cantonese (Ki & Marton). (d) As relationships between instruction and learning in actual classrooms where the teaching was informed by the current theoretical perspective (Lo & Chik).

Variation and the space of learning
Ference Marton, Göteborg University, Sweden
Ulla Runesson, Göteborg University, Sweden

In this paper we present the theoretical background for the empirical studies presented in the symposia. The theoretical framework is developed in detail by Marton and Booth (1997) Bowden and Marton (1998), Marton and Morris (2002) and Marton, Tsui et al (in press). The point of departure taken is that education aims at developing a capability to handle novel situations in powerful ways. How we handle situations is related to how the situation is seen or experienced. Powerful ways of acting derive from powerful ways of seeing, or experiencing, and implies being able to discern what is critical for handling the situation in powerful ways. We learn to experience and act in the world by discerning critical features of objects and situations and focusing on them simultaneously. These features can be discerned only by experiencing variation in the dimensions corresponding to them. Learning something in a certain way requires that the learner experiences pattern of variation/invariance. A necessary condition for learning is thus that there is relevant variation experienced by the learner.

Learning Cantonese tones
Wing-wah Ki, University of Hong Kong, China
Ference Marton, Göteborg, University, Sweden

Mastering of the Cantonese tones is essential for learning Cantonese, because the tones are used to differentiate word meanings. However, very few foreigners seem to be able to learn the tones even after many decades of stay in Hong Kong. In our study we assume that the main reason is the
difficulty in perceiving the pitch pattern as part of the word pronunciation, such that a variation in
the tone would relate to a variation in meaning. Using Variation Theory as the guidance, a training
experiment has been carried out with subjects who know no Cantonese, on the learning of
monosyllabic spoken Cantonese words. The results indicate that keeping sound invariant and
varying tones along with meanings during practice considerably enhances the learning of these
words and their differentiation in meaning in relation to tonal differences; while keeping the tone
invariant and varying the sound along with meanings enhances in the same way the learning of
these words and the differentiation of meanings in relation to the differences in sound. As the
learning of spoken Cantonese words requires differentiation of meanings through sound and tone
simultaneously, this experiment also points to a possibility for finding instructional means to deal
with this highly challenging language learning problem.

Patterns of variation in teaching “the colour of light” to primary three students
Lo Mun Ling, Hong Kong Institute of Education, China
Chik Pui Man Pakey, University of Hong Kong, China
Ming Fai Pang, University of Hong Kong, China

The purpose of this paper is to show how the patterns of variation used in the teaching of ‘the
colour of light’ were critical in helping a class of primary three students in Hong Kong to attain
the conceptual knowledge. In this study, a “learning study” approach (Lo et al., 2002) was
adopted, which is a lesson study (Stiegler & Hiebert, 1999) grounded in the theory of variation
advanced by Marton and Booth (1997) to improve teaching and learning. Specifically in
developing the research lesson, this study was premised on three types of variation: variation in
students’ ways of experiencing the object of learning (V1), variation in teachers’ ways of dealing
with the object of learning (V2), and the use of variation as a pedagogical tool to enhance student
learning (V3). A conscious effort was made to vary certain critical aspect(s) and keep other
aspects of each object of learning invariant in order to help the students learn better. Comparison
between the results of the pre- and post-tests shows that there was significant gain in the
students’ learning outcomes with respect to the intended objects of learning. The findings
illustrate how teachers can make use of this theoretical framework to analyze their own teaching
and thereby develop an analytical awareness of teaching and learning.

The teaching of fractions. Two examples of simultaneity and variation
Ulla Runesson, Göteborg University, Sweden
Ida Ah Chee Mok, University of Hong Kong, China

The study of mathematics teaching in Japan, the US and Germany (TIMMS-video study) has
revealed differences between how mathematics is taught in these countries (Stiegler & Hiebert,
1999). In the study presented here mathematics classrooms in Hong Kong and Sweden was
studied. The overall aim was not to compare the two teaching practices per se, but to get a better
understanding of the own teaching culture by identifying certain features that appeared in one
cultural practice but not in another. In both countries the same topic, fractional numbers, were
taught. The data was analysed from the point of view of how the content taught was handled in the
classroom and what was possible to learn. The point of departure taken is that learning always has
an object. That which is constituted in the interaction is what the students encounter (i.e. what they
are afforded to learn). Some profound differences regarding how the same topic was dealt with in
the two countries was found. For instance, the Swedish teachers handled the topic in a way that
implied a sequential presentation of different aspects of factions, whereas the Chinese students
were presented to tasks that focused on several aspects of the concept simultaneously. The implications of those differences on student’s possibilities to learn are discussed.

H 22 28th Aug 14:30 - 16:30 Room PSY 3 F

Symposium

A BETTER LOOK AT INTELLIGENCE AND LEARNING DIFFICULTIES

Organisers: Carmen Timoneda-Gallart, University of Girona, Spain
Federico Pérez-Álvarez, University of Girona, Spain

Chairs: Carmen Timoneda-Gallart, University of Girona, Spain
Federico Pérez-Álvarez, University of Girona, Spain

Discussant: Timothy C. Papadopoulos, University of Cyprus, Cyprus

We’ll report our personal experience on PASS theory. PASS is Planning, Attention, Successive, and Simultaneous. We understand intelligence in terms of PASS concept that states cognitive processing is a mental operation independent of the input and the output of the information process. This concept is based on neurological evidences. We know the same principle is satisfied by feeling processing. Unconscious processing takes place both in cognitive and feeling processing so both cognitive strategies and behavioral emotional reactions can be and must be reliably interpreted. The PASS treatment consider inductive learning with “near transfer” and “far transfer”, which means both effective cognitive action and emotional action. The educator is a mediator but not an instructor. This way, the student lives the experience as a personal achievement, which is cognitively processed as “I’m able/I’ve got autonomic capacity” and emotionally processed as “I’m feeling well” what provides with security at the “personal identity” level.

Intelligence in the light of PASS theory
Jagannath P. Das, University of Alberta, Edmonton, Canada

The Planning, Attention, Simultaneous and Successive (PASS) cognitive processing model is described as a modern theory. It is concerned with information processing that is dynamic and is not static like an ability. It is based on Luria’s analyses of brain structures. Knowledge, the base of past experiences and learning, emotions and motivations provide the background for information to be processed. The four processes must be active in the context of an individual’s knowledge base. The four processes are associated with different parts of the brain. Planning is broadly located in the front part of our brains, the frontal lobe. We give a special emphasis to planning in our mental activities. Planning process will be required when the individual makes some decision about how to solve a problem, carry out an activity such as how to write an essay about the last summer vacation, or what to say to a friend who has lost his father. Planning is also needed both to focus our attention and to use simultaneous and successive processes when required. Simultaneous processing is supported by the back part of the brain, the occipital and parietal lobes. Successive has to do with frontal – temporal lobe. Simultaneous processing allow us to establish relations and associations and it has to do with spatial processing. Successive processing allow us to mentally operate with serial relation, no other relation being processed. Every processing is a mental activity independent of input and output of information. Input and output may be either successive or simultaneous, but, for instance, both input and output may be successive and central processing, instead, be simultaneous. A battery, the DN:CAS (Das Naglieri Cognitive Assessment
System) has been created to measure intelligence in the sense of PASS cognitive processing. So a guidance for remediation is obtained when a particular profile is known. This concept of mental cognitive operation allow us to intervene, for instance, on a dyslexic problem without using reading. In fact, reading is a behavior and we know the PASS processes are utilized by our brain whatever behavior is put in action. This concept introduces advantage over old measure of IQ. Terms as auditive discrimination, phonologic processing, receptive language, expressive language, visual perception, auditive sequential memory, verbal memory, visual memory, short term memory, long term memory can all be explained in the light of PASS cognitive processing. Nonverbal tests as the Wechles, Binet 4, K-ABC, and McCarthy can be analyzed according to the PASS concept. In addition to nonverbal tests, current IQ tests also have a large number of measures that involve verbal content. These ones can be also analyzed according to the PASS concept. Processing speed is taken into account with the introduction of the WISC-III so as planning tests are timed, some could argue these measures are better described as processing speed, but we we’ll argue against it. The relationship between the PASS model and the K-ABC warrants particular considerations due to the association the authors of the K-ABC have made with PASS cognitive processing.

Practical application of PASS theory in population of Spain
Carmen Timoneda-Gallart, University of Girona, Spain

We present practical experiences on PASS theory in terms of factorial analysis validation of the DN:CAS battery in native population, description of this battery, some relevant technical aspect to be considered in applying it, patterns of clustering we have found, the concept of deficient PASS process, profiles in several kind of problems, and, finally, some considerations on PREP, that is, PASS Reading Enhancement Program. The DN:CAS, that is, Das Naglieri Cognitive Assessment System is the battery created to assess the PASS processes. By factor analysis, we have reproduced the four factor which represent the four PASS processing in a sample of over 500 subjects. We’ll describe this battery emphasizing those technical aspects we have observed of importance in order to obtain accurate results. By the way, one technical point demonstrated important in our experience to guarantee that planning and attention processing is independently isolated will be commented. This fact refers to the instructions on how the attention test must be performed to avoid strategies to be inadequately used. On this line, the active role of the professional administering DN:CAS in the search of strategies being used by the child will be discussed. The diagnose of strategies is useful knowledge for any teaching task. On the other hand, we have verified how simultaneous processing appears less frequently associated to any other processing than the rest of processing, which is in accordance with neuro – anatomical support by posterior brain in contrast with the rest of processing supported by anterior brain. Other aspect to deal with has to do with the concept of deficient PASS processing in the sense of establishing when a processing can justify a concrete academic difficulty. A processing less than 1 standard deviation appears less frequently associated to any other processing than the rest of processing, which is in accordance with neuro – anatomical support by posterior brain in contrast with the rest of processing supported by anterior brain. Other aspect to deal with has to do with the concept of deficient PASS processing in the sense of establishing when a processing can justify a concrete academic difficulty. A processing less than 1 standard deviation seems a well established criterion, but is at least one less than 1 SD processing needed to justify the academic difficulty ? We don’t think so taking into account our accumulated personal results. Also, we’ll show our experience on several kind of specific problems such as dyslexia and other reading difficulties, attention deficit disorder, Down syndrome, Williams syndrome and epilepsy. We’ll show the profiles in the case of dyslexia, attention deficit disorder, and epilepsy. Moreover, we’ll discuss on Down syndrome and on Williams syndrome as practical examples of PASS application in mentally retarded persons. Furthermore, we’ll comment some hints that allows us to think a particular profile of PASS may probably predict the emotional condition as a definite factor in relationship with cognitive performance. Other particular questions we’ll be treated too. Finally, we’ll explain our experience in applying PREP both in traditional format and in personal...
computer format paying attention to those technical considerations to be accurately observed to guarantee maximal profitability. On this purpose, we’ll insist on the careful observance of the described procedure concerning inductive learning and emotional communication. It is very important for any professional interested in this cognitive treatment to know that the efficacy is highly depending on the compliance of the role of mediator, which implies an indirect communication system versus a direct instruction system.

Cognitive processing and emotional processing: Integrated knowledge
Federico Pérez-Alvarez, University of Girona, Spain

From a neurological point of view, any activity of human being is a consequence of neuronal activity. Learning is a neuronal activity concerning not only somatic expression but also, specifically, cognitive function. However, both cognitive function and emotional function act together. As we are learning we are feeling and, furthermore, we learn depending on we feel in such a way that bad feeling determines bad learning. Any cognitive and emotional knowledge is desirable to be explained in terms of neurological bases and this principle is met by the PASS theory of intelligence. This cognitive theory is based on the knowledge of the cognitive neuronal function since Luria, but it implies the application of emotional principle previously stated and this point has to do a great deal, according to our experience, with the demonstrated success of the PASS cognitive remediation concerning both near transfer and far transfer. At present since LeDoux and coworkers, we can explain emotional processing, silently implied in the PASS theory, in the light of the neuronal functioning responsible for the processing of bad feeling. The PASS cognitive remediation applies both inductive learning and positive emotional communication. The inductive learning effect is not only cognitive but also emotional because this kind of learning is experienced as “I know I can”, which it is memorized as an autonomic capability, that is, personal identity what, in other words, means self-esteem. In fact, the learning of “I know I can” is a personal belief. Any experience is both learnt, “I know I can”, and felt, “I feel fine” and we know, at present, cognitive material is memorized at a place of the central nervous system and feeling “sensitivities” is memorized at other different place, temporal amygdala playing a relevant role. From a neurological view, feeling can be considered a kind of sensitivity not different from somatic or visceral sensitivity. The feeling sensitivity can be processed both consciously, “I’m feeling badly”, and unconsciously, “I’m not aware of any feeling, but I need to do uncontrolled behaviors, for instance, not to pay attention”. These uncontrolled and unconscious behaviors can be considered protective behaviors, also named resistance behavior. Disclosing these behaviors is an important part of the remediation procedure. So, the educator is mediator facilitating indirect inductive learning and, on the contrary, he/she is not direct instructor. This way, inductive learning has place with a double effect, cognitive and emotional. On the other hand, an uncontrolled and unconscious behavior is that we observe when, working with a particular child, a verbalized strategy is not really happening. We interpret the strategy has been unconsciously processed, behavior itself being processed consciously as it is put in action. In this case, the strategy is accurately conveyed by body language whereas linguistic language is saying otherwise. Understanding body language is “understanding” both feeling and unconscious processing. Nowadays, we know, at a reasonable level of inference, how feeling processing may explain this manner of cognitive processing, at least, partially. In short, we think communicating without fighting against protective behavior is empathy and rapport.

PASS cognitive planning as to learning difficulties
Jordi Baus-Rosset, University of Girona, Spain
Jordi Hernández-Figuerola, University of Girona, Spain

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The UNPP (Unitat NeuroPsicoPedagogia) is one of the different services that someone can find in the hospital. This Hospital is called Dr. Josep Trueta in Girona. The UNPP belongs to the University. Our team follows a model of both diagnostic and intervention we call humanistic-strategic. Metaphorically, it means that the person has two sides, that is, in one hand he/she has the emotion and in the other hand the cognition. The cognition we assess is based on the PASS theory of the intelligence and the emotion we consider is based on what we know of the processing of danger – fear sensitivity. We aim to present our personal experience on different situations we have studied, emphasising the relationship between cognition and emotion. We’ll show the relationship between PASS planing and the masked behaviour put in action as a reaction when danger – fear sensitivity is neurologically coded. We assess PASS processing by means of DN:CAS. When assessing cognitive processing, we must have in mind that the planning process is, by far, the most frequently influenced by emotional state among the children with learning difficulties. The planning process is what make them to act and makes them do any possible physical or mental action. Anyway, we would like to notice that we’ll pay particular attention to the planning process without forgetting the others process of the PASS theory. We will focus on the remediation oriented to detect the strategies carried out by the child. Once strategies have been disclosed, we try him/her to learn, by himself, the best strategy depending on what he/she wants to learn. Therefore, our aim is to help them as a mediator for the child to find out the best strategy for his/her capacity. Among the resources for intervention we count with the PREP (PASS Reading Enhancement Program) both in paper format and computerised format. Other computerised program we use is the PIP (Psycho-pedagogical Intervention Program).

