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Lab work in secondary school science: teachers' objectives and how these are implemented

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Abstract

Laboratory work is considered important for student achievements in science education. This thesis will contribute with increased knowledge about lab work in science education in Swedish secondary school. The main purposes are to describe secondary school science teachers' objectives for lab work and to describe how these objectives are implemented during laboratory exercises. The thesis shows and discusses, from a teacher perspective, the complexity involved in lab work.

The thesis is comprised of four papers based on empirical analysis of teacher interviews, laboratory manuals and laboratory exercises. Two interview studies identified which objectives the teachers consider important and compared these to international studies. Two case studies identified how the teachers' objectives are put forward during lab work and what factors are important for the implementation of objectives.

The results from the interview studies show that Swedish secondary school science teachers express general objectives including the development of students' understanding of concepts and phenomena, of their interest in science and ability to think and reflect upon lab work. This is to a large extent in accordance with objectives identified in international studies. However, when the teachers describe specific laboratory exercises they emphasize the activity and the laboratory skills. Some of the teachers describe lab work that includes scientific inquiry but not specifically, knowledge about the nature of science. Scientific inquiry was mostly used to develop interest in science and not to develop knowledge about how to systematically investigate phenomena in nature. The teachers express their objectives differently in different contexts. The laboratory manuals mostly put forward objectives to help students identify objects and phenomena and to learn facts, which is not always in accordance with the teachers objectives. Results from the case studies show that the teachers' objectives do not always correspond to the students' views of important things to learn. It is not obvious that lab work in itself makes students understand a certain scientific content, they need help to "see what is intended to be seen". Interactions between the teacher and the students are important to help students perceive the teacher's objectives. Many interactions have a starting point in the laboratory manuals, and if the objectives in the manual correspond to the teacher's objectives it makes it easier for both the students and the teacher to reach the intentions for the laboratory exercise. Implications for science teaching are discussed.

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