RECENT DISSERTATIONS

ANITA WALLIN, 2004:

The theory of evolution in the classroom. Towards a domain specific theory for teaching biological evolution.

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Abstract

The overall purpose of this thesis is to study how upper secondary school students (grade 10-12) develop an understanding of evolutionary biology as a result of teaching. Taking students' pre-conceptions as the starting point a teaching sequence is designed with the aim that students shall learn the theory of evolution by natural selection in such a way that it becomes an intellectual tool. In other words they shall be able to describe, understand, explain, and partly predict biological phenomena from an evolutionary point of view.

Three different teaching experiments were performed and studied in a cyclic process with design and evaluation of both teaching and students' learning, followed by a new design and so on. The students' knowing was tested before, during, and after teaching by written tests, interviews, small group discussions, and a database-driven Internet problem. Similar results emerge from the analyses of the students' performances in the different data collections: e.g. all students do not accept random processes before teaching, many students use the same alternative ideas, and existing variation is a key idea to understand the theory of evolution, and to reason scientifically. The majority of the students, about 80 %, had alternative ideas about evolution before teaching. They viewed evolution as a gradual process where every member of the population adapts to the environment. They consider adaptation as the driving force that is regulated by, for instance need, strive, or purpose. In the delayed post-test one year after teaching most students, about 75 %, had reached a scientific level. This result can be considered good compared to many other studies reported in the literature.

The students' reasoning in the different tests was carefully analysed having preconceptions, the conceptual structure of the theory of evolution, and the aims of teaching in mind. This gave insights into those learning and teaching demands that constitutes challenges to students as well as to teachers, when beginning to learn, or to teach evolutionary biology. The combined results from these analyses of the three experiments are summarized in a domain specific hypothesis for teaching. It consists of three different aspects: content specific aspects, which are unique for every field of science, aspects concerning the nature of science, and general aspects. This hypothesis can be tested in new design experiments, and if it will withstand future tests it can be developed into a domain specific theory for teaching evolutionary biology.

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