PASS planning and emotional processing
Judith Alabau, University of Girona, Spain
Silvia Mayoral, University of Girona, Spain

This paper allow us analyze the relationship between the cognitive process of one child and his emotional state, keeping in mind the Model of Diagnosis and Intervention we call Humanist-Strategic Model (Pérez-Álvarez & Timoneda, 1998). It is based on the PASS theory to explain intelligence and learning and on the theory of masked behaviors as a defensive response supported by fear cerebral processing. In fact, the PASS theory implicitly implies the understanding of emotional response in the sense of protective behavior when a painful experience is coded as a dangerous situation. This principle is carefully observed both in diagnosing activity and remediation activity. Emotions, personality and intelligence are parts of the same person and nobody can deny that they are tied conforming an united entity to be considered as such. On this purpose, we think our contribution may be very useful for those dedicated to orientation in the field of education and learning as well as in the field of diagnosis and treatment of different behavioral problems concerning, for instance, different cultural patterns. Behind any behavioral problem there is an emotional problem because any behavior is put in action as a consequence of the cerebral processing of both beliefs and feeling. Can we think that the emotional processing determine somehow cognitive processing? Many do think so. We think so, too. The PASS theory consider this point carefully and its success in the application of cognitive treatment may be founded on this assumption. On the basis of this hypothesis we have done an exploratory study oriented to demonstrate how cognitive processing can be deteriorated by emotional reasons and how emotional intervention can recover cognitive processing. Our research indicates that planning processing is the PASS cognitive process more frequently related with the influence of emotional state, which allows us to hypothesize that a particular profile of PASS processing could be predictor of emotional reasons for a concrete behavioral problem.

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The last decade has seen a comprehensive effort to implement new information and communication technologies in higher education. The dissemination of these new technologies was made possible by national and regional governments, investing extensively in implementation projects. A widespread assumption among the policy makers was that new technologies would redesign the landscape of higher education (e.g. with virtual universities replacing traditional universities). Most people, including policy makers and educational researchers, are now more realistic. Traditional universities and traditional ways of teaching will remain important assets of higher education. Moreover, educational researchers are gaining in confidence as they work on innovations, blending new technology with traditional educational methodologies. As this symposium will show, the success of these implementation projects relies heavily on the didactic methods utilized. The presentations are centred around three questions: (1) What can evaluation research tell us about the use of electronic information resources and virtual university teaching? (especially the presentations of Goodyear et al. and Haimerl et al.); (2) What skills and knowledge are needed by teachers engaged in virtual teaching and how can new technology help communities of teachers to construct new knowledge about teaching? (Nevgi et al. and Petko et al.); (3) How can traditional lecture-based teaching be made more effective through the use of new technologies (Wessels et al.)? By focussing on these questions, and on some cross-cutting themes concerned with integration and change, we plan to provide an overview of the current status of research and point to future research directions.

Scrubining the logic of innovations: A case of mistaking publishing for teaching?
Peter Goodyear, Lancaster University, United Kingdom
Christopher Jones, Lancaster University, United Kingdom
Maria Zenios, Lancaster University, United Kingdom

This paper uses a theory-based evaluation approach to scrutinise the implicit logic of a linked set of innovations in the area of technological support for higher education. We report on the formative evaluation of a national programme of investment in distributed electronic information resources and, in particular, on the evaluation of a subset of projects aimed at improving the use of these electronic information resources in learning and teaching. Our approach involves working at programme and project level, to help those driving the innovation articulate the logic of their interventions. We focus on the distinction between project outcomes and project outputs. Outcomes include intended benefits to student learning and are part of the rationale for funding the interventions in the first place. Project outputs – which include the formal deliverables of a project - often stop short of securing these intended benefits. Drawing attention to the gap between contractual outputs and intended outcomes allows work to be done on closing the gap: especially through identifying people and agencies, outside the project team, who can help transform outputs into desired outcomes. The evaluation data on which we draw show that a significant number of
the projects were concerned with improving students’ access to information, but not with how that improved access could result in enhanced learning activity and improved learning outcomes. The implicit logic of their projects was the logic of publishing or librarianship rather than teaching. We conclude by drawing implications for both evaluation methodology and programme-based innovation in higher education.

The importance of perspective and methods for the evaluation of virtual university teaching
Charlotte Haimerl, University of Mannheim, Germany
Holger Horz, University of Mannheim, Germany
Stefan Fries, University of Mannheim, Germany

Since 1998, the research team ‘Didactics and Evaluation of virtual Learning’ (DEviL) aims at the integration of virtual course modules (e.g. computer-based trainings, lecture recordings, virtual seminars, etc.) into conventional university teaching across the different partner universities of the cooperative project Virtual University Upper Rhine. This talk will discuss the DEviL evaluation approach to foster this objective on the basis of exemplary studies. As such, the DEviL approach encompasses (1) a threefold evaluation perspective and (2) a twofold evaluation method. The evaluation perspective emphasises the equal importance of the didactic, the technical and the organizational components of virtual University teaching to ensure didactic and technical optimisation as well as integration of the virtual teaching modules into conventional university teaching. The evaluation method includes experimental alongside single case studies. The experimental approach is particularly important to allow for general conclusions about the efficacy of the virtual course modules, since results of single case studies are always specific to particular organisational contexts and can never be generalized. On the basis of 12 single case studies and 11 quasi-experimental studies on the effects of different didactic, technical and organisational conditions, valid criteria have been established to guide future development of virtual course models and their integration into conventional university teaching.

What skills does a university teacher need when teaching in a virtual learning environment?
Anne Nevgi, Heikki Kynäslahti, Sanna Vahtivuori, Katja Ryti and Annukka Uusitalo, University of Helsinki, Finland

Virtual University courses present new pedagogical challenges to university teachers. What skills do university teachers need within virtual learning environments? The research of this area is still seeking for a theoretical understanding as well as empirical evidence to answer this question. Our research aim was to find out about the teachers’ needs and the kind of national virtual services available, focusing on the web-portal of the Finnish Virtual University. The theoretical background of the study was based on the theories of teachers’ professional development and theories of expert knowledge. Data was collected as follows: In structured interviews university teachers (N=15) received questions concerning their opinions about the skills of web-based teaching and their training needs. Additionally, the services (N=26) of the web-portal of the Finnish Virtual University for university teachers, was used (http://www.virtuaaliyliopisto.fi). All material was content analysed. The first results of the study are following: The web services were classified into six categories: building the expertise, professional competence, web-based teaching, developing web-based material, co-operation, and ethical and copyright problems. Teachers’ concepts were classified into seven categories: mastery of change and new media, awareness of the demands of society, understanding the teaching presence, control of the mediated time, educators’ role, knowledge of the Internet, and media choice. The final results of the research will be presented at the symposium.
Collaborative video based teacher training in a virtual learning environment
Dominik Petko, University of Zurich, Switzerland
Caspar Noetzli, University of Zurich, Switzerland
Kurt Reusser, University of Zurich, Switzerland

New technologies enhance the possibilities to train teaching professionals and to reflect teaching practice in schools. Video based research has been a very effective approach to promote an understanding of the micro-aspects of classroom teaching. As a result videotechnology is increasingly used in teacher training. Additionally virtual collaboration environments have given teachers the possibility to create strong knowledge building communities, where teachers share and exchange their ideas and experiences in online forums. It is a central aim of research on teacher training to combine the two new technologies and to develop didactical concepts of how to use them in a productive manner. Several case studies were conducted at the University of Zurich, using LessonLab Viewer ™ (http://www.lessonlab.com/software/viewer.html). The presentation of the cases will focus on the advantages and difficulties of combining the potentials of video based teacher training and computer supported collaborative learning. Videos of eighth grade mathematics lessons from an international classroom video study (TIMSS-R Video) have been distributed over the Internet and discussed online by groups of university students and experts. The discussions have been evaluated in formative and summative ways, using questionaires and log-file data. The results show how didactical arrangements in combination with easy-to-use technological tools can foster a knowledge building discourse on teaching within a virtual learning group. Potentials and difficulties of this approach will be discussed.

Interactive lectures. Using wireless networks to optimise lectures
Anja Wessels, University of Mannheim, Germany
Stefan Fries, University of Mannheim, Germany
Holger Horz, University of Mannheim, Germany
Manfred Hofer, University of Mannheim, Germany

Conventional lectures are connected with fundamental didactic problems of no interactivity and low adaptativity. In this talk the new learning paradigm of the Interactive Lecture is introduced, which is supported by Wireless Local Area Networks (WLAN). The use of a WLAN allows interactivity and adaptivity in lectures through bi-directional synchronous communication between the students and the lecturer. Two experimental investigations of the new scenario were conducted. In a first trial in a computer science lecture (N=44), a so-called quiz service was implemented for the use on mobile computers. This tool allows an online posting of questions, immediate evaluation of the students’ answers and a graphical presentation of the results. The students participated either in an interactive or a conventional lecture session. With respect to acceptance, the interactive condition was evaluated significantly better than the conventional one. Concerning the learning outcome the results for the interactive scenario were superior when compared to the conventional setting. In the second study (N=99), a long-term integration of the quiz service was implemented as well as an experimental application of the call-in-service, which allows a content-oriented editing of questions and notes of the students. Besides, the computer science lecture was transmitted to another university as a tele-lecture, and the students at the remote location were likewise included into the scenario. The highly positive acceptance values of the preliminary investigation were replicated. Besides, a higher and faster learning increase was observed in the interactive condition. The results highlight the potential of the interactive lecture scenario for didactic improvements in higher education.
In higher education an evolution from teacher-centred towards student-centred learning environments is observed. This evolution entails more flexibility at the curriculum level, the implementation of new instructional approaches and new evaluation methods. The success of these innovations is partly dependent upon the students’ acceptance of the new approaches and their new roles and responsibilities. This acceptance, in turn, is mediated by students’ conceptions about these new approaches and roles. This symposium aims at both furthering research in this regard and at supporting the design of suitable learning environments in higher education by: (1) Identifying students’ conceptions about specific features of innovative learning environments in higher education (‘guided independent learning’; authentic tasks, students’ presentations) and their relation to designers’/teachers’ conceptions; (2) exploring relationships between students’ conceptions about learning environments and actual learning activities and between students’ conceptions about and experiences with specific approaches, and (3) elaborating a theoretical framework that clarifies the nature of students’ conceptions about learning environments and clarifies their impact.

Towards a theoretical framework on the nature and impact of students’ conceptions about learning environments
Joost Lowyck, University of Leuven, Belgium
Jan Elen, University of Leuven, Belgium

Students bring very different conceptions to the learning environment. These conceptions direct the interpretations by the students. Most research has been done on domain-specific (mis-)conceptions (e.g. Vosniadou), and on conceptions about learning (e.g. Marton & Saljö, Vermunt, Entwistle) and knowledge (e.g. Perry, Schommer). Students also have conceptions about good instruction and the functionality of particular features of a learning environment (e.g. Winne & Marx, Lowyck & Elen). In this contribution a theoretical model is presented that clarifies the nature and impact of students’ conceptions about learning environments. Firstly, the model all highlights the specificity of conceptions about learning environments by differentiating them from epistemological beliefs and learning conceptions. These conceptions are part of prior knowledge of students and affect learning in a similar way as other types of prior knowledge do. The model indicates that schema-theories and connectionist approaches to knowledge representation may help to understand both the nature and structure of this type of conceptions. By co-determining the interpretation of (elements in) the learning environments students mediate the effects of these environments. Considering students’ conceptions more closely may help to explain a number of ‘non-significant’ research outcomes. The model clearly distinguishes between perceptions and conceptions by outlining that perceptions result from the interaction between students’ conceptions and a specific learning environment. It is argued therefore that instruments to assess students’
perceptions and evaluations of a learning environment cannot be used as a direct indicator of students’ conceptions.

*Learning with electronic authentic cases: Do students really get what they expect?*
Rob Martens, Open University, The Netherlands
Theo Bastiaens, Open University, The Netherlands
Judith Gulikers, Open University, The Netherlands

This paper provides increased insight in the actual use, perception and results of e-learning with authentic tasks. Although frequently used, it is questionable if learners find it motivating or if learners find it above all confusing. In other words, student perceptions and expectancies are often neglected. Claims of positive effects on intrinsic motivation or increased explorative behaviour are mostly unproven. The main study in this paper deals with electronic distance learning courses, designed in order to provide students with realistic or authentic cases. ICT was used to present realistic and thus motivating and challenging cases. For example, students have to play the role of junior consultant and are provided with a multimedia case with audio fragments of interviews, virtual colleagues, and so on. The (high) designers’ expectancies are contrasted with learner perceptions. From the results it can be concluded that there is a gap between the two. A second study will be shortly discussed for it offers additional information about the gap between students’ and designer’s expectancies and experiences. Here, the use, perception and effects of authentic tasks are compared in an experimental design. In the discussion it is argued that developer guidelines derived from (social) constructivism are insufficient to develop authentic learning environments with realistic cases that meet with students’ expectancies. A better understanding of basic motivational processes is required. It is argued that evolutionary educational psychology may provide a better future basis to understand the influence of electronic learning environments on perception and motivational processes.

*Students’ conceptions and guided independent learning*
Geraldine Clarebout, University of Leuven, Belgium
Joost Lowyck, University of Leuven, Belgium
Jan Elen, University of Leuven, Belgium

In 1999 the University of Leuven adopted ‘guided independent learning’ as the leading concept for education. This concept determines responsibilities of different actors and directs all university design, development and evaluation processes in the university’s education. Research indicates education to become more effective when there is calibration between the instructional concepts of all actors involved (Winne & Marx, 1982). Consequently, to implement ‘guided independent learning’ successfully it is important that students’ conceptions about instruction mirror those defined by the educational concept of the university. To measure students’ instructional conceptions, a questionnaire was constructed with two parts. In part one, three descriptions of learning environments were presented to students. These environments differed with respect to the extent they represent the goals of guided independent learning. Students had to order these three environments according to what they thought as being the most representative of good university education. In part two, students were asked to indicate the characteristics that according to them corresponded to the goals stated in the environment of their choice by indicating on a likert-type scale the extent they agreed with the statements mentioned. First, third and fifth year students of 8 different university departments were questioned. Based on literature (e.g. Clarebout, Elen, Luyten, & Bamps, 2000; Kember, 2000) it can be assumed that students’ conceptions evolve depending on the experience they have with guided independent learning.
The impact on students’ conceptions of giving presentations
Paul Sander, University of Wales Institute, United Kingdom
Lalage Sanders, University of Wales Institute, United Kingdom
Keith Stevenson, University of Nottingham, United Kingdom

Survey data suggests that students do not like presentations as a means of learning or assessment (Sander et. al., 2000). Further analysis suggests that there may be varying reasons for disliking the idea of presentations (Sander and Stevenson, in press). When students’ views are sought after presentations, though, a more favourable view emerges (Sander, Sanders, & Stevenson, 2002). We sought to understand the effect that doing a presentation has on students’ views of and attitudes towards studying. This prospective study used a 2 x 2 factorial design to compare the impact of assessed and non-assessed student presentations. Four measures were used: Perceptions of Teaching and Assessment scale, an academic confidence scale; the Approaches to Study Inventory (Entwistle, 1988) and the marks awarded for the presentation. Initial consideration of the data shows that (a) doing a presentation increases a student’s academic confidence; (b) attitudes to presentations and academic confidence are positively correlated; (c) academic confidence correlates with presentations marks in a complex way; (d) giving an assessed presentation effected a significant increase in Reproduction score of the Approaches to learning Inventory; (e) responses to the experience of doing a presentation reflected a variety of emotions. Understanding how students perceive and respond to presentations enables teachers to promote the benefits, such as better engagement with the material and increased confidence. Furthermore teachers can be prepared to address their students’ anxieties.

