Application of a Computer Supported Collaborative Learning Environment (CSCL) in Teaching of Electric Circuits

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Abstract

In the presented research design, application and evaluation of a learning environment took place, where with the use of software that supports collaborative learning, we succeeded improvement of students’ learning in comprehension of concepts relative to electrical circuits and deepening in how they learn physics.

Methodology

The curriculum topics of the Physics course in 8th level were about the electrical circuits. For 10 instructive hours, one experimental class (24 children) and three control classes (66 children) participated in this research which was held at the laboratories of informatics and physics of Athens Kostea-Geitona private school, during April and May 2002, as a part of the ICT European project ITCOLE http://www.euro-cscl.org/site/itcole (Innovative Technologies for Collaborative Learning Environments and Knowledge Building). This project focuses on developing innovative pedagogical models, design principles and technology for collaborative knowledge building to be used in European education.

In this learning environment there were combined: a) already known principles of design for teaching Physics and b) internet software (Synergeia) which has been drawn so to support collaborative building of common knowledge and self-adjustment of learning process of the students themselves.

The preexisting ideas (preconceptions) of students on the relative concepts were taken into consideration; written queries were used, recordings of dialogues, and video taping the whole procedure.

Synergeia software, developed in the framework of the same scientific project, gives the possibility of exchange of files, provides spaces for synchronous and asynchronous dialogic communication with texts and pictures among groups of students.

Emphasis was given in the dialogic process to the exemplary opinions so that negotiation is facilitated on students’ opinions, to the exemplary use of argumentation from teaching, to the connection with other spaces of learning (observations, results from classic experiments, and various bibliographic sources). Attention was paid to functionality control of the pedagogic "tool", e.g. learning of natural sciences to be structured around the control of hypotheses. Regarding the didactical topics, the points of attention are: Building of electric circuits, modeling of current, predictions about the operation of circuit when local changes are applied and transformations of energy, topics of curriculum, which were also taught in experimental class and in the control classes at the same period and for equal time. Emphasis was laid on exemplary opinions so that part opinions are fixed; also in argumentation; predictions of the whole class after agreement and at judgment time (real experiment).

Results

At the moment of the submission of this work, while statistical analysis of inquiring data is running, results are clearly positive: the unencumbered and comfortable use of this computer environment is realized; better comprehension of concepts of electricity from a traditional class is proved through written and comparative queries as well as by the analysis of dialogues and video tapings and the explicit possession of certain exploratory techniques that are absent in students of traditional classes.

Reference