Computer Supported Collaborative Learning Environments: Introduction

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ABSTRACT
The goal of this Workshop is to present aspects of the research that takes place in different laboratories in Greece, that combines a concern for conceptual change in science and mathematics with an interest in the implementation of relevant CSCL environments. The accumulated experience brings forth the opportunity to discuss the new affordances that are provided by the availability of CSCL software in achieving demanding science and mathematics concept learning and possible routes of introducing CSCL in the practice of Greek schools.

KEY WORDS: *Computer Supported Collaborative Learning, Conceptual Change,Iintentional Learner, Assessment, Social Negotiation.*

INTRODUCTION
Computer Supported Collaborative Learning (CSCL) is an important new educational paradigm that, among others, aims at the design of educational software and accompanying instructional practices that support synchronous and/or asynchronous student collaboration (Koschmann, 1996). The Cognitive Science and Educational Technology Laboratory (COSET) at the University of Athens, building on its expertise in the study of conceptual change (Vosniadou 1994) has been a pioneer in the effort to design learning environments that build on CSCL to promote conceptual change in science and mathematics (Kollias, Vosniadou & Ioannides 1999; Kollias, Vlassa, Mamalougos & Vosniadou 2000; Vamvakoussi, Kollias, Vosniadou, Skopeliti & Ikospentaki, 2002; Mol, Stathopoulou, Kollias & Vosniadou 2003; Vosniadou & Kollias 2003)

In order to facilitate the kind of conceptual restructuring often required in the learning of science, we need to pay particular attention to a) the design of curricula that take into consideration students' prior knowledge, and b) the development of metaconceptual awareness, metacognitive skills, and intentional (purposeful and goal-oriented) learning (Vosniadou 2001; Vosniadou 2002) . A CSCL environment can be designed in ways that encourage the development of critical discourse around students' ideas and beliefs and also to give students more control over their learning. It can therefore be helpful in developing the metacognitive and intentional learning skills that are necessary if we want to make students understand the anomalies behind the counter-intuitive science concepts presented to them through instruction.

Moreover collaboration leaves students open to strong social influences that have the potential to "shale" their convictions, question their sense of understanding and create both contexts of conflict and needs to reach agreement in order to stream operations. However, the above leave open the possibility of shallow agreements, decisions by majority rule irrespective of the subject as well as the logistic problems of mastering the multiplicity of information and understandings that come forth. The use of computers has the additional advantage of stabilizing information and opinions in a written form and structuring communication in a manageable way.

In charting the interaction between CSCL and conceptual change we notice also that research results coming from the domain of conceptual change can make CSCL environments more powerful since it provides teachers with concepts to navigate through the variety of student products in the strongly student centred CSCL learning environment. It supports teachers to distinguish, among the "noise" of different opinions, substantive progress towards understanding, to recognize the deeper resemblance or difference among the opinions students express so that the teacher takes better decisions towards establishing a better quality of inquiry in the classroom. In a systemic level conceptual change research underlines the importance of time and the gradualness that is needed when learning in demanding academic areas.

The presentations in this workshop are divided in two groups: Three of the papers present case studies that were realized in two of the participating laboratories while one paper presents CSCL and conceptual change from the point of view of various research projects realized in one laboratory.

In the paper by Vamvakoussi et al. emphasis is given in the radical reorganization of students' understanding of rational numbers, especially with respect to the constraining presupposition of discreteness. In this case, the students were 9th graders and the learning environment designed had the characteristics of the kind of knowledge building that we try to develop in COSET: facilitation in the expression of prior knowledge, construction of models and argumentation about models, support for developing awareness about the provisional nature of students' understanding of scientific and mathematical concepts so that students can understand that that their explanations are hypothesis that may be changed when further evidence and argumentation is generated. The results are both promising and open new directions. On the one hand, the authors got statistical significant differences between the experimental and the control group both in the understanding of numbers and in the awareness of the difference of opinions. Moreover students in the experimental group were making deeper evaluations of their learning process. On the other hand "few comments were adequately explained and supported by adequate arguments".

In the paper by Kollias et al. 6th grade students worked in a CSCL environment specially designed for increasing students' control of their learning. In this paper there is given emphasis in how metacognitive activity is distributed between working through the software and working face to face in the same dyad, and in correlating metacognitive activity with the quality of collaboration inside the participating dyads.

In the paper by Voyatzaki et al high school students were introduced in a learning environment that aimed towards teaching algorithms. In this case the researchers brought forth the formative assessment and the self-assessment affordances created by appropriately designed CSCL environments and showed how these materialized in the case of the specific difficulties that students faced with respect to the domain of algorithms. Moreover, building on their prior work on CSCL environments they experimented with the notion of roles and of the distribution of computation that is usually done by one individual to different individuals playing different roles.

Finally the paper by Dimitrakopoulou et al. gives a view of how the joint concerns for CSCL implementation and conceptual change can appear in different aspects of the research directions of an educational Laboratory (The Learning Technology and Educational Engineering Laboratory at the University of Aegean). In the work presented we notice the concern for metacognitive support and the expression of prior knowledge but also an effort "to relate metacognition and self-regulation to social negotiation". They are concerned with the importance of social awareness (decentring, developing of empathy) and with delineating conditions that promote argumentation, explication, and explanation triggering. Although this group does not always distinguish learning in general from conceptual change in particular, the overview of their research activities allows the conceptual change researcher to distinguish interesting avenues for further research. Interesting aspects of the laboratory's work is the variety of populations that have been studied and the interest for constructing software instruments for teacher and student friendly analysis of the contents of the data base.

CONCLUSIONS

The work included in this workshop shows both agreements and differences of emphasis among the pariticpating groups. There is a common agreement in giving students the opportunity to express their prior knowledge, to construct models supported by appropriate tools that make their models concrete and shareable, to use group interaction to bring forth arguments among students. However the first group (COSET) gives more emphasis on assessing the degree that students achieve regulation of their own learning within specific disciplinary domains. The second group (Human Computer Interaction Group) emphasizes the assessment opportunities provided by the CSCL environments especially for the teacher and the significance that the structure in social interaction ("taking roles") and the design of the software can have for learning. Finally the third group (LTEE) is particularly interested in social negotiation and how this can be related to metacognition and self-regulation.

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