H 25  28th Aug  14:30 - 16:30  Room PSY 2 E

Symposium

MORAL ATMOSPHERE IN SCHOOL AND MORAL DEVELOPMENTS AS PRECONDITIONS FOR ADOLESCENTS’ DEVELOPMENT AND LEARNING

Organiser:  Daniel Brugman, Utrecht University, The Netherlands
Chair:  Daniel Brugman, Utrecht University, The Netherlands
Discussant:  Jan Boom, Utrecht University, The Netherlands

In this symposium models will be presented linking adolescents’ moral development to behavioral outcomes, including learning outcomes. These outcomes are seen as influenced by the individual development of moral judgment competence and the quality of the moral atmosphere of the social context (i.e. the school) in which the person is embedded. The moral atmosphere in school refers to the norms, values and meaning systems that regulate informal social relationships within school and the degree in which these norms and values are shared by the students. Kohlberg introduced the concept of moral atmosphere as “the missing link” between moral judgment and moral action. The School Moral Atmosphere Questionnaire (SMAQ) was constructed to assess students’ perception of the moral atmosphere in school. Two studies in this symposium report about the SMAQ (Brugman & Boom; Mancini & Fruggeri). Moral judgment competence is the highest level of ability in making moral judgments attained by individuals at a certain point in their development, and is investigated by using abstract, hypothetical dilemmas. Two different instruments for measuring moral competence will be presented in this symposium: the Moral Judgment Sorting Task (MJST) by Boom (2001) and the Moral Judgment Test (MJT) by Lind. Participants
will report results of empirical studies to investigate the links between moral atmosphere and/or moral judgment development and behavior. The empirical links between moral atmosphere, moral judgment and behavioral outcomes raise the question about an effective intervention strategy. Intervention strategies to improve the moral atmosphere in school will be discussed by Podolskij.

*Moral atmosphere in school, adolescents’ moral development and their misbehavior*
Daniel Brugman, Utrecht University, The Netherlands
Jan Boom, Utrecht University, The Netherlands

The relationships between moral atmosphere, moral development, moral self-complexity and misbehavior were analyzed in a longitudinal design (measures were administered two or three times). The sample consisted in total of 1947 adolescents in 16 secondary schools from Central and North Russia. Based upon the notion that moral atmosphere would function “as a bridge” between moral development and behavior, a model was constructed in an exploratory analysis in one dataset and further tested in the other set. The analyses included structural equation modeling and latent growth modeling. Multigroup analysis showed differences between boys and girls. Results of the exploratory analyses indicated that 1) school-related misbehavior is context-specific, in particular for boys; it depends on students’ perception of the moral atmosphere in school and is mediated by the perception of the engagement of others in minor offenses. For girls, serious misbehavior more strongly depends on their moral competence and self-complexity than for boys. 2) The level and development in moral competence depends on the level of school moral atmosphere. A high moral atmosphere as perceived by the student contributes to a high level of moral competence and to the speed of development in that competence.

*The Moral Learning Cycle - New findings on the relevance of moral judgment competence for learning and teaching*
Georg Lind, University of Konstanz, Germany

Many years ago, I read this fascinating proposition by Jean Piaget without understanding what he really meant: “Logic is the morality of thought,” he wrote, “just as morality is the logic of action”. (Piaget, 1965/32, S. 398). New findings in our ongoing research program on moral judgment and discourse competence (using the Moral Judgment Test, MJT, by Lind) indicate that this proposition is not just a play of words but relates to one of Piaget’s most central yet still much neglected insight: “Affective life, similar to intellectual life, is continuous adaptation, and both of these adaptations are not only parallel but interdependent, since sentiments express the interests and values of actions, intelligence constitutes the structure.” In 1983 Heidbrink published an experiment in which he showed that indeed rod learning depends on moral judgment competence as defined by the Mjt. More recently, we found that several processes along the path from taking in new information, processing and validating it through critical reflection, and applying the newly learned in every-day decision making and in teaching depends on well-developed capacities to think morally and to enter a moral discourse. Many of these “interdependencies” are quite large in terms of absolute effect sizes. As it seems, moral development is not only an educational aim in its own right but has also great functional value. In this paper, the new findings will be displayed and a sketch is given of a new theory of learning and teaching called the “Moral Learning Cycle”.

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Moral atmosphere and aggressive behaviours in school. An Italian sample
Tiziana Mancini, University of Parma, Italy
Laura Fruggeri, University of Parma, Italy

In line with the studies on moral atmosphere in school conducted by Brugman and coll. (1994, 1999, 2002), the aim of this research was to validate an Italian version of SMAQ (Brugman et al., 1999) and to connect adolescents' perception of moral atmosphere in school with students' aggressive behaviours towards classmates. The structure, reliability and validity, of the SMAQ was investigated using a sample of 688 students (mean age 17.2) from six Italian high schools of three education level (lyceum, technical and professional). Subjects also completed an Aggression Scale (Orpinas & Frankowsky, 2001) regarding the frequency of the verbal, physical and indirect aggression towards classmates shown, acted and/or suffered during the previous 7 days. The moral atmosphere is a construct that has shown an acceptable degree of reliability and validity also in the Italian context where students perceive a lower moral climate than in Netherlands and Russian. Adolescents’ perception of the moral atmosphere in school seems a good predictor of physical aggressive behaviours towards classmates and shows a moderate effect also on verbal and indirect aggressive conducts. Methodological issues related to the improvement of the relational dimensions of the moral atmosphere construct will be discussed.

Intervening school moral atmosphere perception: Lessons learned from an empirical study
Andrei Podolskij, Moscow State University, Russia
Olga Karabanova, Moscow State University, Russia

The paper analyzes intervention procedures and results of the international Dutch-Russian project named “MAMOS” (Moral Atmosphere and Moral Self), investigating the perception of moral atmosphere (PMA) in Russian schools. As a PMA is considered to be the result of a specific student’s competence, one may expect to register significant changes of such a competence caused by the goal-directed intervention (formation) procedure based on the Galperin’s theory of planned stage-by-stage formation of mental actions (Galperin, 1992). The intervention procedure included several theoretical innovations based on the recent findings made in the framework of the Galperinian approach (Podolskij, 1997, 1998, 1999) such as the hierarchical instead of the linear model of the orientation base construction, and the module instead of the stage-by-stage design of the formation procedure. An important characteristic of a mature moral competence in the context of the school is student’s acceptance of the other person as a person and the other person’s opinion as different from the student’s own. This characteristic was not easy available in most students and, consequently, a specific formation procedure was organized to fill the gap. Orientation, internalization, and appropriation modules of the intervention procedure brought students to important changes in the structure of their mental actions directed to perceive and to evaluate the school moral atmosphere. Basic differences between a successful formation procedures applied to the 8th and 10th grade students were found.
THE IMPACT OF NOTATIONS UPON CHILDREN’S COGNITIVE DEVELOPMENT IN THE VERBAL AND NUMERICAL DOMAINS

Organiser: Eva Teubal, Hebrew University of Jerusalem, Israel
Chair: Eva Teubal, Hebrew University of Jerusalem, Israel
Discussant: Giyoo Hatano, University of the Air, Chiba, Japan

External symbol systems have been characterized as enabling mind sharing, mind extension and mind regulation (M. Donald, 1995). Notations, which are permanent external symbol systems have been claimed to fulfil the above functions in particularly powerful and characteristic ways (Olson, 1994). From a developmental point of view there are quite a number of interesting questions such as how does notational ability emerge, and how do children become proficient in their use; how early to children discriminate between different notational domains; and when do they recognize different affordances associated with different notation types. How synchronous is development of different notational domains; what are the factors which might account for asynchrony? The papers to be presented here deal with the above mentioned aspects of the topic of notation with children of different ages, ranging from Preschool to third grade, within the framework of a variety of tasks within different notational domains. The papers as a whole address both the question of the impact of function of notation upon notational performance and the question of the impact of notation as a mediator on cognitive performance.

The differential impact of various notational systems upon children’s understanding of mathematical word problem solving
Barbara M. Brizuela, Tufts University, USA

This paper will focus on research carried out with a group of third graders regarding their understanding of different mathematical representations. Specifically, it focuses on a series of interviews with three third graders (Jennifer, Nathan, and Jeffrey), in which they establish relationships among different representations made for word problems they are presented with in the context of a mathematics teaching experiment they were participating in: number lines, vectors, function tables, Cartesian coordinate graphs, and algebraic notation were used during the course of these interviews. The children established relationships among the different representations to corroborate understandings they had developed from one of the representations in particular, as well as a tool for understanding the information provided in the novel representations they were facing. The analysis of the children’s interviews provides an illumination and illustration of the kinds of suggestions being put forth by NCTM: “different representations often illuminate different aspects of a complex concept or relationship…. Thus, in order to become deeply knowledgeable about [a specific mathematical concept] — and many other concepts in school mathematics — students will need a variety of representations that support their understanding” (2000, p. 68).
Young Japanese children’s knowledge of mapping speeches to spellings
Kiyomi Akita, University of Tokyo, Japan

Recent research shows that young children learn to recognize the features of different notational domains, drawing, writing letters, and writing numbers. There are different mapping rules between referents and symbols in each domain. This study focuses on acquisition of mapping rules between speech and spelling. Children have to learn which elements of speech correspond to spelling, which features of letters correspond to speech and how different kinds of letter represent speech. In Japanese orthography there are many homonyms with the same spelling but stressed differently. The first purpose is to examine when children realize to map not stress but phonemic sequences to spelling. The second purpose is to examine whether children apply one mapping rule between sounds and letters to the other kinds of letters. Japanese adults use three kinds of letters, two types of kana (hiragana and katakana) and Chinese Kanji characters. Two types of Kana have one-to-one correspondence between syllables and letters, but Chinese characters do not. Do children apply this mapping rule to Katakana and Kanji? To examine these questions, twenty-three four-years-old and forty-five five-years-old children participated in the studies. The selection card task of correct spelling and the phonetic awareness task were designed. The result shows that the four-years-old children realize that spellings represent not stress but phonemic sequences. The second result shows that children tend to overextend this mapping rule of hiragana to Kanji spelling.

Developing notational competence: Comparing children with specific linguistic impairments with chronological and linguistic controls
Richard Cowan, University of London, United Kingdom
Chris Donlan, University College London, United Kingdom
Elizabeth J. Newton, University College London, United Kingdom
Delyth Lloyd, University College London, United Kingdom

Studying children with specific linguistic impairments (SLI) can illuminate the interaction between language learning and development of mathematical competence. Such children show delays in language development but normal or above average nonverbal reasoning. SLI children show significantly deviant patterns of strength and weakness in number development. For example preschool children with SLI show impaired counting skill but normal counting principles. This study examined the relation between grasp of the principles underlying written number, oral counting and transcoding skills. A group of 60 7-9-year-old children with SLI were matched with a group of typically developing children with similar ages on the basis of nonverbal reasoning, and with a group of 4-6-year-olds on the basis of grammatical development. Oral counting was assessed with a set of items including rote counting, backward counting, and continuing counting across decade, century and thousand boundaries. Three multi-digit tasks assessed transcoding abilities: writing spoken numbers, matching printed numbers with spoken numbers, and naming written numbers. A computer-presented task assessed understanding of written number by requiring magnitude comparisons of multi-digit numbers. A multiple regression showed understanding of written number was highly predictable from performance on the oral counting and transcoding tasks (adjusted R square = .58). However, residuals analysis showed that the SLI children’s understandings of written number were significantly in advance of their counting and transcoding abilities. The results are discussed in relation to the debate about the relation between principles and skill in number development and educational provision for children with SLI.
Studies of the development of children’s notational abilities are currently viewed as both a way of examining the development of competence with symbolic systems and as a means of identifying the mechanisms that influence developmental trajectories. Studies of developing notational systems fail to consider children’s performance across tasks presenting different cognitive demands. Our research focuses on pre-schoolers’ early production of notations for numerals and writing across a range of different tasks. Sixty children between the ages of three and six participated in the studies. Children’s understanding and use of notations was assessed across six different task. Two tasks were designed to assess the children’s ability to distinguish between numerals, letters and shapes: a sorting task and a labelling task. Two tasks were designed to support the communicative use of notations – an identity card and a birthday card. Finally two tasks were designed to assess the children’s ability to use notations in a problem solving context: a dice game and a shopping list. The results are considered in relation to developmental and task based changes in performance. Consistency of notations across tasks is considered.
Paper Presentation

**ASPECTS OF SELF-REGULATION**

Chair: Monique Boekaerts, Leiden University, The Netherlands

*Development of a training program for pupils and their parents to improve self-regulative competence*

Susanne Bruder, TU - Darmstadt, Germany  
Franziska Perels, TU - Darmstadt, Germany  
Bernhard Schmitz, TU - Darmstadt, Germany

The aim of the project is the development, implementation and evaluation of a training program to impart pupil’s self-regulative competence. To increase effects a parent training was implemented. In this program parents were trained to support children’s homework in sense of self-regulative learning. In the training for pupil the self-regulative competence is aimed to be enhanced by specific strategies. These should induced the pupils to choose and apply suitable learning strategies for homework, to observe their use and to check and evaluate their efficiency continuously to adjust them. To survey the learning behavior outside school the pupils keep a diary. The aim of the parent training ist not only to learn how to support the self-regulated learning behavior of their children but also to learn self-regulative strategies for their own daily life. The parents have to keep a diary, too. The design combines the factors pupil training an parent training.

*Effort avoidance and volitional components*

Wolfram Rollett, Technical University Berlin, Germany  
Stefan Engeser, University of Potsdam, Germany

A disposition to effort avoidance (EA) is characterised by a strong tendency to avoid goal-oriented effort when encountering a demanding task. Subjects with such a disposition find it especially difficult to put their intentions into action or to sustain their actions. Action control theory suggests that higher EA might be related to volitional skill deficits. 144 psychology freshmen were tested for EA and different components of volition. In the following they were investigated for 7 month as they tackled the subject of statistics. Particularly high negative relationships were found between EA and volitional components that serve self-control (goal-maintenance). Less frequent and comparatively smaller associations were observed with components of self-regulation (self-maintenance). As expected, pronounced unfavourable relationships were evident between EA and a large number of variables of the learning process, indicating that substantial volitional problems are encountered in the pursuit of the performance goal. Implications for educational measures are discussed.

*Students’ motivational appraisals, persistence and performance in a complex problem-solving task*

Anna Tapola, University of Helsinki, Finland  
Markku Niemivirta, University of Helsinki, Finland

Research on students’ context-specific motivational appraisals and academic performance has shown the facilitative effect of both students’ personal self-efficacy beliefs and situational interest. In the present study, a complex problem-solving task in an authentic classroom situation was used.
as a context for assessing students’ motivational appraisals. The aim was to examine how the variability and change in students’ situational appraisals related to persistence and performance in the course of the task. The sample consisted of 80 ninth-graders. Latent growth modeling was used for analyzing the data. The results showed that the changes in students’ task-specific motivation and performance were related to each other in a coherent manner. Positive initial experiences seemed to promote further interest and confidence. Moreover, when controlling for the level of initial motivation, persistence predicted performance within the various stages of the task. All in all, the results illustrate the dynamic relationships between context-specific motivation and performance.

Procedural aspects of self-regulated learning
Joachim Wirth, University of Essen, Germany

The process of self-regulated learning can be described as the attempt to pursue two goals simultaneously. On one hand the learner must identify and select information to be learned. On the other hand s/he has to organise and integrate information into the existing knowledge base. Regulating means to decide which of these competing goals to pursue at every point of time during learning. Using a dynamic assessment tool we found that successful learners start with the tendency to identify new information but show very soon a strongly increasing effort in integrating these information. Students who are less successful seemed not to regulate the learning process at all and behaved in a more or less random way. These findings show that the success of a specific cognitive learning strategy is dependent on the point of time of its application. This is important not only for a valid assessment of self-regulated learning but also for its training.

