RECENT DISSERTATIONS

KALLE JUUTI, 2005

Towards Primary School Physics Teaching and Learning: Design Research Approach

Department of Applied Sciences of Education, University of Helsinki, Finland

Abstract

The thesis describes a project to design a primary school physics learning environment which takes into account teachers' needs, design procedures, properties of the learning environment, and pupil learning outcomes. The project's design team has wide experience in research and development work in relation to science education, the use of ICT in education, the way students think about physics, curriculum and teaching method development, and the design of instructional materials. This knowledge base was the starting point for design. The project engaged in design research. Design research is here considered to be a form of educational research, and offers opportunities to study unique educational phenomena. It produces artefacts to be applied directly in an educational setting, and thereby engages the researcher in the direct improvement of educational practice. Design research can even offer a strategy for the development and refinement of educational theory. The first main research result was a design procedure. The procedure contained four phases: 1) needs assessment; 2) definition of the objectives for a design solution; 3) design and production of the material; and 4) evaluation of the material. The phases apply research literature and empirical research. Phases three and four are iterative and include three stages: limited use of the prototype, a pilot test and a field test. The second main result was a designed learning environment as an example of a learning environment. The research showed that an environment should be: 1) concrete and illustrative, offering examples for the classroom; 2) mentally stimulating, for both study and practical work; 3) physically and pedagogically meaningful 4) usable; 5) offer peer and expert support for teachers. In addition, the research uncovered many contextual features that are important concerning the usability of the learning environment. The third main result was that qualitative level models delivered by way of stories offer much potential for learning primary school physics. From the Finnish perspective, the designed learning environment offers a novel phenomenon to investigate primary physics teaching and learning in a new situation where, from the point of view of this research, rather ambitious new National Framework Curriculum for physics education has been introduced.

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Contact: kale.juuti@helsinki.fi

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