

## RECENT DISSERTATIONS

### TRINE HYLLESTED, 2007

*When the teacher takes the school out of the school  
an analysis of visits to nature centres and other out-of-school places with a focus on the purposes of the teachers and their interactions with the students in relation to providing optimum conditions for the learning processes of the students.*

Department of Curriculum Research, School of Education, University of Århus, Denmark.

#### **Abstract**

This study investigates the use of out-of-school activities in science in Denmark. From a historical point of view the active, concrete and practical methods in contemporary pedagogical practises are not new. Based on works of Giddens and Bourdieu the study analyses the professional out-of-school centres as representing a new expertise. The teachers value the professional expertise and aim to give the students cognitive, affective, psychomotor and sociocultural experiences on the excursion. The preparation and follow up from the teachers before and after the out-of-school activity had significant impact on the learning process of the students.

The whole study concentrates on out-of-school activities involving a nature centre, as well as in public schools. It focuses on the views of the students and the views of the teachers. The empirical work is primarily based on qualitative interviews, however they are supplemented by a questionnaire.

#### ***Why do the teachers use out-of-school activities?***

The teachers have an epistemological reason for taking the students out. They believe that a new place will enrich the students with a special experience and expertise. This special experience and expertise will become apparent in the meeting with the physical environment or the professional interpreters out there. This understanding is a social construction. The teachers also have a pedagogical purpose. They aim to give the students cognitive, affective, psychomotor and sociocultural experiences during the excursion.

#### ***How do the teachers support students' learning outside school ?***

The three empirical studies as a whole show that the use of out-of-school activities back at the school was related to the way the teacher chooses to support the learning process. The questionnaire about the pedagogical use of the professional nature shows that half of the teachers did not use the visit to the nature centre as a part of the curriculum in their daily teaching. It was considered a one day experience. But the studies also find teachers who prepare their students and follow up on the excursions. They stimulate curiosity before, during and after the excursion. They act as resource providers and senior co-investigators. They help the students to articulate the learning process following the excursions.

The out-of-school activities provide learning stimulus, but the teacher is a key person in providing the learning conditions for the students, and the students are key persons in the learning processes.

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## RECENT DISSERTATIONS

MARIA ANDRÉE, 2007

*Den levda läroplanen. En studie av naturorienterande undervisningspraktiker i grundskolan.*  
(*The lived curriculum. A study of science classroom practices in lower secondary school.*)

Department of social and cultural studies in education, Stockholm Institute of Education (Stockholm University), Sweden.  
Studies in Educational Sciences 97, Stockholm: HLS Förlag.

### Abstract

The aim of the thesis is to develop knowledge about what students actually learn in lower secondary school science, regardless of intentions and policies. This is conceptualized as a study of *the lived curriculum*. During the last decades, new ways of organizing classroom work have evolved in Sweden. Students are to an increasing extent expected to take responsibility for what, when, and how they study. The aim of this thesis is therefore delimited to the study of which lived curriculum is constituted in such an individually organized science classroom practice.

The theoretical foundation is a cultural-historical activity-theoretical perspective on human learning and development. The point of departure is that what we learn must be understood as an aspect of the activities we engage in. The research approach is ethnographic; field studies were conducted in two science classes, grades six and seven (ages 12 to 14 years old), in a Swedish mid-sized compulsory school during one school-year.

The first result is that two different practices are discerned in the studied science classroom. One classroom practice is a criteria-based practice, where students work individually with local school criteria determining what students must be able to do in order to get a pass or a pass with distinction in the natural science subjects. The other classroom practice is a laboratory practice, where students do laboratory experiments and write laboratory reports. The second result is that students, in both practices, participate in different actions; either *production and reproduction of correct answers* or *development of conceptual relations*. These actions correspond in varying degrees to different motives; as a consequence, different scientific formation is made possible in the two different actions. A third result is that classroom practice supports student participation in the action of reproducing correct answers; while participation in the development of conceptual relations is a more risky and uncertain endeavour. However, there is evidence that students' ways of participating can change, to a more qualified, as conditions for work change.