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Paper Presentation

INDIVIDUAL DIFFERENCES IN READING COMPREHENSION

Chair: Jean-Francois Rouet, CNRS and University of Poitiers, France

Attributional beliefs, goal orientations, strategy use and reading comprehension of good and poor readers
George Botsas, University of Thessaly, Greece
Susana Padeliadu, University of Thessaly, Greece

The aim of this study was to examine the relationship between the motivational constructs of success and failure causal attribution beliefs and goal orientations and cognitive and metacognitive strategy use and reading comprehension of good and poor elementary school readers. One hundred and twenty two 5th and 6th graders from Thessaloniki, Chalkidiki and Pieria took part in the study. Half of them (N=61) were good readers and the rest were reading disabled peers. Success and failure causal attributional beliefs and goal orientations were assessed using two questionnaires developed for the specific study. The use of a “think-aloud” verbal protocol provided data for cognitive and metacognitive strategy use. Reading comprehension performance scores were collected with the reading comprehension scale of TORP (Test Of Reading Performance) (Sideridis & Padeliadu, 2002). The results are discussed in the context of understanding reading disability.
Text comprehension and idiom comprehension in children: A follow-up investigation of poor readers
Maria Chiara Levorato, University of Padova, Italy
Barbara Nesi, University of Padova, Italy

Idiom comprehension in childhood is based on different cognitive abilities and linguistic resources (Levorato & Cacciari, 1995). Processing contextual information, interfacing it with previous knowledge and inferential processes are necessary in order to understand an idiomatic expression embedded in a text. Previous investigation showed that good readers outperformed poor readers in an idiom comprehension task (Levorato, Nesi, & Cacciari, 2001). The aim of the present study was to analyse more deeply the relation between idiom comprehension and text comprehension in poor readers. In particular it was hypothesised that an improvement in reading comprehension was related to a parallel improvement in the ability to understand the figurative meaning of idiomatic expressions. On the other hand it was hypothesised that other linguistic abilities, such as the syntactic, were weakly involved in the comprehension of figurative language.

Are there differences in lexical ambiguity resolution between less-skilled and skilled readers? The role of dependent variable measures
Juan L. Luque, University of Málaga, Spain
Rosa Elosúa, National University of Distance Education, Madrid, Spain
José M. Díaz, University of La Laguna, Tenerife, Spain
Joni Karanka, University of Málaga, Spain
Miguel López-Zamora, University of Málaga, Spain
Juan Moreno, University of Málaga, Spain

Individual differences in lexical ambiguity resolution is a controversial area. While Gernsbacher et al., 1990, found significant differences between less skilled and skilled readers, Long et al. 1994 did not find anyone. Two experiments were conducted to know whether this disagreement due to the different measures of the dependent variable implemented. Skilled and less skilled readers were randomly assigned to a decision lexical experiment versus to a semantic verification experiment. Two 2 x 2 x 2 factorial design were carried out. Main results of Long experiment’s were reproduced: a significative priming effect on the appropriate associate items and no skill factor differences. Gernsbacher experiment’s results was not fully reproduced for the less skilled readers group. In spite of this problems an interesting explanation could be drawn from this primary results: individual differences between less skilled and skilled readers are found as much as semantically deeper to be the task demand.

Metacognitive strategies and skills for effective reading comprehension: A developmental approach
Efi Papadimitriou, Ioannis Marmarinos, Eleni Renzoula, Evaggelia Palogou, Vassiliki Kouroudi, Anastassia Papadopoulou and Olympia Palikara, National and Capodistrian University of Athens, Greece

This study investigated changes in the metacognitive skills and self-regulation skills that are involved in reading comprehension process, with age. Fifty children (25 7th graders and 25 10th graders) were asked to answer in a questionnaire consisting of two texts and accompanied by two types of questions, metacognitive questions and understanding questions. Results of the research show that there are no significant differences between the younger children and the older children. Both, the 7th graders and the 10th graders show no competence in activating the appropriate skills.
to control and regulate their cognition when they read a text in order to overcome difficulties in understanding. This result suggests that knowing whether students can accurately monitor their knowledge and thought processes should be key concerns of teachers, researchers, and theoreticians interested in encouraging self-regulation of learning. Consequently, new goals need to be set for the current curriculum giving more emphasis to the skills that must be acquired by the children.

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Paper Presentation

PROFESSIONAL ASPECTS OF TEACHING

Chair: Jurgen Baumert, Max Planck Institute, Berlin, Germany

The meeting of the educator and the pupil in the school situation, perspectives of biographical research
Helena Hovila, University of Tampere, Finland
Ropo Eero, University of Tampere, Finland

This study uses biographical and autobiographical research to examine life story narratives. The study is based on the conception of situational element and situational learning theory. Narratological and interpretative analysis are used to examine educators interviews. How do educators describe in their narratives the meeting with the pupil, professional growth affected by co-operation and possibilities of individual learning of a child? The personal relationship between adult and child becomes more obvious in situational elements. The child becomes a member of the school community when meeting the educator and this requires development of identity. Professional growth needs the multi-professional co-operation. The subjective educational theory of an educator is most affected by the work experience. Situational learning gives new perspective in school situation.

The nature and outcomes of academic upgrading as perceived by the faculty of a teachers’ college
Ron Hoz, Ben Gurion University, Beer Sheva, Israel
Anat Kainan, Kaye College of Education, Beer Sheva, Israel
Dan Bowman, Ben Gurion University, Beer Sheva, Israel
Olzan Goldstein, Kaye College of Education, Beer Sheva, Israel

A decade ago Israeli teacher education began to be reconstructed by the Council of Higher Education, which was enacted by parliament. The reform consisted of transforming all teachers’ seminaries into teachers’ colleges. To assess the effectiveness and nature of this major change two research questions were set: how do the teachers’ college faculty perceive the nature of the change process and how do they see the academic characteristics of the new institute? Concept mapping tapped the conceptions in a teachers’ college and found that this process was vague for the faculty and viewed as organizational, and the new institute looked as lacking crucial elements of academic culture. These results were attributed to the process being a macro rather than micro level process and a first order rather than a second order change, which ignored the culture of the teachers’ seminary and prohibited the reconceptualization of the roles.
Decision making processes in the choice of teaching as a profession among first year student teachers
Yael Katzir, Levinsky College of Education, Israel
Itzhak Gilat, Levinsky College of Education, Israel
Rachel Sagi, Levinsky College of Education, Israel

The importance of capable, committed teachers for learning improvement and fostering the will to learn contrasts research findings, which demonstrate difficulties in recruiting suitable candidates for teaching and raises the need for studying teaching career’s choice process. This is a study of first year student teachers in Israel. It studies such a process and relationships between choice indices and other variables including: reasons for choice, influential socialization agents, time of decision making, certainty about the decision, alternatives considered, attitudes toward teaching and commitment to teacher education and teaching. Four profiles of decision makers emerged. Significant differences concerning all indices were found between two profiles. Teacher education curricula can apply the findings of this study to empower student teachers uncertain about their choice.

Teaching as a career change: An exploration of motives and influences
Paul W. Richardson, Monash University, Australia
Helen M. G. Watt, University of Western Sydney, Australia

Factors influencing graduates’ decisions to pursue a teaching career were investigated in this study, along with profiles for identified typologies of respondents. Participants were 74 candidates enrolled in a Graduate Diploma course at a major urban Melbourne university in Victoria, Australia. A survey collected data about respondents’ reasons for choosing teaching as a career, with open-ended questions eliciting rich qualitative data to elaborate on rating-scale responses. Factors relating to community benefits, career fit, prior considerations, financial reward and time for family were identified using factor analyses. Interestingly, responses were independent of previous level of qualification and having children or not, with little evidence of gender effects. Three distinct clusters of students showed that different combinations of reasons were relevant to each group’s choice of teaching as a career, and these reasons were further illustrated and discussed in relation to qualitative data from open-ended survey questions.

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Paper Presentation

ISSUES IN SOCIAL INTERACTION

Chair: Michèle Grossen, University of Lausanne, Switzerland

Exploring distance learners’ interaction in CSCL environments
Silvia Dewiyanti, Open University, The Netherlands
Saskia Brand-Gruwel, Open University, The Netherlands
Wim Jochems, Open University, The Netherlands

This explorative study attempted to get an insight into learners’ interaction in computer supported collaborative learning (CSCL) environments and to explore to what extent distance learners regulate their group process. This study also aims to find the best practices that can be used to
enhance interaction and regulation in CSCL environments. Participants (N=66) came from five different distance-learning courses using a CSCL method at the Open University of the Netherlands. Questionnaires that were distributed in the pre-, mid-, and post- courses were used to let participants reflect on the collaboration process. Written messages were also analyzed to get more insight into interaction and regulation during the collaboration process. Results showed that participants interact actively and appreciate the opportunity to work in CSCL environments. However, little group regulation occurred during collaboration process. Further, group size and the collaboration level of a task seemed to influence the learners’ interaction and the group’s regulation.

The meaning of mediation in the epistemology of innovative knowledge communities
Sami Paavola, University of Helsinki, Finland
Kai Hakkarainen, University of Helsinki, Finland

The present investigators have maintained that, in order to understand innovative knowledge communities, one has to differentiate a knowledge-creation metaphor of learning, which focuses on the ways how new knowledge, practices, products, etc. are developed. Yrjö Engeström’s model of expansive learning and Carl Bereiter’s knowledge building approach represent this metaphor which highlights the role of mediation in epistemology. This means that intelligent activity in general and knowledge creation in particular are mediated processes that are organized around objects of activity. These are articulated collaboratively in iterative processes across extended periods of time (rather than created here and now). We analyze Engeström’s and Bereiter’s approaches, and also Charles Peirce’s philosophical theory of signs, in order to understand the role of material as well as conceptual artifacts in mediation.

Repair as a tool for language learning in SLI classroom discourse
Julie Radford, University of London, United Kingdom

Trouble spots are a regular feature of talk between children with specific language impairments (SLI) and their teachers. The Interaction Hypothesis suggests that negotiated interaction can facilitate language development, and this can include episodes of repair. This study examines the learning potential of various designs of repair during language instruction. The database comprises video-recordings of 18 language lessons in 3 classrooms with children aged 4y 4m-8y 7m. The 275 repair trajectories were broadly categorized according to definitions used by conversation analysts and further analyzed by error type. Findings reveal that the teachers do not consistently repair errors of form (recasts) and, when they do, there is limited uptake by pupils. Errors of meaning, on the other hand, are consistently repaired and there is pupil uptake, particularly of lexis. In negotiated repair sequences the teachers use a hierarchy of designs to transfer responsibility for repair to the learner.

Appropriation and social interactions: How some taught strategies can be transformed in tools to solve a problem?
Valérie Tartas, University of Toulouse Le Mirail, France
Anne-Nelly Perret-Clermont, University of Neuchâtel, Switzerland

This research aims to examine the process by which children construct knowledge, how they transmit them to others and how this construction of knowledge elaborates with, by and sometimes against others. Our experimental design is composed by four stages: (1) a pre-test session where intraindividual level of each child is estimated (children shared out between spontaneous expert,
novice or intermediate level); (2) a training session with an adult for a third of novices who will become trained expert, then (3) an interactive session between a novice and an expert (spontaneous or trained) and (4) a post-test similar to the pre-test. We will show with a detailed analysis of interactions how, under some conditions, the strategies taught during the training session are used by the trained expert and how he manages to transmit them to his partner who, in his turn, reminds him of them when he does not use them anymore.

Paper Presentation

INFLUENCE OF COMMUNITIES AND/OR COLLABORATIVE WORK: MYTH OR REALITY?

Chair: Marina Santi, University of Padova, Italy

Restructuring staff meetings for teachers’ in-service training
Panayiotis Angelides, Intercollege, Cyprus
Charalambo Vrasidas, Intercollege, Cyprus
Michalinos Zembylas, Intercollege, Cyprus
Eleni Gabrielidou, Intercollege, Cyprus

Criticising the existing orientation of staff development in Cyprus this paper argues that an important factor underlying the difficulties faced by Cypriot teachers when following modern approaches to teaching is the method of in-service training that is used by the Cyprus Ministry of Education and Culture. This paper, therefore, suggests an alternative and practical way for helping teachers to improve their practice. In particular, it describes outcomes of a study that points to some promising possibilities in terms of assisting schools and teachers to develop as a team. Specifically, it explains how staff-meetings in Cyprus could be restructured in order to become in-service education sessions.

Collaborative networked learning in teacher training
Klara Bolander, Karolinska Institute, Sweden
Kirsti Lonka, Karolinska Institute, Sweden

In this paper we describe the new teacher-training program at the Karolinska Institutet, Stockholm, Sweden (www.lime.ki.se/cul). By introducing a learning platform called Knowledge Forum alongside with using activating instruction in teacher training, social construction of knowledge in a networked computer-based environment gave course participants the opportunity to collaboratively build and build on new ideas to help reflection on learning. This presentation will show how the participant teachers’ ideas of learning were different to start with and demonstrate the evolution of ideas during the teacher training programme.

Teacher educators create a virtual learning community
Lea Kozminsky, Kaye College of Education, Israel
Olzan Goldstein, Kaye College of Education, Israel

A group of 23 teacher educators from five different colleges worked together to create a virtual learning community, which shared and developed knowledge about the role of electronic
discussion forums in the pre-service teacher education curriculum. This research had two aims: to examine the process by which teacher educators from different colleges became members of a collaborative learning community, and to discover how knowledge that was created by the virtual learning community was implemented personally by each member of the community. The activities took place over one entire school year. Through the use of electronic discussions, a positive change was noticed in the attitudes of the participants towards electronic communication and its role in teacher education. Sharing their beliefs and practices the community members created and formalized new knowledge of how to set up virtual learning community via electronic discussion forum.

*Partnership or collaborative research? Building the conditions for a research knowledge production and sharing process*
François Larose, University of Sherbrooke, Canada
Johanne Bédard, University of Montreal, Canada
Jean-François Morin, University of Sherbrooke, Canada

In this communication, we shall present the results of the analysis of the impact of collaborative research on the building of reflective knowledge in teachers who collaborated in an action-research process in Teacher Education. We shall also examine the probabilities of the transfer of knowledge built by the collaborators on their future pedagogical practices. We shall conclude our presentation by identifying the limits of the potential impact of collaborative research on the co-construction of knowledge by university researchers and practitioners. We shall also identify conditions that support the collaborative research processes that allow for the emergence of formalized knowledge of experience and the appropriation of disciplinary knowledge by participants in collaborative research dynamics.

**APPLYING ICT AT VARIOUS CONTENT DOMAINS**

Chair: Andrea Kárpáti, Eötvös University, Budapest, Hungary

*Socio-emotional and contextual features framing knowledge construction in a Web-based history project*
Maarit Arvaja, University of Jyväskylä, Finland

One weakness of the study on computer-supported collaborative learning is that it fails to recognise the importance of classroom communities in which collaboration is embedded (Crook, 1999). This case study aims to demonstrate how one student pair working face-to-face around computer in a web-based discussion environment construct knowledge and how the process of knowledge construction is due to students using different contextual resources (Linell, 1998). The aim is also to study how the students themselves interpret and value the learning activity. Subjects are two secondary school students (aged 15) participating in a web-based history project. Data is collected by various means in order to validate the findings of the case study. Preliminary analysis of the data demonstrates that students’ knowledge construction activity is framed by students’ attitude towards (school) knowledge, interpersonal relationships with each other and other students using web-based environment as well as their habitual use of technology. The study shows that
web-based interaction and wider classroom context are tightly intertwined and should not be studied separately.

*Exploring the efficacy of an online iterative simulations for teaching physics concepts*

Robert K. Atkinson, Arizona State University, USA
Taha Mzoughi, Mississippi State University, USA
Paul Hutchison, University of Maryland, College Park, USA

This study examined the impact of using an iterative simulation — one that focused on concepts related to one-dimensional kinematics — as a supplement following classroom-based instruction on the same topic. In Experiment 1, 60 undergraduate students enrolled in physics were assigned to one of two conditions: iterative simulation or computer-based control. According to the results of the experiment, there was a statistically significant difference in favor of the participants assigned to the iterative simulation on problem-solving transfer as well as an affective measure. In Experiment 2, 90 undergraduate students were assigned to one of three conditions: iterative simulation, animation, and computer-based control. Again, participants assigned to the iterative simulation outperformed their control counterparts on problem-solving transfer as well as an affective measure. Surprisingly, no difference occurred between the animation condition and the other two conditions. Overall, these findings provide evidence that iterative simulations can serve as effective supplements to course-based instruction.

