RECENT DISSERTATIONS

PIRKKO KÄRNÄ, 2009:

Holistic physics education in upper secondary level based on the optional course of physics. University of Helsinki, Department of Physics, Helsinki, Finland

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Abstract

The goal of this research was to improve teaching and to widen the perspective on how physics is taught. Holistic physics education means in this research teaching, in which all goals of the curriculum are taken into account. These involve knowledge, skills and personal value and attitude goals. Research task was to clarify how the educational goals involving student's values and attitudes can be carried out through the subject content of physics. How does the physics teacher communicate the modern world view through the content of the physics class?

The teacher-researcher planned and delivered an optional course where she could study the possibilities of holistic physics education. In 2001-2002 ten girls and two boys of the grade 9th class participated in that elective course. Research method was content analysis that involved both analyzing student feedback, and relevant features of the teacher's knowledge, which are needed for planning and giving the physics lessons. In this research that means taking into account the subject matter knowledge, curriculum, didactic and the pedagogical content knowledge of the teacher. Among other things, the researcher constructed the contents of the curriculum and abstracted sentences as keywords, from which she drew a concept map. The concept maps were tools for studying contents which are included in the holistic physics education. Moreover, conclusions were reached concerning the contents of physics domains by which these can be achieved.

According to this research, the contents employing the holistic physics education is as follows: perception, the essence of science, the development of science, new research topics and interactions in physics. The starting point of teaching should be connected with the student's life experiences and the approach to teaching should be broadly relevant to those experiences. Since such contents is not employed by teaching the physics included in the standard curriculum, supplement relevant teaching material that includes such topics are needed.

The students reported that the goals of holistic physics education were achieved in the course. The discourses of the students indicated that in the experimental course they could express their opinions and feelings and make proposals and evaluations. The students had experiences about chances to affect the content of the course, and they considered the philosophical physics course interesting, it awakened questions, increased their self-esteem and helped them to become more aware of their world views. The students' analytic skills developed in the interactive learning environment.

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