A conclusion is that work in science classroom practice cannot, as suggested in previous research, be comprehended in terms of cultural border-crossings, between a culture of science and student cultures. Rather, work in science classroom practice must be conceptualized in terms of schooling.

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**ISBN:** 978-91-7656-632-9, ISSN: 1400-478X

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**Download:** <http://urn.kb.se/resolve?urn=urn:nbn:se:su:diva-6669> (abstract in English, the thesis is available in print only from HLS Förlag [www.hlsforlag.se](http://www.hlsforlag.se))

## RECENT DISSERTATIONS

MATTIAS LUNDIN, 2007

*Students' participation in the realization of school science activities*

Swedish National Graduate School in Science and Technology Education, FontD:  
Department of Social and Welfare Studies, Linköping University, Norrköping.

### **Abstract**

This thesis investigates and considers how students and teachers realize school science activities. Students' questions and accounts of their experiences as they become part of an established science content form the focus of this work. Its purpose is to provide an understanding of how two agendas –one, based on students' participation and the other, based on the already established science content –are orchestrated so that both are accounted for. The empirical work is based on video-recorded observations in science classrooms. The findings show how different activities in the accomplishment of a school science project orchestrate students' questions and accounts of experiences with the science content. The findings also show how the nature of science (NOS) is communicated as a by-product of instruction. In addition, different uses of questions for bridging science and everyday ways of communicating are shown in the results. The findings also indicate the different roles that students' experiences acquire in a school science activity. These results should be seen as a step towards a definition of the nature of school science (NOSS). School science activities become intelligible if we consider them from a basis of their own purposes and prerequisites. The concept of NOSS is described to elicit such purposes and prerequisites as they become apparent in the activity.

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## RECENT DISSERTATIONS

MICHAL DRECHSLER, 2007

*Models in chemistry education - A study of teaching and learning acids and bases in Swedish upper secondary schools*

Department of Chemistry and Biomedical Sciences, Karlstad University, Sweden  
Karlstad University studies 2007:13. Karlstad: Karlstad University Press.

### Abstract

This thesis reports an investigation of how acid-base models are taught and understood in Swedish upper secondary school. Historically, the definition of the concepts of acids and bases has evolved from a phenomenological level to an abstract level. Several models of acids and bases are introduced in Swedish secondary school. Among them an ancient model, the Arrhenius model and the Brønsted model. The aim of this study was to determine how teachers handle these models in their teaching. Further, to investigate Swedish upper secondary students' ideas about the role of chemistry models, in general, and more specific, of models of acids and bases.

The study consisted of two parts. First, a study was performed to get an overview of how acids and bases are taught and understood in Swedish upper secondary schools. It consisted of three steps: (i) the most widely used chemistry textbooks for upper secondary school in Sweden were analysed, (ii) six chemistry teachers were interviewed, and, (iii) seven upper secondary school students were interviewed. The results from this study were used in the second part which consisted of two steps: (i) nine chemistry teachers were interviewed regarding their PCK of teaching acids and bases, and (ii) a questionnaire was administered among teachers of 441 upper secondary schools in Sweden.

The results show that most of the teachers did not emphasise a distinction between the various models of acids and bases in their teaching. For them it was sufficient to distinguish clearly between the meaning of acids and bases at the phenomenological level and at the particle level. A simple and valid argument for their preference was given: To simplify the acid-base concept and thereby facilitate learning. This study, however, shows that although students were expected to have learnt Brønsted's acid-base model, most of them had not developed a clear picture of it.

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## RECENT DISSERTATIONS

### PASI REINIKAINEN, 2007

*Sequential Explanatory Study of Factors Connected with Science Achievement in Six Countries: Finland, England, Hungary, Japan, Latvia and Russia. Study based on TIMSS 1999*

Institute for Educational Research, University of Jyväskylä, Finland. Research Reports 22.