*The effect of computer-based instruction on achievement, attitudes and self-esteem in the study of mathematics*

Alfred Errera, Beer Sheva University, Israel
Dorit Patkin, Kibbutzim College of Education, Israel
Agnès Morillo, IUFM de Foix, France

The current quantitative and qualitative study assesses the impact of artificial intelligence-based software, used in a first grade mathematics curriculum, on student achievement, attitudes, and self-esteem. The software includes hundreds of activities, research-based diagnosis of errors and fitted remediation. Methods include pre- and post-tests completed by research and control groups, observation of students, analysis of computer-generated reports, student questionnaires, and interviews. The study found that a comparison of pre- and post-test achievement showed significantly greater improvement in the research group than in the control group (p<0.001). Student attitudes towards mathematics were significantly more positive in the research group and self-esteem regarding success in mathematics was higher as well. These findings indicate that artificial intelligence software grounded in a substantiated model of learning has a very positive effect on math instruction.

*Student approaches to design in a robotics challenge*

Campbell McRobbie, Queensland University of Technology, Australia
Steven Norton, Queensland University of Technology, Australia
Ian Ginns, Queensland University of Technology, Australia

Design technology is becoming an increasingly important component of primary and secondary schooling. This study investigated the design and construction practices of year 8-10 secondary school students in a science classroom. Data sources included observations, classroom artefacts, interviews with teacher and selected students, video of computer screen moves and construction of artefact. More successful students were found to adopt differing design and construction activities
from the less successful students. They adopted a more holistic approach, developed flow charts for the programming component and constructed the program and artefact in parallel. However, there was little overt discussion of science principles or concepts that arose in the problem solving process. The study has implications for planning, scaffolding and assessing robotics challenges.

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Paper Presentation

**MOTIVATIONAL ASPECTS OF ADULT LEARNING**

Chair: Brigitte Rollett, University of Vienna, Austria

*Career identity constitution: Developing the means for students to steer their own learning in education and work*

Peter Den Boer, Stoas Research, Wageningen, The Netherlands
Annet Jager, Stoas Research, Wageningen, The Netherlands
Frans Meijers, Meijers Research and Consultancy, The Netherlands
Hester Smulders, Stoas Research, Wageningen, The Netherlands

One of the main assumptions in vocational education (VET) is that students know what they want after leaving school. In Dutch practice, many youngsters appear to have no idea of a professional career when starting their training or even when they have almost finished their training (Doets & Westerhuis, 2001). According to Wenger (1998) this can only be overcome young people develop a career identity when enabled to become a member of a community of practice; learning and giving meaning to learning is a collective process. In this paper we take a more individualistic view. We investigate the constitution of career identity using an integrated model based on the models of Marcia and of Meijers and Wardekker. We test this model using existing longitudinal data for quantitative analysis and interview data about 15 students and their teachers for qualitative analysis. Results (partly) support our model.

*Motivation in adult education - An application of the theory of reasoned action and perceived self-efficacy as the factors that influences adult's motivation for learning*

Marko Radovan, Slovenian Institute for Adult Education, Ljubljana, Slovenia

The present study tested how well Ajzen and Fishbein's (1980) theory of reasoned action predicted educational intentions of the unemployed to enroll in further education. Study also explores the role played by self-efficacy (Bandura, 1997) as the third independent determinant of intention within the theory of reasoned action and its impact on motivation for learning. Questionnaires were administered to a sample of 326 unemployed persons, aged 16 to 49 years, who were included in a government project for education of unemployed. It turned out that the only significant predictor variable is subjective norm that explained 38% of the variance in intentions, whereas attitudes toward behavior and self-efficacy did not achieve significance. On the other hand self-efficacy strongly influences individual’s motivational orientation (intrinsic versus extrinsic orientations). The results of the study support the hypotheses that external variables have stronger impact on person’s goals which are under strong social influence then personal beliefs about instrumentality of behavior and perceived competence.
The impact of educational environment on interests, emotions, learning strategies, and achievement of university students
Gerald A. Straka, Bremen University and LOS-Research/ITB, Germany
Cornelia Schaefer, Bremen University and LOS-Research/ITB, Germany

The impact of perceived educational conditions on interests, emotions, use of learning strategies and achievement was investigated. Perceived educational conditions comprise instructional and potentially motivating factors. Interests are differentiated into contentual and procedural interest. Learning strategies consist of sequencing, resource management and acquisition. Emotions include joy, anger, and boredom. Achievement is represented with grades. A cross sectional study was conducted using some modules of the “Motivated Learning Strategy Questionnaire, Version for Higher Education”. The sample consists of 144 university students, with an average age of 27 and 66% females. The results of structural modelling tested with LISREL are: Different impacts of perceived motivating factors and instructional conditions on interests and emotions. There is a strong impact from the perceived educational environmental conditions via interests, and learning strategies on achievement.

The motivation of adult learners and self-discrepancies
Denise van Dam, University of Notre-Dame de la Paix, Belgium
Sandrine Neuville, Catholic University of Louvain, Belgium
Jean Nizet, University of Notre-Dame de la Paix, Belgium
Bernadette Charlier, University of Fribourg, Switzerland

This research explores relations between engagement and persistence in learning, on the one hand, and self-discrepancy regulation, on the other, in the context of adult education. In reference to Higgins’ theory of self-discrepancies (1987), the central hypothesis is in three part: motivation (i.e., engagement and persistence) for learning will be higher if (1) learning is perceived as instrumental to the regulation of significant self-discrepancies, (2) “actual-ideal” self (vs “actual-ought self”) discrepancies are salient, and (3) if “own” self (vs “other” self) discrepancies are salient. Twenty students have been interviewed three times over a period of 12 months in four countries (Belgium, France, Québec and Benin) and data have been analysed using qualitative methods. On the whole, results support the hypothesis. The communication will present some of those results.

Paper Presentation

ACADEMIC WRITING

Chair: Linda Allal, University of Geneva, Switzerland

Construction of shared meanings and construction of knowledge through teacher/learner interactions
Kristine Balslev, University of Geneva, Switzerland

This paper will be concerned with a situated research involving adult learners with their teacher in a written French workshop. The main issue of this research lies in the observation that communication between and adult learner with a teacher in didactic settings is not always obvious.
and deserves to be analysed in a microscopic way. It is based on a socioconstructivist point of view and supposes that two types of constructions occur through teacher/learner interactions, the construction of shared meanings and of knowledge (on the learner’s side). Two features characterize the analysis of verbal interactions: the first one consists in describing exactly what knowledge components teacher and learner talk about and how they talk together. The second feature concerns the description of microprocesses occurring in the two types of constructions. This paper will focus on the methodological design and on the description of patterns of co- constructions.

A multidimensional approach to understanding college writing processes
Ellen Lavelle, Southern Illinois University, USA
Anthony Guarino, Auburn University, Alabama, USA

The aims of this study were to confirm the factor structure of college writing processes as measured by the Inventory of Processes in College Composition, and to test for a second order, deep and surface structure as suggested in the literature on college learning and writing. Confirmatory factor analysis was used to examine the dimensionality of the model based on the responses of 517 undergraduate students enrolled in general education courses. Results support the construct validity of the original model as well as binary second order factors reflective of the deep and surface processes. Conclusions address the nature of the interrelationships of writing processes and provide suggestions for instruction.

An activity-theory lens for teaching writing: The case of the many-splendored abstract
Christine Räisänen, Chalmers University of Technology, Göteborg, Sweden

This paper discusses results from a comparative study of writing in the workplace and academia. Are these two settings really “worlds apart?” Activity theory is used to analyse the interdependency of form, content, function and social context of sub-types of the same genre, the abstract. The findings are based on case studies of writing-process, writing-practice and text in three different settings: the university classroom, the conference activity system, and an IT consultancy firm. The types of abstracts discussed are the conference abstract, an occluded genre; the article abstract, a well-researched genre; the classroom abstract, a fuzzy genre; and the workplace abstract, a “new” genre. The results show that students – and professionals – need better understanding of the production and interpretation processes of different genre types. Using an activity-theory lens for the teaching of genres helps students understand the mediating roles genres play within the activity systems that the genres serve.

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Paper Presentation

BURNOUT DISCREPANCIES IN ROLE EXPECTATIONS AND TEACHING- LEARNING PROCEDURES

Chair: Paolo Sorzio, University of Trieste, Italy

Construction of teaching profession, and burnout syndrome among teachers
Victoria Fernández-Puig, Ramon Llull University, Barcelona, Spain
Montserrat Castelló, Ramon Llull University, Barcelona, Spain

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The primary aim of this study is to examine the relationship between the subject's construction of teaching profession and burnout syndrome. We hypothesized that burnout process is enhanced as a result of a misadjusted professional construction, and, in his turn, burnout causes its modification. Construction of teaching profession is conceptualized in terms of discrete factors: training; classroom management; psychopedagogical support; job satisfaction; implicit theories on teaching-learning processes. Results of pilot test show significant correlation among training, classroom management, implicit theories, job satisfaction, and burnout syndrome. That allows us to work on the subject's professional construction in order to prevent and detect burnout syndrome among teachers.

Discrepancies between role expectations and reality as predictors of burnout among novice teachers
Bella Gavish, Levinsky College of Education, Israel
Isaac A. Friedman, The Henrietta Szold Institute, Israel

The present study examined the contribution of the discrepancies between expectations of novice teachers prior to the assumption of teaching roles and their perceived reality during their first year of teaching, to the prediction of burnout at the onset and the completion of that year. This longitudinal study comprised three stages: before starting work, in the beginning of the school year, and toward the end of the first teaching year. Findings showed that the discrepancy between expectations and perceived reality at the beginning of the first year of teaching at school (“the reality shock”) explained 35% of the burnout variance, and that the discrepancy between expectations and perception of end of first year reality at school, explained 24% of burnout variance. It was also found that the perceived burnout level at the beginning of the first teaching year was substantially high.

Teaching learning procedures: Advantages and difficulties for teachers and students
Teresa Guasch, Open University of Catalonia, Spain
Montserrat Castelló, Ramon Llull University, Barcelona, Spain

The main aim of this research is to analyse how the teaching-learning process of a learning procedure takes place. This means to explain how teachers interiorise the concepts of training sessions, how they transfer the control while they teach a learning procedure (note-taking), and how this transfer influences students’ learning. For this reason, we designed different teaching and learning formats (strategic teaching of note-taking procedures, technique teaching, and not teaching note-taking procedures) with the aim of assessing the effects on teachers and students’ conceptualisation of note-taking; on students’ learning; on students’ notes and their use, and teaching practice.

Burnout in kindergarten teachers, teachers, and counselors
Christine Schwarzer, University of Duesseldorf, Germany
Dirk Weimar, University of Duesseldorf, Germany

Burnout can be described as a specific stress reaction among human service professionals as a result of the demanding and emotionally charged relationships between professionals and their person opposite (Maslach & Jackson, 1986). Professionals, such as kindergarten teachers, teachers or counselors are particularly vulnerable to burnout, because of their frequent contact to other persons. However, little is known about interpersonal stress in the kindergarten, where repeated
exposure to emotionally charged social situations also occurs (C. Schwarzer, 2000). Additionally, it is notable that burnout has been frequently conceptualized as burnout not only within an individual, but also in the social connections between individuals (Maslach, 1993). Therefore the major aim of the present study is to shed more light onto the tripartite burnout construct (emotional exhaustion, depersonalization, lack of personal accomplishments) with certain work settings by relating environmental factors such as the number of working rooms or counseling talks. For this purpose, counselors, kindergarten teachers, and teachers were asked to complete the Maslach Burnout Inventory (MBI; Maslach & Jackson, 1996), and the State-Trait-personality-Inventory (STPI; Hodapp, 1989). The kindergarten teachers and the counselors were asked to complete the Strategic Approach to Coping Scale (SACS; Hobfoll, 1998) in addition. Interesting indications of differences in burnout depending on environmental factors, anxiety and the specific forms of communal and individual types of coping emerged for the different work settings, providing professionals with informations for further preventive or interventive actions in order to reduce emotional, social, and financial burdens.

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Paper Presentation

TEACHING AND LEARNING HIGH-ORDER THINKING

Chair: Benö Csapó, University of Szeged, Hungary

Teaching/learning systemic thinking
Silvia Caravita, CNR, Rome, Italy

Many relevant arguments can support the importance of including systemic modes of thinking among the goals of education: more and more often in our society we need intellectual tools to comprehend and to deal with complex domains and situations. Cognitive obstacles are connected with the phenomenology we are exposed at, with the cognitive stragies that we practice, with the logic that is required by the application of systemic models: non-linear causality, statistical processing of data can be mentioned to point out just the most prominent ones. In collaboration with a group of teachers of elementary school classes (4th grades) we have made attempts to create conditions that could support the conceptual evolution of the idea of urban system. “Ingredients” of the learning environment that we considered to be significant for approaching the goal of systemic thinking were manipulated to design long-term activities about the theme “Changes in our environment”.

The results of inquiry-based learning – Do qualitative data tell the same story as the learning outcomes?
Hanna Salovaara, University of Oulu, Finland
Piritta Leinonen, University of Oulu, Finland
Sanna Järvelä, University of Oulu, Finland

The aim of this study is to examine the quality of inquiry-based learning and consider the data of students’ learning process in relation to learning outcomes. Previous studies suggest that inquiry-based pedagogical models enhance learning in terms of learning outcomes. However, there is a growing body of process-oriented studies telling that learning processes in inquiry-based settings are complex in nature. In this study 18 upper secondary school students worked with inquiry
method for 8 weeks. The students conducted a literature inquiry and used computer supported collaborative learning environment to support their inquiries. The data consist of pre- and post-test on content knowledge, process-oriented interviews conducted twice during the study and process data including computer log-files and computer notes that students wrote during the project. Qualitative and quantitative data are combined to provide a thick description of students learning outcomes, interpretations of their cognitive activity and collaborative processes. The analysis indicates that there are certain relationships between qualitative features of learning process (such as deep processing and active collaboration) and learning outcomes, but that these relationships are complex in nature.

Teaching higher order skills - Does it make a difference?
Ornit Spektor-Levy, Weizmann Institute of Science, Rehovot, Israel
Bat Sheva Eylon, Weizmann Institute of Science, Rehovot, Israel
Zahava Scherz, Weizmann Institute of Science, Rehovot, Israel

The aim of this study was to expand our understanding of the issue: Do students develop higher order skills spontaneously through their science studies or is explicit instruction needed? A program for developing learning skills in science contents was designed for the Junior High School level. The implementation of learning skills by the students was examined by a performance task, which was distributed to a total of 165 8th grade students, 80 of which learned the program and 85 of which did not have any formal instruction of learning skills. The results showed that students who learned the program achieved significantly better results in skills performances than the comparison group. In particular, the results revealed that the program contributed mainly to the average and higher level students. The results of this research show that development of learning skills do not occur spontaneously: The explicit instruction is needed.

Structure of, access to, and uncertainty in reasoning and their dependence on content
Henk Vos, Twente University, Enschede, The Netherlands

It is known that content has an effect on reasoning. In this paper the influence of the content on the structure of reasoning, the access to it, and the ability to handle uncertainty was studied. The participants were presented with reasoning tasks about the weather and about the oscilloscope in which uncertain premises were introduced. Correct reasoning procedures were identified including correct reasoning with wrong answers. In correct reasoning procedures about the weather, three different structures of reasoning were identified. The participants were mostly able to reason with uncertain components. In reasoning about the oscilloscope, less correct reasoning procedures were found. No empirical and theoretical structures were used. The hidden structure differed here from the one in the weather case because the participants were not able to handle all uncertain components in otherwise correct reasoning. The implications of this unique finding for the acquisition of reasoning skills are discussed.
Paper Presentation

**EXPLORING AND APPLYING METACOGNITION**

Chair: Marja Vauras, University of Turku, Finland

*Student perceptions of instructional design for independent learning*
Beryl Crooks, Open University, United Kingdom

The importance, to students, of the ‘pedagogic presence’ expressed in the instructional design of distance learning materials has been highlighted in this research. The research aim was to improve the opportunities for adult students’ independent learning, using mixed media distance learning materials. An interpretivist/constructivist approach was taken to study students’ experience of pedagogic strategy from the point of view of the learner, using both qualitative and quantitative methods. The theoretical perspective of personal construct psychology was adopted both as a research methodology and as a learning theory. The research outcomes develop and defend the critical mediating role of pedagogy, expressed in instructional design, in providing learning opportunities for students learning independently. Principles of ‘guided’ instructional design were empirically derived from student perceptions of effective instructional design. The research has implications for methodology, theory and practice.

