RECENT DISSERTATIONS

JARKKO LAMPISSELKÄ, 2003:

Demonstration in Chemistry Instruction in the Upper Secondary School

Department of Chemistry, University of Jyväskylä, Finland.

Research report no. 102

Abstract

The purpose of the study was to examine students' conceptions regarding the combustion of iron wool and the reactions of hydrated copper sulphate and determine how demonstration affects their understanding of these phenomena. It was found that traditional demonstration-based instruction is in many respects an obsolete method. The research project developed a new model of demonstration-based instruction grounded on the cognitive constructivist view of the learner as a constructor of their own knowledge. The learner's observations of the demonstrations become meaningful when the learner links these with their previous learning, interpreting their new knowledge within a framework based on their earlier experiences and in a way that is appropriate to the given situation. Learning was considered in the study as an individual process that is nevertheless capable of being influenced, in essential ways, through social interaction.

The study involves a teaching experiment used to gather data on the feasibility, in upper secondary school chemistry instruction, of a hypothetico-theoretical model of demonstration-based instruction. The research subjects consisted of the teachers and students in the research groups, and the research data were collected from the subjects using several different data-gathering methods. The research interventions took place during a chemistry course taught to and obligatory for all subjects, which covered general and inorganic chemistry. The new method of demonstration-based instruction was used to demonstrate the combustion of iron wool to only one of the two research groups, while the reactions of hydrated copper sulphate were demonstrated to both groups. As regards the students' understanding of the combustion of iron wool, the learning outcomes of the two groups could be compared also with those of four groups taught using what are known as conventional methods.

The findings showed that the new method of demonstration-based instruction makes for more effective formation of memory traces and thus affects the effectiveness of the learner's knowledge-gathering activities. Demonstration-based instruction can promote the learner's learning and help them to build up a well-structured conception of the causal relationships involved in a natural phenomenon. However, this required seeing demonstration-based instruction as a broader process than what has traditionally been customary. It was obvious that a demonstration designed and carried out in a pedagogically appropriate manner prepared the ground for a basic grasp of the given phenomenon; it was seen as a step towards a more in-depth understanding of phenomena.

Language: Finnish
ISBN: 951-39-1659-6
Contact: jarkko.lampiselka@helsinki.fi