



UMEÅ UNIVERSITET

"Kunskap är vad du vet, och vet du inte kan du alltid googla!"

Elevers epistemic beliefs i
naturvetenskaplig undervisningskontext

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"Knowledge is what you know, and if you don't know, you can always google it!"
Students' epistemic beliefs in a science teaching context.

Abstract

One important goal of science education is to help students develop an adequate understanding of what science is and how it is done. An understanding of science includes epistemic beliefs, that is, individuals' beliefs about the nature of knowledge, how knowledge is constructed, and how knowledge can be justified. The epistemic beliefs are hypothesized to exist on a continuum ranging from naive to sophisticated. Students' epistemic beliefs and their epistemic cognition have been shown to influence various facets of learning. The overarching purpose of this thesis is to contribute to our knowledge and understanding of the role played by epistemic beliefs within the context of science education. The thesis intended to answer the following three general questions within a scientific context: 1) What prerequisites for drawing conclusions about epistemic beliefs are given based on the choice of questionnaire as a measurement method, including its design and content? 2) What is the relation between students' epistemic beliefs and other phenomena that are important in learning situations? 3) What is the relation between students' epistemic beliefs and their epistemic practices?

The studies used both quantitative and qualitative methods to examine students' epistemic beliefs and epistemic practices. Data sources included questionnaires, video and screen observations, and semi-structured interviews. Participants in the studies were students in Grade 5-11 in Sweden and Germany. A series of four papers address the purpose of the thesis and respond to the three general questions. The first paper investigate relations between students' epistemic beliefs and perceived classroom characteristics and whether differences could be found between the two countries. The second paper investigate the relative importance of epistemic beliefs dimensions for predicting achievement goals in Grade 5 through 11, in both a cross-sectional and a longitudinal study. The third paper explore the relationships between students' scientific epistemic beliefs, their problem-solving process, and the quality of solutions produced by students. Finally, the fourth paper describe students' epistemic practices of problem solving in science and their sense making in the moment, to deepen the understanding of the process of the students' epistemic cognition. In relation to the first question, results indicate that the chosen measurement method for epistemic beliefs generates certain prerequisites for how epistemic beliefs can be understood and characterized. This in turn may have consequences when epistemic beliefs are studied in relation to, for example, other phenomena and epistemic practices. With regard to the second question, findings show that there are many relationships between epistemic beliefs and other phenomena, but also that they are in many cases context and/or situation dependent. Regarding the third question, the results point out that the relationship between students' epistemic beliefs and their epistemic practices should be understood by how the students show, through words and actions, that they understand what the situation requires. Thus, there is no universal relationship between sophisticated epistemic beliefs and successful epistemic practices. It can be concluded that students' epistemic beliefs do not exist in a vacuum without interacting with other phenomena, but that they depend on the surrounding context or situation in different ways. More studies that take into account different types of situations are required. This would in turn most likely also contribute to a better understanding of how students' epistemic beliefs, epistemic cognition, and epistemic practices develop in relation to the surrounding teaching context.

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Problemlösning, kunskapssyn, lärandemål, lärandemiljö, simulering, motivation

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