*Exploring the relationship between metacognitive skills and intelligence in upper primary school children*
Erik De Corte, University of Leuven, Belgium
Els van Pelt, University of Leuven, Belgium

In the literature three models are distinguished concerning the relationship between metacognitive skills and intelligence. The “intelligence model” states that metacognitive skills are a part of intelligence. The “independency model” regards intelligence and metacognitive skills as independent. The “combined model” states that metacognitive skills have an additional value on top of intelligence in explaining study performance. Against this background and taking into account that most previous studies were done with older subjects, the present study aimed at exploring the relationship between metacognitive skills and intelligence in upper primary school children, focusing thereby on the domain of mathematics. The results obtained in a sample of 400 children seem to support no one of the three models mentioned above. The findings will be discussed taking into account the available literature.

*Using a metacognitive strategy to solve mathematical word problems*
Tajika Hidetsugu, Aichi University of Education, Japan
Narao Nakatsu, Aichi University of Education, Japan
Hironari Nozaki, Aichi University of Education, Japan

The purpose of the study is to advance our understanding of how a metacognitive strategy known as self-explanations influences word problem solving in elementary school children. Participants were 60 sixth-grade children in elementary schools. They were assigned to one of three groups, the self-explanation group, the self-learning group, or the control group. The predictions of the study were as follows. (1) Students in the self-explanation group will outperform students in the other
two groups on ratio word problem and transfer skills. (2) Good solvers will generate more self-explanations during worked-out example explaining. (3) High metacognitive students will outperform low metacognitive students on ratio word problem and transfer skills. We are currently collecting data and analyzing them.

Constructing metacognitive knowledge in an information technology environment: Analyzing students' reflections during search for information and construction of databases
Rikki Rimor, Ben Gurion University, Beer Sheva, Israel
Ely Kozminsky, Ben Gurion University, Beer Sheva, Israel

The study examines metacognitive knowledge of 75 Ninth-grade students attending History class. Two classes participated in the study differed in academic achievement level and technology background. Students were split into two interventions: search for data and construction of database. Students wrote personal reflection notes following each session during the study. We examined the differential effect of class level and intervention on various types of reflections. A new tool for analyzing students’ reflections was developed. Analysis of reflections was held through the method of content analysis. Results show that the data-base group was significantly more reflective than the data search group. This advantage was found among the higher-achievements group of students and it relates to various types and dimensions of reflection. The significance of the results is discussed in terms of the constructivist learning approach, as well as the ill-defined database environment that served as a catalyst and scaffold for reflections.

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Paper Presentation

ASSESSMENT: STATISTICAL ASPECTS

Chair: Celia Hoyles, University of London, United Kingdom

The possible influence of class size on assessment for learning
Hester Geyser, Rand Afrikaans University, South Africa
Neels Fourie, Rand Afrikaans University, South Africa

The distinction between deep and surface learning includes references to the role of assessment in learning. Research has proven that class size does have an impact on teaching quality. An increase in class size also has serious implications for assessment. The purpose of this presentation is to explore the possible interaction between deep and surface learning in classes of different sizes. In the Rand Afrikaans University (RAU) context, six different class size categories have been identified in two faculties. The following methods and instruments will be applied: 1) Questionnaires to learners (R-SPQ-2F) to distinguish between students adopting a deep or a surface approach to learning. 2) Questionnaires to lecturers (ATI) to identify their approaches to teaching. 3) A document analysis of the learning materials in the identified modules with the focus on assessment. 4) An analysis of contact lectures in these modules in terms of assessment. 5) Focus group interviews with separate groups of learners on their approaches to learning in specific modules. 6) An analysis of the learners’ summative assessment results in order to determine any relationship between their approaches to learning and summative learning achievement.
Estimating scale reliability: A proposition for an estimator adapted to ordinal measurements
Thierry Huart, University of Liege, Belgium

This work is situated at the junction of statistical and psychometric fields: analysis of covariance structures with ADF (asymptotically distribution-free) methods on the first hand and estimation of scale reliability (internal consistency) of questionnaires on the other hand. Although this latter domain is well represented in the literature by estimating reliability on continuous variables, a few researchers have put interest in estimating reliability for discrete scores from questionnaires composed of Likert’s type items. The aim of this work is to develop an estimator for discrete data and to assess its qualities (bias and precision) through a Monte Carlo study. Results show that bias and precision can easily be determined and predicted from design’s variables (sample size, number of items, ...). Moreover results demonstrate that the proposed estimator is less biased and more accurate than those usually reported (alpha coefficient and, more rarely, Raykov’s coefficient). Implications for practice are discussed.

Empirical evaluation of non-linearities in professional growth data
Petri Nokelainen, University of Tampere, Finland
Tomi Silander, Helsinki University of Technology, Finland
Pekka Ruohotie, University of Tampere, Finland
Henry Tirri, Helsinki University of Technology, Finland

Traditional linear Gaussian models widely used in the social sciences are not statistically able to understand non-linear dependencies between variables. However, Bayesian dependency models for discrete data is a model family capable of describing such non-linearities. In this paper we investigate non-linear and multi-modal relationships with Bayesian network modeling. The 28 items of the Abilities for Professional Learning Questionnaire measure three dimensions of motivational scale. The empirical data (N=1242) represents students of three Finnish polytechnic institute. The research evidence shows that 29.1 percent of dependencies are purely linear (linear mode, linear mean, unimodal). In addition, 36.6 percent of all dependencies are multimodal and 11.0 percent have non-linear mean. 10.2 percent of dependencies are purely non-linear (non-linear mode, non-linear mean, multimodal). The over all rating of non-linearity is 23.4%. Our conclusion is that descriptive power of traditional linear models is insufficient as they are technically unable to analyse over 70 percent of dependencies between variables.

Developing statistical tools for non-linear and non-causal models of educational systems
Ruurd Taconis, Eindhoven University of Technology, The Netherlands
Dees van Oosterhout, Ik-Consult, The Netherlands

In educational research linear correlations and causal modeling are very popular although the systems under study are extremely complex, non-linear or ‘chaotic’. This produces results based on inappropriate statistics and leads to lengthy argumentations necessary to arrive at defendable conclusions. Predictability of such systems is limited, but it can be often hypothesized that particular future states will not occur. Hence an analysis of ‘forbidden states’ holds valuable information about de system. The paper concentrates on the statistical analysis of relationships of the type: Z(X,Y) = 0 for certain pairs of X and Y (X and Y are the variables, and Z is the expected frequency). An example frequently occurring in mainstream educational research (e.g. Ng & Bereiter, 1991) is: “A high value of X is a necessary/sufficient condition for a high value of Y”. The paper presentation comprises: a) the development of a test for the occurrence of such relationships, b) an analysis of the statistical power of this test, c) a demonstration of the
usefulness of our approach on mainstream studies described in recent high standard journals, and
d) an elaboration to apply for multivariate situations and into an analysis analogous to path-

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Paper Presentation

APPLYING INFORMATION TECHNOLOGY IN DIFFERENT EDUCATION SYSTEMS

Chair: Paul Brna, Northumbria University, England, United Kingdom

Characteristics of empowerment amongst master teachers (MT) in the international training
program on the use of information technology (IT) in schools in Israel
Orit Avidov, Achva Academic College of Education, Israel
Rinat Oren, Achva Academic College of Education, Israel
Orly Zak, Achva Academic College of Education, Israel

The research aims to examine the characteristics of the feeling of empowerment amongst 120
Master Teachers (MT) who participated in the international training program on the use of
information technology in the Israeli education system. The basic assumption of the study is that
the role of the MT will be relatively dominant compared to the traditional role of classroom
teaching. The findings were gathered through a structured questionnaire completed by 120 MTs
(of 160 MTs to whom it was distributed) based on open, in-depth interviews with a sample of 10
MTs. The findings indicate three main types of empowerment hierarchy among the MTs,
appearing on a three-tiered developmental continuum of the “reactor”, the “encourager” and the
“creator”. Each type of empowerment embraces functional and emotional elements.

Integration of information and communications technology in Italian schools: Some notes on
assessment and evaluation
Camilla Gobbo, University of Padova, Italy
Chiara Papini, University of Padova, Italy
Vissia Zanobi, University of Padova, Italy

The goal of the study was to investigate whether there is a relationship between teachers’ personal
theories of teaching and learning, how Information and Communications Technology (ICT) is
integrated in the school context, and teachers’ thoughts about evaluation in school. Thirty-two
teachers of primary and secondary schools, with different levels of ICT competence were
interviewed. They were asked to reflect upon their practice and tell about their use of the computer
in the classroom, including their own ideas about possible changes concerning their professional
role and pupils’ learning behavior in school. Teachers’ thoughts and practice dealing with
evaluation and assessment was found to be related to teachers’ personal theory, and focussed
mainly either on students’ knowledge and/or on other aspects of cognition and affect. Moreover,
the teachers’ perception of their role and availability to improve their own knowledge and
competence varied with both personal theory and level of ICT competence.

Computers as physical printers: A new view of educational technology
Mitchell J. Nathan, University of Colorado, USA
Michael Eisenberg, University of Colorado, USA
A criticism of educational computing is that it distances students from physical, “hands-on” activities and experience. According to this line of thought, computational media are the source of a relentless and counterproductive “virtualization” of students’ experience. We demonstrate how computers can be integrated into an extremely rich tradition of physical construction and design in K-16 mathematics, science, and technology education. In particular, the advent of new and powerful output devices permits students to design (on the computer) and then “print” objects in sturdy materials such as wood, foam core, and plastic. By devising creative activities and applications with these output devices that meet the prescriptions of current learning theory and reform standards in science and mathematics education, computers can be the central elements of a new type of shop - a newly revived tradition of student-initiated design and engineering - that can enhance science and mathematics learning and instruction.

Engaging students in higher order thinking: A collective case study of ICT integration in Singapore schools
Lim Cher Ping, Nanyang Technical University, Singapore
Tay Lee Yong, Nanyang Technical University, Singapore
Philip Wong, Nanyang Technical University, Singapore

Based on the findings of 4 case studies (4 primary schools in Singapore), which are part of a larger research study, this paper describes how the different types of ICT tools are integrated in schools to engage students in higher-order thinking. By employing various research methods such as observations, focus group discussions with students, and face-to-face interviews with teachers, heads of departments, and principals, an account of how the activity systems within and between classrooms, schools and the education system are generated. These findings and analyses are particularly critical to education research in ICT integration where the object of its inquiry is useable knowledge. The account of the case studies emphasizes on what work and what appear right in a particular setting, the problems encountered and addressed in a particular situation, and the sociocultural perspective from which the setting is construed. Like a good guidebook, the paper sensitizes the audience to what is likely to happen given a particular objective, constraint or design.

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Paper Presentation

STUDENTS' EPISTEMOLOGICAL BELIEFS, MOTIVATION AND ACADEMIC PERFORMANCE

Chair: Cornelis J. De Brabander, Leiden University, The Netherlands

Epistemological beliefs - Learning strategies and academic achievement
Barbara Moschner, University of Oldenburg, Germany
Ulrich Schiefele, University of Bielefeld, Germany

The interrelatedness of epistemological beliefs, learning strategies and academic achievement was addressed in the present longitudinal investigation. Questionnaires were administered to 224 German university students every six month; up to now nine waves of data collection took place. Preliminary results show only weak relations between epistemological beliefs, learning strategies
and academic performance. However, domain specific differences and developmental changes concerning personal epistemology were revealed. Students in the natural sciences expressed stronger beliefs in objectivity of knowledge than students in the humanities. Beliefs in the objectivity of knowledge declined during the first semester at the university. The results are discussed in the light of theoretical implications and measurement improvements.

Understanding the achievement of inner-city adolescents: The influence of epistemological beliefs and achievement goal orientation on academic performance
P. Karen Murphy, Pennsylvania State University, USA
John F. Alexander, Pennsylvania State University, USA

Although much is known about the role of constructs like epistemology and achievement goals in students’ learning, very little is known about how these factors work in concert to influence educational performance, and even less is understood the structure of these constructs for young adolescents living in poverty-stricken communities and attending urban, inner-city schools. The purpose of this proposed presentation is to explore these issues. Specifically, we will discuss several characteristics of inner-city, eighth and ninth grade students including: (a) The extent to which their epistemological beliefs are multidimensional and domain-specific; (b) the dimensionality of their goal orientation; (c) the influence of epistemological beliefs and goal orientation on academic achievement; and, (d) the developmental differences between eighth and ninth grade students relative to epistemological beliefs and achievement goals. In doing so, we hope to present a multidimensional, complex picture of the influence of epistemology and motivational goals on urban, adolescents’ academic performance.

Epistemological beliefs and motivation in university students: Comparisons across four countries
Michelle Riconscente, University of Maryland, USA
Liliana Maggioni, University of Maryland, USA

The present study compares data collected across four countries – France, Italy, Taiwan, and the United States – exploring the relationships between general- and domain-specific epistemological beliefs and motivation. While these constructs have been explored individually, few studies have sought to examine the potential interactions between the two. In addition, these constructs are as yet seldom explored in a cross-cultural context. By comparing the findings across countries, we seek to identify the variability which could be attributed to cultural diversity and serve as signposts for future research. Further, this study highlights the methodological issues and potentials that are unique to cross-cultural investigations. As such, it contributes to the development of viable approaches which could be used in an international setting to examine a range of constructs.

Cognitive, emotional, and attributive aspects of students’ conceptions of learning
Alessandro Antonietti, Catholic University of Milan, Italy
Olga Liverta-Sempio, Catholic University of Milan, Italy
Antonella Marchetti, Catholic University of Milan, Italy
Sonia Perez-Tello, Catholic University of Milan, Italy

Recent studies about folk conceptions of learning suggest that students develop consistent patterns of beliefs and that such patterns influence learning strategies and outcomes. However, as yet relationships between the different dimensions of these conceptions have not been adequately investigated. The aim of the paper was to find possible links among cognitive, emotional, and attributive aspects of the conceptions about learning. A questionnaire, including items referring to
the above-mentioned dimensions, was devised and administered to 300 boys and girls attending
different kinds of secondary schools. Analyses allowed us to highlight the factorial structures of
each section of the questionnaire, to identify coherent systems of associations among the sections,
and to assess the roles that gender, kind of school attended, and year of course play in modulating
students’ perceptions and opinions about the learning process.

**PROBLEM SOLVING IN MATHEMATICS**

Chair: Cinzia Bonotto, University of Padova, Italy

*Educational aspects of problem posing in spatial geometry: The experience of two groups of the
teacher education students*
Irina Bershadsky, Technion Israel Institute of Technology, Haifa, Israel
Ilana Lavy, Emek Yezreel College, Israel

This study is a part of an ongoing research that attempts to describe the pre-service teachers’
experience in problem posing using the “what if not?” strategy in the context of spatial geometry.
Here we are focusing on educational strengths along with possible weak points of such an activity.
We are presenting a case study of two groups of pre-service teachers that were engaged in posing
problems on the basis of given spatial tasks. Data were obtained through written protocols,
audiotapes of interviews and videotapes. Our results give evidence that fostering problem posing
activities can encourage students to rethink various geometrical concepts, construct connections
between them and deepen the understanding of them. Along with the mentioned advantages, the
study reveals some disadvantages emanating from operating in a technical manner during the act
of problem posing using the “what if not?” strategy or from the task complexity that might lead to
poor results.