#### **Abstract**

This thesis explores country-specific explanatory variables for eighth-grade student science achievement in Finland, England, Hungary, Japan, Latvia and Russia by multi-level modelling of the Third International Mathematics and Science Study (TIMSS 1999) data. These variables are presented in a new graphical form that facilitates interpretation of the results also by persons unfamiliar with multi-level modelling. However, this study does not only present statistically significant explanatory variables but also aims at a new level of interpreting secondary results of Large-scale International Comparative Achievement Studies (LINCAS): firstly by describing the demographics, educational systems and science education practices of the studied countries, and secondly, by using national science education experts to provide emic interpretation of the statistical results as well as to highlight the cultural, historical and social contexts in which the actual learning takes place.

As a result of this study some recommendations are made to improve future LINCAS. For example, it seems advisable to keep the international core of background questionnaires relatively small and add the number of national options instead. But what is even more important, based on the findings of this study, it seems obvious that the beneficiaries of this kind of secondary analysis include not only educational policy makers but also teachers and students' parents.

This study also includes discussion about criticism towards LINCAS studies as well as a literature review on studies using multi-level modelling on TIMSS data.

Keywords: science, TIMSS 1999, multi-level modelling, Finland, England, Hungary, Japan, Latvia, Russia.

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*Download:* <http://www.ier-publications.fi>

## RECENT DISSERTATIONS

EVA BLOMDAHL, 2007

*Technology in the classroom – a study of technology education for younger children in compulsory school*

Stockholm Institute of Education, Sweden

Studies in Educational Sciences 99. Stockholm: HLS Förlag

### Abstract

The main purpose of this study is to find out how technology as a school subject is formed into pedagogical action. Issues addressed are:

- How does teaching in the school subject of technology differ in terms of content and process?
- How do frame factors influence teaching in technology?

As analytic tools, concepts from philosophical thought on technology and education as well as frame factor theory are used to throw light on the way technology education takes shape in the practices of two primary school teachers. The philosophical concepts employed and developed have been inspired by the thinking of Martin Heidegger and John Dewey. These concepts are “place” and “shaping of technology,” where the shaping of technology involves the following phases: formulation of the assignment, analysis, visualization/construction and evaluation/reflection.

The basic questions are investigated in two case studies over a period of one year. Data is collected based on ethnographic methods and consists of observations, video recordings, documentation in the form of teachers’ diaries as well as pupils’ work, taped interviews with pupils, and interviews with the two teachers both before and after the project was finished.

The overall results of the study show that the two teachers, to a different degree, use place, e.g. they try to use the children’s own experiences and the surrounding environment as a starting point in their teaching. They try to organize their teaching as a process of knowledge construction instead of as a process of transmission. In that process, different forms of representation are used, such as sketches, model constructions and written documentation, with the element of model construction providing a common denominator given the availability of tools and material. Another similarity between the practices is that the children are given opportunities to work at problem solving in cases where there are no given solutions. However, they enter problems due to their own embodiment in a pedagogy of transmission, which results in the fact that the shaping of technology becomes difficult to organize. Strict borders between subjects, the fragmented timetable of the school, and the organization of the classroom space and scarce equipment and materials all influence the possibilities of teaching in technology.

Keywords: technology education, classroom practice, primary school, educational content, ethnographic method, Martin Heidegger, John Dewey and frame factors.

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## RECENT DISSERTATIONS

### OLAVI HAKKARAINEN, 2007

*Pupils' mental models of a pulley in balance, and how the models are changed by successive pulley demonstrations*

Department of Physics, University of Jyväskylä, Finland  
Research report No. 4/2007

#### Abstract

This study explores changes in the Finnish comprehensive school pupils' (age eleven to fifteen) conceptions of hanging objects in balance under successive demonstrations. The study aims to address the understanding of a young pupil's conceptual change and to capture the factors of the instructional processes which foster or hinder the process of conceptual change. The aim of the study is to promote science teaching in comprehensive schools.