*How many buses are needed? Hungarian students’ achievement on “problematic” word problems*
Csaba Csikos, University of Szeged, Hungary

Since numerous studies have revealed that students’ responses to so-called real-life or authentic
mathematical word problems indicated poor level of understanding the real-life situation, this
investigation used 20 mathematical word problems from Verschaffel, De Corte and Lasure’s
(1994) work. The Hungarian version of this test contained the same 10 standard and 10 parallel
tasks as the original test. The test was administered to 562 students aged 10-11 years. The results
show that our students’ achievement indicates the same level of understanding the so-called
parallel tasks as it was revealed by former international findings reported by Verschaffel, Greer
and De Corte (2000). Finally, the role of students’ beliefs about the nature of mathematical word
problems, and the importance of developing metacognitive strategies as early as in elementary
schools will be discussed.

*The impact of superficial and structural similarity on sequence effects in solving algebra word
problems*
Katharina Scheiter, University of Tuebingen, Germany
Peter Gerjets, Knowledge Media Research Centre, Tuebingen, Germany
Sequence effects occur when solving a set of problems in different sequences results in performance differences between those sequences. We tested two alternative predictions with regard to the impact of superficial similarities among succeeding problems: On the one hand, sequences in which subsequent problems share superficial but not structural features may result in negative transfer. On the other hand, superficial similarities among subsequent problems may highlight features in which the problems differ, i.e., structural features (near miss). Experiment 1 supports the near miss view, i.e., subjects committed more errors when problems were solved in a structurally blocked sequence compared to a superficially blocked sequence. Experiment 2 revealed that subjects who rearranged the problems showed better performance than those who kept the presentation order, thus confirming previous findings that sequencing is associated with higher awareness for structural features. There was no sequence effect suggesting that this effect of sequencing overrides the sequence effect.

Co-evolution of model and symbol: Inventing math with a new fraction manipulative
Taylor Martin, Stanford University, Stanford, USA
Daniel L. Schwartz, Stanford University, Stanford, USA
Anna Veit, Stanford University, Stanford, USA
We describe the results of a study exploring a novel approach for teaching fractions using a newly designed manipulative. To prepare students to learn about conventional notations and the quantities they represent, students invent notations to help differentiate fractional quantities shown in the manipulative. The initial results are promising and show that students were more prepared to learn from a lecture and subsequently handle new problems than students who learned fractions using manipulatives in a more traditional manner.

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Paper Presentation

TEACHERS’ BELIEFS AND TEACHING PRACTICES

Chair: Miriam Mevorach, Levinsky College of Education, Israel

Secondary education teachers’ conceptions about teaching, learning and development
Elena Martin, Mar. Mateos, María del Puy Pérez-Echevarría, Juan Ignacio Pozo, Ana Pecharromán, Patricia Martínez and Ruth Villalón, Autonomous University of Madrid, Spain

The aim of the present research project was to identify the conceptions that Secondary Education teachers hold in relation to teaching, learning and development. The conceptions are analysed according to a previous proposal that differentiates three learning theories; direct, interpretative and constructive. Two questionnaires are used in the study. These questionnaires present dilemmas which reflect conflictive decisions frequent in schools and four different opinions to face them. The participants were 150 Secondary School teachers from different curriculum subjects and with different levels of experience. The most relevant results show that teachers’ conceptions differ according to their level of experience and the aspect of teaching actually analysed (motivation, contents selection, learning difficulties, etc.). However teacher’ conceptions don’t differ according to subjects matters. The consequences that the results would have to impel processes of educational innovation and teachers’ training are also analysed.
The match between constructivist teacher education and student teachers’ beliefs and conceptions
Peter Teune, Fontys University of Professional Education, Eindhoven, The Netherlands
Anouke Bakx, Fontys University of Professional Education, Eindhoven, The Netherlands
Johan van der Sanden, Fontys University of Professional Education and Eindhoven University of Technology, The Netherlands

Dutch teacher training colleges are involved in a shift from a ‘knowledge oriented’ curriculum towards a more ‘constructivist and competence based’ curriculum. Students are assumed to fulfill an active and constructive role in the process of professional development as a teacher. It was found, however, that novice student teachers’ learning and teaching conceptions did not match the constructivist and competence oriented educational philosophy on which the new training program is based. Students have clear preferences for reproductive learning, going together with rather traditional conceptions of the roles teachers have to play at school. It is concluded that care should be taken of these conceptions, because they are important determinants of student teachers’ study and teaching behaviour.

The effects of teaching on learners’ epistemological development: Implications for the design of science-and-technology learning environments
Nicos Valanides, University of Cyprus, Cyprus
Angeli Charoula, University of Cyprus, Cyprus

Research evidence indicates that students’ epistemological beliefs play an important role in the ways scientific knowledge is organized in cognitive structures. The issue of whether epistemological growth is developmental in nature or affected by teaching constitutes an ongoing debate in the literature. In this study, we investigated the effects of teaching critical-thinking principles on university students’ epistemological development. One hundred and eight undergraduates were randomly assigned to three different 65-minute instructional interventions, namely, PreTeach, Infusion, and Immersion. Epistemological development was measured in terms of the difference in participants’ performance on a pre- and post-assessment. A repeated-measures ANOVA analysis showed a statistically significant main effect related to the teaching method. Post-hoc comparisons revealed that Infusion outperformed PreTeach. The results showed that a short instructional intervention on critical thinking promoted students’ epistemological development. Moreover, the results showed that scaffolded debate instruction enhanced students’ epistemic understandings.

Knowledge restructuring processes, educational beliefs, and teaching practices among teachers who use information technologies in their classrooms
Rivka Wadmany, Teachers College of Technology, Tel Aviv, Israel
Tamar Levin, Tel Aviv University, Israel

Significant changes in the learning and teaching processes in a school that utilizes information technologies is possible only if the teachers are prepared to alter their beliefs and instructional practices. The research is an exploratory case study, which examines the changes that occurred in the educational beliefs, modes of instruction and knowledge restructuring processes of six teachers, who, for three years, experienced teaching in classrooms using information technologies. The findings indicate that the processes of change in the teachers’ beliefs are personal and vary from one teacher to another. At the end of the three-year period some of the teachers restructured their knowledge in a deeper way and others in a peripheral manner. Most of the teachers were still undergoing a process of change. The major changes were apparent in the reconceptualization of
the meaning of learning and of the students’ roles, and less in a revised, constructivist, view of teaching.

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Paper Presentation

MODELS FOR INSTRUCTIONAL DESIGN

Chair:  Jan Elen, University of Leuven, Belgium

“Chain of signification” as a design heuristic and an instrument of analysis in design research
Arthur Bakker, Utrecht University, The Netherlands
Koeno Gravemeijer, Utrecht University, The Netherlands

In this paper we first focus on how the semiotic notion of a ‘chain of signification’ functioned for the design of the software and instructional activities for statistics education to students aged 10-14. A chain of signification describes how the meaning of one sign in a particular problem solving situation can ‘slide under’ the next, more sophisticated, sign, and so on. Then, as part of a retrospective analysis, we analyse the students’ learning process with the same notion. The line of reasoning is that this dual character as a design heuristic and instrument of analysis makes the chain of signification useful for design research. Finally, it is argued that the linear nature of a chain of signification can and should be extended to allow non-linear processes of signification, such as comparing and connecting graphs.

A new curriculum emerges
Hanna Ezer, Levinsky College of Education, Tel Aviv, Israel

A new curriculum emerged in our teacher education college based on the accumulated practical experience with ICT and the accompanying research. ICT is an inherent feature of this new curriculum and technology rich courses are compulsory. We view ICT applications as “mindtools”, intellectual partners in learning and teaching (Jonassen, 2000). Since “…preparing teachers is perceived as the main critical success factor in deploying ICT in education” (Kirschner & Wopereis, 2002), ICT is integrated in a wide variety of our courses; based on teacher educators’ tendency to shift towards new pedagogies after a long-term experience, we have implemented a long-term program studying in the enriched new environment for all students. Experiencing such pedagogy as learners is a necessary but insufficient condition to enhance change in student teachers’ beliefs. Thus, it is an integral part of our new curriculum for all. As for our faculty members, our LDL center helps them construct site-supported courses or add ICT features to their regular ones. Furthermore, there is an emergence of a true community of learners that includes our teacher educators, our students and their mentors at practice teaching, as communication virtually expands and facilitates college-school rapport.

A conceptual framework for comparing and integrating instructional design models
Markus Molz, University of Koblenz-Landau, Germany
Wolfgang Schnottz, University of Koblenz-Landau, Germany

A comprehensive conceptual framework for analysing, comparing, integrating and generating instructional design models (IDMs) is suggested. It can be shown that the complexity of
instructional design and technology can be fruitfully understood along a limited set of independent basic dimensions. Each IDM can be represented as a particular profile in a tentatively universal instructional space. This overarching approach bridges the theory-practice gap by going beyond terminological surface differences, overlapping IDMs and opposing educational philosophies. It helps to reveal the degree of coherence or contradiction in instructional prescriptions across IDMs as well as the topics attracting high and low research activity. Compared to single IDMs it also offers added value for practitioners and (academic) teachers who are non-experts in instructional design and technology. It potentially gives a rationale for the selection of an adequate IDM and for reasoned design decisions if none of the known IDMs fits to the given conditions.

Iteration in instructional design: An empirical study
Daniëlle Verstegen, TNO Human Factors, The Netherlands
Yvonne F. Barnard, EURISCO, France
Albert Pilot, Utrecht University, The Netherlands

Instructional design is not a linear process: designers have to weigh the advantages and disadvantages of alternative solutions, taking into account different kinds of (often conflicting and changing) constraints. To make sure that they eventually choose the most optimal one, they have to keep on collecting information, reconsidering continuously whether their own decisions are still justified in the light of the latest insights. We have studied the role of iteration during instructional design and developed support for iteration. For our research we have used the ISD-based MASTER method for the specification of training simulators. The results of our empirical evaluation show that the quality of the designs is not directly related to the amount of iteration. This led to the conclusion that there are different kinds of iteration, triggered by different kinds of actions and events. We propose a model for iteration and support.

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Paper Presentation

STUDENTS' PERCEPTIONS

Chair: Bianca De Bernardi, University of Verona, Italy

Students’ and lecturers’ perceptions of factors influencing academic performance at two south African universities
William Fraser, University of Pretoria, South Africa
Roy Killen, University of Newcastle, Australia

Investigations at two South African universities attempted to identify the pre- and post-enrolment factors that lecturers and students perceived as having the most important influences on students’ success in their university studies. Opinions of lecturers were compared with opinions of various groups of students within and across the two universities: different genders, different years of study, different home languages, different languages of instruction, and different modes of study (contact and distance education). There was a strong level of agreement between lecturers and students concerning most factors that were identified as being likely to contribute to students’ success in university study. However, there was considerable diversity in the opinions of lecturers and students concerning the factors that were identified as being likely to contribute to students’
failure at university. These differences were more pronounced at the distance education institution than at the contact university. Implications for instruction practices are discussed.

How do students conceive of learning when entering and leaving university?
Gunnar Handal, University of Oslo, Norway
Tone Dyrdal Solbørkk, University of Oslo, Norway
Berit Karseth, University of Oslo, Norway
Kirsten Hofgaard Lycke, University of Oslo, Norway

The paper will present qualitative data from an international comparative research project: “Students as ‘Journeymen’ between the communities of education and work”. The project interviews freshmen and senior students in three programmes (professional and liberal) in each of the four participating European countries (Germany, Norway, Poland and Sweden). A follow-up interview will be conducted one year after the students have left university and started working. The paper concentrates on data from the freshmen and senior student interviews (Spring 2002, cross sectional samples) and focuses on the students’ conception of learning at the university. It provides possibilities for comparison within and between the two programmes common to all four countries: Psychology and Political science and will discuss national results in a comparative perspective.

Living is learning: A reconceptualisation of cognition, epistemology, intelligence and learning in the doctoral experience
Gavin Hazel, University of Newcastle, Australia

This paper will be propose a strategy for exploring the interactions of dispositions, experiences and beliefs, in situ, for final year doctorate students with regards to their epistemological strategies and constructs. The goal of this approach is to create a rich description of the learning interactions within doctorate/supervision process. This method provides a mechanism for investigating a number of problematic issues involved in our current conceptualisation of how we learn as part of the doctoral process. As such, it can give us preliminary access, by drawing on existing models in the field of epistemology and cognition as a starting point, to information about: scaffolding and supervision; knowledge frameworks; and epistemological cognition. I will illustrate this method in practice, and the possibilities that it provides, but the discussion of an example case.

Students’ course perception and their approaches to studying in undergraduate science courses
Carolin Kreber, University of Alberta, Canada

This study investigated whether the approaches to studying students adopt in a given course could be predicted from how they perceive the learning environment created in that particular course. To this end, the Approaches and Study Skills Inventory for Students (ASSIST) and the Course Experience Questionnaire (CEQ) were administered to a large sample of Canadian undergraduate science students (N=1080). Eleven items were added to the CEQ to address the notion of choice and independence in learning. The factor structure of the ASSIST questionnaire was confirmed at the main scale level. The factor structure of the CEQ was also largely confirmed though some changes were noted. Stepwise multiple regression analyses identified predictors for each of the three approaches to studying: deep, strategic, and surface. It is suggested that staff development initiatives that inform instructors about the links between workload and approaches to studying might help change their perspectives.
EFFECTS OF LEARNING ENVIRONMENTS

Chair: Thea Peetsma, University of Amsterdam, The Netherlands

Never say it’s beta: Quality expectations and learners’ performance
Stefan Fries, University of Mannheim, Germany
Charlotte Haimerl, University of Mannheim, Germany
Holger Horz, University of Mannheim, Germany

First evidence for the existence of a reversed apersonal Pygmalion effect in the learning process with computer-based trainings (CBT) will be reported. Students of computer science were given a CBT on compression methods. Different quality expectations were induced: The CBT was presented to 21 students as “beta version”, to 20 students as “high-end” product, and to 21 students with no information about its quality. Results showed significant effects not only on the evaluation of the programme but also on learning outcome. Students in the high-end version condition evaluated the CBT better and learned more than those in the beta version condition and in the control condition. In a second experimental study, the quality expectation effect on learning outcome was replicated for a total of 95 students. Building on these results, a model will be presented, in which the observed effect is explained in the framework of self-regulated learning.

Differences in reading literacy between private and public compulsory schools in Sweden
Eva Myrberg, Göteborg University, Sweden
Monica Rosén, Göteborg University, Sweden

In Sweden, a voucher plan was adopted in 1993 and since then an increasing number of private schools have been established. Almost 5% of the Swedish students at compulsory level now attend private schools. Whether school-choice and voucher systems increase educational efficiency and social mobility or if instead an increased segregation by ethnic group, social class and ability level reduces efficiency in a general sense, is in international research a disputed question. Swedish data from the cross-national study of reading literacy, PIRLS 2001 conducted by IEA, is used to analyse differences between public and private schools, as well as differences between categories of private school, using multilevel statistical analytic techniques. Initial results show considerable differences with regard to localisation, availability to resources and background characteristics of the students. Variation in dimensions of reading comprehension and their relation to background factors, school-type and teaching methods is now being analysed.

Background music and classroom performance: A far from simple relationship
Rhona Stainthorp, University of London, United Kingdom
June Dominquez, University of London, United Kingdom

This is a study investigating the effects on performance in mathematics of different types of background music. The Year 9 pupils from one secondary school in South East England were divided into 4 mathematics ability groups. All the children took 4 timed mathematics tests; each test under a different background music condition. The four conditions were: “Mozart”, “Bangra music”, “Japanese music”, “no music”. The performance in the “no music” condition was used as
the baseline against which to measure the effects of background music. Contrary to other published work (e.g. Savan, 1999), there was no strong “Mozart effect”. There was a complex interaction between type of background music and ability. Because of this complex interaction, it is suggested that it is not possible to assert that background music always has a positive effect on performance. Schools need to think carefully before adopting the use of background music in their classrooms.

Student progress, aspirations and perceptions following the introduction of coeducation into a single sex school
Shirley Yates, Flinders University, Adelaide, Australia

Coeducation was introduced into a non-government single sex boys’ school in South Australia in 1999. The restructuring from unisex to mixed sex education was phased into the school over two years, with girls initially admitted to the secondary Grades 7 to 12 in 1999 and to the primary Grades 3 to 6 in 2000. Educational progress, occupational and educational aspirations and perceptions of the psychosocial climate of the school’s learning environment were measured annually in all primary and secondary students from 1999 to 2002. Path analytical modelling revealed significant relationships between students’ gender, progress, occupational aspirations, plans for tertiary study and perceptions of the relationship dimensions of cohesiveness, friction and satisfaction and the personal dimensions of competitiveness and difficulty of schoolwork. In particular, students’ perceptions of interpersonal friction within the school played a significant pivotal role in their educational progress and the psychosocial climate of the learning environment.

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Paper Presentation

SOCIAL INTERACTION AND DISCOURSE

Chair: Angela O’Donnell, Rutgers State University of New Jersey, USA

Content or cognition? Teachers’ use of questioning to scaffold pupils’ learning
Debra Myhill, University of Exeter, United Kingdom
Susan Jones, University of Exeter, United Kingdom
Frances Dunkin, Field Place First School, Worthing, United Kingdom
Margaret Brackeley, Hawthorns First School, Worthing, United Kingdom
Pauline Warren, Elm Grove First School, Worthing, United Kingdom

The paper will describe the findings of the analysis of teachers’ questions and will illustrate how ‘interactive’, whole-class teaching is characterised by questions requiring predetermined answers. The paper will explore whether the predominance of factual questions reflects a transmissive mode of teaching, and will suggest novel ways of considering teachers’ questions in terms of their function within a teaching sequence. In addition, the paper will consider how higher order speculative and process questions are used to enable learners to articulate their understanding. Finally, the paper will consider how national curriculum imperatives in the UK may be compelling teachers to prioritise teaching (delivery and curriculum content) over learning (understanding). The paper will raise important issues about the nature of interactivity in whole class teaching and about the role questions play in supporting and extending pupils’ learning experiences.
Listening to context. Rethinking the nature of metacognitive control of listening within classrooms
Pauline Sangster, University of Edinburgh, United Kingdom
Charles Anderson, University of Edinburgh, United Kingdom

This paper focuses on the question of how best to conceptualise the demands that students now face in directing their listening and responding within classrooms. A central insight that has emerged from the findings of a qualitative study of children's listening in classrooms (which involved extended periods of observation and interviews with students and skilled teachers) is the ways in which established accounts of metacognitive control and monitoring may need to be expanded. Drawing on the findings of this study, attention centres on how executive control entails the internalisation of specific norms governing the interpersonal and ideational uses of language within classroom settings and the disciplining of the self to recognise and adhere to these norms. In addition, such control also depends on acquiring specific knowledge that enables students to frame their attention within the demands of different listening tasks and genres of texts.

How do story telling promote shared understanding in a group learning situation?
Ulla Maija Vallesala, University of Jyväskylä, Finland

The aims of this study were to examine how shared understanding is developing during the story telling episodes of the group discussion and to find story telling practices which would promote shared understanding in the group. The notion of shared understanding was described on the basis of Gadamer’s hermeneutics as a sharing of common meaning. Conversation analysis of the story telling episodes of a group discussion of three Open University students indicated that the students oriented to the story telling structure in their interaction when they noticed an asymmetry of knowledge in the group. There were also found two story telling practices which may promote shared understanding. They were collaborative story telling and telling the second stories. These two practices are suggested to describe empirically Gadamer’s theoretical notion of shared understanding. They are also offered as a base for helping students to develop a symmetry of knowledge in a group learning situation.

The role of discourse in the construction of social reality in the classroom
Esther Vardi-Rath, Kaye College of Education, Israel

The present study describes and analyzes the features of teacher talk in the Israeli classroom, within a sociolinguistic framework. The role of discourse in constructing social reality in the classroom is expressed in student-teacher interaction during lessons. Data collection was conducted in 12 lessons. The recorded and transcribed lessons were analyzed by means of a specific coding scheme, adapted for this research. Our findings show that teacher talk is characterized as social control acts, which carry with them a threat to the face of the students. This work sheds light on the uniqueness of classroom discourse, where the teacher and students form a ‘speech community’, creating a specific way of speaking. Classroom discourse appears to be ritualistic, and schematic discourse, in which the participants know their place and position.
Collaboration in Writing

Chair: Bernard Schneuwly, University of Geneva, Switzerland

How virtual discussions improve writing process: A descriptive study and a writing learning tool
Elena Barberà, Toni Badia, Anna Espasa, Teresa Guasch and Daniela Ruiz, Open University of Catalonia/IN3, Spain

The main objective of this research is to describe and explain how virtual discussions effect the process of learning to write of secondary school students, and to design a writing tool that allows students to be guided in the process of planning, writing and revising a text. Results are related with the following procedure: 1) Analysis of four High Schools that develop experiences of virtual debates in order to detect needs and potential; 2) Interpretation of the experiences of the theory based on writing process; 3) Development of a guidance tool for teachers and students.

Student interactions and writing competencies within a paired writing classroom
Loretta Ho, University of Hong Kong, HKSAR, China

This study examined: (1) the effects of PW on improving the writing competencies of primary school Chinese writers. (2) the nature of student interactions (particularly peer scaffolding) and their effects upon students’ writing competencies throughout the PW process. The study involved 56 primary three students drawn from two classes (experimental and control group) of a Hong Kong school. The design involved measures of students’ changes and group differences in writing performance, metacognitive growth in writing, student interaction patterns, types of peer scaffolding. Both quantitative and qualitative analyses focus on any differential effects of Paired Writing and unstructured collaborative writing on the dependent variables. Results indicated that PW has a positive effect on students’ writing competencies (both cognitive and metacognitive), student interaction patterns, types of peer scaffolding. The high correlation between the effects of tutor-tutee interactions and writing competencies explained why PW is more promising in promoting novice writers’ competencies.

Collaborative argumentation-based learning: Quality of interactions and tool use
Marije Van Amelsvoort, Utrecht University, The Netherlands
Jerry Andriessen, Utrecht University, The Netherlands

Focus of this research on computer-supported collaborative argumentation is on the relation between quality of interactions, and the use of graphical and textual preparation tools to support these interactions. Students in upper secondary education had to discuss the topic of genetically modified organisms in pairs, in order to write a collaborative argumentative text, in an electronic environment. This was preceded by an individual phase in which students read information, and represented their individual opinion on the topic either in a text or graph. These individual products were available for inspection during the collaborative phase. We research the way students broaden and deepen the space of debate on this topic, and the way they co-work on knowledge. Three forms of individual preparation and stimulation of discussion are compared, to investigate the effect of preparation tools on the quality of interactions.
An examination of interactional coherence in e-mail use of elementary school children
Hans van der Meij, University of Twente, The Netherlands
Bregje De Vries, University of Twente, The Netherlands

Research is scarce on how to functionally integrate email in elementary school (i.e. achieve interactional coherence). The paper introduces the Contextual – Rhetorical – Semantic profile for attending to the key factors in a study in which children from different elementary schools communicated via email. Various measures of support are described and operationalized to characterize interactional coherence. Emails were analyzed in a two-step procedure. In segmentation each email was subdivided into meaningful units. In categorization these units were classified into factors from the CRS-profile. The important roles of the variables time and turn-taking are illustrated by the presence of statistically significant interactions with, among others, the topic of the exchange, the presence of expressions of affect and the linkage between questions and responses. Conclusion. The methodology yields valuable insights into the complex ways in which different dimensions of an email communication influence each other.

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Paper Presentation

HOW TEACHERS DEVELOP A PROFESSIONAL IDENTITY

Chair: Sanneke Bolhuis, University of Nijmegen, The Netherlands

Professional development of university professors as teachers: Theories and challenges
Mònica Feixas, Autonomous University of Barcelona, Spain

Our research aims to examine what changes take place in university professors’ teaching. It particularly analyzes the evolution of teachers’ teaching orientation: preoccupations, teaching conceptions, instructional and assessment strategies, the relationship between teachers and students and the relationship among colleagues in various moments of their teaching career. Different stage development theories (adult development; age and vital cycle’s development; intellectual, moral and ego development; career development) have been taken into account. Such analysis has been accomplished using an original questionnaire, interviews and document analysis. Teachers of 12 departments of Universitat Autònoma de Barcelona and 12 of Universitat Politècnica de Catalunya delineate the research sample. Interviews have been realized to 14 teachers of different age, experience, professional status, subject area and university. The final objective is to justify how important and necessary is to offer pedagogical training to university teachers which is varied and adequate to their different interests, expectations, skills, motivations of their teaching career.

Monitoring pre-service teachers’ perceptions about teacher roles through a practice-based education programme
Annemarie Hattingh, University of Pretoria, South Africa

The teacher education programme at the largest residential university in South Africa was redesigned in response to the reconstruction of the education system, which is philosophically underpinned by outcomes-based education. The new programme is a problem-practice-based
programme which commenced in 2002. Since teachers’ practices are influenced by perceptions of their roles, this research investigated how the initial perceptions regarding teacher roles had changed as a result of the programme. Visual collages were constructed and then analysed followed by clarification interviews before and after student teachers experienced the programme. The initial and actual perceived roles were juxtaposed against seven roles which incorporate the idea of applied and integrated competence that all student teachers have to demonstrate in order to qualify as professionals. Understanding the evolution of consciousness regarding roles was useful in that it provided insight into the impact of the programme on the cultivation of practical, reflexive and foundational competence of these student teachers.

Constructing teacher identity in classroom contexts: Student-teachers’ relations to chemistry and the adoption of teacher identity in socioculturally oriented chemistry classes
Sinikka Kaartinen, University of Jyväskylä, Finland
Eero Ropo, University of Tampere, Finland

This paper examines the processes related to student-teachers’ identity construction in school contexts. The study applies identity as its key theoretical concept. We refer to several researchers emphasizing the importance of personal identity as a core concept of theorizing modern life and learning (e.g., Castells, Giddens, Gergen). Methodologically, the paper applies a narrative framework in collecting data on students’ relations towards the learnt subject, in this case, chemistry. The results of the study suggest that there is a connection with the student-teachers’ self-positioning and their experiences with their own chemistry teachers and his/her way of teaching. However, the student-teachers participating in the study expressed their willingness to shape their personal attitude towards chemistry learning and instruction. In general, the study suggests the power of participatory classrooms in enhancing student-teachers’ development as chemistry learners and teachers.

Student teachers’ understanding of teacher profession
Iva Stuchlikova, University of South Bohemia, Czech Republic
Bina Daniel, University of South Bohemia, Czech Republic

The study focuses on pedagogical knowledge of student teachers in terms of their implicit theory of teaching. We have analysed student teachers reflections of what it means to be a teacher. Though it is impossible to study implicit theory directly, it is possible to discover some part of it through the “discourse” about teaching, especially when open projection is fostered. A modified version of Twenty-statement test (TST) was used. Data gained from freshmen student teachers (N=308) were qualitatively analysed. The students tended to use mostly normative statements. They produced mainly the statements drawn from the pupil/student position. The “strict” competencies were described in less elaborated manner than the “mild” ones. The results are in correspondence with the assumption that implicit theory of freshmen student teachers reflects mostly their personal schooling experience.
INTERVENTION STUDIES: WHAT HAS BEEN LEARNED?

Chair: Jesus Alonso-Tapia, University of Madrid, Spain

Fostering students’ learning motivation with computer based attributional retraining
Markus Dresel, University of Ulm, Germany
Albert Ziegler, University of Ulm, Germany

Deficits in learners’ motivation are a prominent predictor of dysfunctional learning processes. An approach to foster motivation is attributional retraining. However, there are some practical and theoretical limitations. Computer based motivational training could be an opportunity to compensate them and to analyse remaining theoretical questions. We conducted a longitudinal study, where German 7th graders worked with a computer based attributional retraining (N=981). Six conditions were realised, differing in the content and sequence of presented attributional feedback. Motivation could be improved immediate and sustainable by combining and sequencing attributional feedback. Especially early attributions to high efforts followed by later attributions to high ability, were highly effective. Although exclusive presentation of ability or effort feedback was partly short-term effective, detrimental long-term effects could be observed.

Establishing the effectiveness of interventions in literacy
Judy Parr, University of Auckland, New Zealand
Helen Timperley, University of Auckland, New Zealand

Sixty school leaders participating in a national literacy initiative to encourage classroom interventions based on an action research design were asked about their understanding in theory and in practice of such designs. They rated a hypothetical scenario containing several problematic features and described the school-based literacy intervention they had instigated. Most principals and literacy leaders based their ratings of aspects of the scenario by referring to the collegial nature of the discussions rather than the lack of data to identify student learning needs or to determine the success of the intervention. Few of their descriptions of school-based interventions were even focused on student learning. This study shows that traditional focus of schools on professional collegial processes overrides messages about the importance of testing (through examining outcome data) of the effectiveness of practice in raising student achievement in literacy.

Comparing the effects of three methods that developed kindergarten children ability to generate questions on achievements in analogical problem solving, self-directed learning and transfer of learning
Vered Tamir, Bar-Ilan University, Israel

The purpose of this research was to examine, in kindergarten children, the effects of three teaching methods of self-questioning on the quality and quantities of questions children ask, as well as the effects of each method on the achievements in three domains: analogical problem solving, self directed learning and transfer in learning. The intervention plans were based on three theories: the Metacognitive Theory, the Scheme Theory, and the Active Processing Theory (Wong, 1985). The research findings strengthened the research hypothesis almost completely. A significant distinction
was found between the children of the Metacognitive Theory group and the children of the two other experiment groups in the three variables that were examined; but only in some of the measures it was found that the children that learned according to the Scheme Theory reached higher achievements than those of the children in the Active Processing Theory group.

Cognitive acceleration intervention and teachers’ pedagogical thinking
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Eight teachers participated in an Cognitive Acceleration Intervention programme in Finland. They were Primary school teachers working in two schools with their pupils aged 11-13 years. Intervention programmes were CASE and CAME (Adey & Shayer). During intervention there were group discussions with mentor teacher (the first author) and some teachers kept a diary. After intervention all the teachers were interviewed. Diaries, tape recorded discussions and interviews comprise the data for the qualitative analysis of the presentation. The purpose of these intervention programmes is to help children in their developmental mastery of cognitive abilities. Concrete preparation, cognitive conflict, construction, metacognition and bridging are the “five pillars” of the teaching model of CASE and CAME. These cognitive activities form an analogy in relation to about teachers’ professional development. Could these five steps be found also in teachers’ thinking about experiences during the intervention? At the beginning the teacher deals with a lot of concrete preparation and meets maybe some cognitive conflict too, but as time goes, metacognition and bridging are increasing. Metacognition in this connection could mean reflection, and bridging could mean starting to see all his/her teaching as a tool for helping pupils to learn to think. Could this kind of well structured and planned intervention programmes, based on sound theories, work as a start and inducement for teachers’ professional development in general? This question is discussed through the framework of teachers’ pedagogical thinking (Kansanen). The data analysis shows that intervention increases reflection and teachers move in their thinking from the descriptive towards more normative pedagogical questions. The Intervention aimed at increasing pupils thinking skills is also an intervention in teachers’ mind.