The theoretical part of the study considers historical conceptions of weight, the conceptions pupils have about the concept of weight, the descriptions of different theories about conceptual change, and some learning methods applicable for changing pupils' conceptions towards the scientific concept of weight.

The empirical part of this dissertation, *the learning intervention*, is described and based on the following five articles:

1. Hakkarainen, Olavi and Ahtee, Maija (2005). Pupils' mental models of a pulley in balance. *Journal of Baltic Science Education*, 2005, 2(8), 26-34.
2. Hakkarainen, Olavi. Mental models in manual weight comparisons between two objects of different size. *Themes in Education*, Vol. 6, No 2, 151-167.
3. Ahtee, Maija and Hakkarainen, Olavi (2005). Importance of the order of demonstrations in changing pupils' conceptions. *NorDiNa Nordic Studies in Science Education*, 1, 31- 42,
4. Hakkarainen, Olavi and Ahtee, Maija. The durability of conceptual change in learning the concept of weight in the case of a pulley in balance. *International Journal of Science and Mathematics Education*, 5, 3, 461-483.
5. Ahtee, Maija and Hakkarainen, Olavi (2007). Changing pupils' conceptions about weight applying variation theory. *Science Education in a Changing Society. Problems of Education in the 21<sup>st</sup> Century*, Volume 1, 2007. Scientific Methodical Centre "Scientia Educologica", Siauliai: Lithuania.

The success of the learning intervention in the case of the fifth and ninth grade pupils can be explained with Marton's theory of variation because the use of successive demonstrations is based on simultaneous variation. A particular way of experiencing something is a set of related critical aspects focused at the same time. Teachers can help pupils' learning by using appropriate variations in the successive demonstrations so that the pupils will recognize the cognitive conflict present in their earlier thinking.

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## FOURTH SCANDINAVIAN SYMPOSIUM ON RESEARCH IN SCIENCE EDUCATION

University of Southern Denmark, Odense, 14-15 February 2008

*“Teaching and learning science in new contexts”*

### Invitation and first circular

This symposium is a follow-up of the successful symposia, organized by Hans-Jürgen Schmidt (Karlstad), and Veijo Meisalo (Helsinki) and Onno de Jong (Karlstad). As earlier, the aim is to bring together researchers from Scandinavian countries to present and discuss empirical studies in biology, chemistry, physics, and general science education. Research that is already finished as well as ongoing research can be presented. The symposium language will be English.

Please, send a one-page outline for a paper or poster presentation before 1 January 2008 to [cmich@imada.sdu.dk](mailto:cmich@imada.sdu.dk). The decision about your proposal will be sent before 20 January. Participants without a paper or poster are also very welcome. They should express their interest by sending a mail to the address above (preferably before 20 January).

**Conference dates:** 14–15 February 2008.

**Location:** University of Southern Denmark, Odense, Denmark, see [http://www.sdu.dk/?sc\\_lang=en](http://www.sdu.dk/?sc_lang=en). Odense is the third largest town of Denmark and the birthplace of the world famous fairytale writer Hans Christian Andersen, see <http://www.visitodense.com/>. Odense is easy to reach by plane (via Copenhagen or Billund), by train (from Copenhagen, Århus and Frederikshavn), or by car.

**Conference fees:** No fees. Participants shall cover their own expenses for travel and stay.

**Conference Chair:** Dr Claus Michelsen, Center for Science and Mathematics Education, University of Southern Denmark.

**Deadline for proposals (paper, poster): 1 January 2008.**

**Further information:** [cmich@imada.sdu.dk](mailto:cmich@imada.sdu.dk) A second circular with details about the program, possible accommodation, and so on, is sent out in the beginning of January 2008.



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