The Nordic Graduate School in Mathematics Education

Summer school of 2006

The NoGSME summer school for doctoral students took place in June. Twenty participants from the Nordic and Baltic countries met for a week at the campus of Agder University College in Dömmesmoen, Norway. Most of the time was spent in working groups of 6-8 persons with an experienced group leader. The work focussed on the studies of the participants and dealt with their research questions, choice of theoretical framework, methods, data collection, analysis, results, discussion and implications for teaching mathematics. Many hard questions were raised and everyone had to justify their research design and decisions taken. The group leaders were Kath Hart, Ole Björkqvist, Christer Bergsten and Trygve Breiteig. Lectures were given by Kath Hart and Simon Goodchild. A series of workshops dealt with questions such as *How to read a scientific paper productively*, *The role of theory in scientific papers* and *How to write a scientific paper.* All participants produced a draft or sketch of their next paper for a scientific journal. Nomad certainly can look forward to good access to Nordic and Baltic research papers.

The next summer school will take place in Iceland in the beginning of June 2007. Suggested themes are how to design a classroom study and how to collect and analyse classroom data.

Dissertations in mathematics education

In the last issue of Nomad five Nordic dissertations were presented. We can now take part of another six dissertations treating questions on teaching and learning mathematics.

Mette Andresen defended her dissertation, *Taking advantage of computer use for increased flexibility of mathematical conceptions*, in May at the Danish University of Pedagogy. Mette Andresen's study is part of a larger project in Denmark called World Class Math & Science. In a sub project each student had a laptop, with computer algebra software, at their disposal. Participants gained the experience that computer use in upper secondary school mathematics has a potential. Mette studied: "How could these potentials be captured and conceptualised?" Later, her questions became: "Is flexibility a supportive construct for articulation of experiences of teaching and learning within a modelling approach? Is it useful for realisation of the learning potential of students' concept formation?" The methods can be described as an interpretative approach to experimental teaching design. Data were collected through classroom observations with field notes and video recording, and through interviews with students and teachers at four different schools all involved in the same project.

Gunnar Sjöberg defended his dissertation at Umeå University in the Graduate School of Pedagogical work. The title is O*m det inte är dyskalkyli – vad är det då?* (*If it is not dyscalculia – what is it then?*). He investigated the concept of dyscalculia in the research literature and found that it is an ill-defined or not defined concept. The pupils he followed from grade five in school to upper secondary school were said to be in mathematics difficulties but many of them later succeded in the subject. One crucial factor seems to be the short time these pupils spend on mathematics learning, often less that half an hour per school week. Compulsory school mathematics teachers will find interesting interviews as well as noteworthy pupils' comments in this work.

Monica Johansson wrote about *Teaching mathematics with textbooks – a classroom and curricular perspective*. She defended her work in June at Luleå University of Technology. The dissertation consists of four papers and a preamble and the focus of all parts is the relationship between the textbook and the curriculum. She shows that the textbook influences not only what kind of tasks students are working with during the lessons, but also the examples the teacher presents on the board, what kind of concepts are introduced and how they are introduced. The teacher can get into problems because of too much reliance on the textbook. The study shows the relative autonomy of the mathematics teacher in relation to the most common teaching tool in Swedish classrooms – the textbook.

Örjan Hansson is, as is Monica, a member of the Swedish Graduate School in Mathematics Education. He defended his dissertation the day after Monica at the same university. The work carries the title *Studying the views of pre-service teachers on the concept of function*. His work consists of five papers and an overview that binds the work together. Three different groups of pre-service mathematics and science teachers for grade 4-9 were his informants. He used questionnaires, concept maps, and interviews in order to understand and analyse how they perceive the concept of function. The concept of function is rarely a well integrated concept and the pre-service teachers view of the concept is represented by a less developed knowledge structure than one could wish for. Thus there are many implications for the teaching of pre-service teachers.

On the same day as Örjan, Maria Bjerneby-Häll defended her thesis at Linköping University. The title is *Allt har förändrats och allt är sig likt: en longitudinell studie av argument för grundskolans matematikundervisning*. The aim of this thesis is to describe and analyse arguments for mathematics in compulsory school and to understand why and how the official arguments change. The point of departure is that the conditions and the reality for school mathematics can be understood through an analysis of official arguments and of personal arguments given by teacher students and teachers. She followed a group of teacher students through their education

and their first three years of teaching. The result shows that during their education the teacher students develop a view on mathematics and mathematics education harmonizing with the goals of mathematics in the national syllabus. The novice teachers experience quite different conditions when they start to work as teachers. Preparing their pupils for the national test becomes the most important goal. A factor influencing the mathematics teacher is the qualification requirement in mathematics from compulsory school to go into the national programs in the upper secondary school. The novice teachers experience a conflict between different goals in the national curriculum and course syllabus for mathematics.

Andreas Ryve's dissertation took place at Mälardalen University in the end of June with Anna Sfard as opponent. The title is *Approching mathematical discourse. Two analytical frameworks and their relation to problem solving interactions*. His main aim is to investigate how conceptual understanding and problem solving can become a natural part of mathematics teaching and thus of students' mathematical knowledge construction. He wants to characterize the classroom discourse in two different problem solving courses in teacher education and also to investigate and further develop two analytical frameworks – a communicational approach and a dialogical approach used to study mathematical discourses. He shows that the classroom discourse can be characterized in terms of subject oriented, didactically oriented and problem solving oriented discourses. The analytical frameworks are further developed in his study.

Readers are recommended to examine all these dissertations closer. They are all available in electronic form from the authors. Already in September still a number of dissertations will be presented.

Workshop on mathematics textbooks and curricula

The Nordic Graduate School organised a workshop on textbooks and curriculum studies in the end of May this year. This area of research seems to have been neglected for at least two decades in the Nordic countries but a new interest has grown and a number of doctoral students are now working in this area. Birgit Pepin from Manchester University and Linda Haggarty from Open University, well known international researchers, were invited. They have both published studies on textbooks and are often quoted in recent works in the Nordic countries. Both doctoral students working in the area and more senior researchers took part. Others interested in being part of this new network are welcome to contact us. The first follow-up will be a discussion group on the issue at PME30 in Prague, were many of the participants will meet again and continue to develop the ideas from the workshop. The presentations from the workshop will be documented and published. We hope that this network will

support the development of research on textbooks and curricula as well as comparative studies in the Nordic and Baltic countries.

A similar workshop will take place during the autumn, probably on the use of technology in mathematics teaching and learning. Information will be distributed as soon as the programme is settled. All ideas and suggestions for content of seminars or workshops are welcome.

Seminar for supervisors in NoGSME

The fifth seminar for supervisors organised by NoGSME took place in Vasa in Finland in the beginning of May. At several universities in the Nordic countries there is a wish to build research education in mathematics education. The process often starts with the creation of a doctoral stipend for a student who is then enrolled in an existing programme at another university. The hope seems to be that this student after finishing doctoral studies will work in the home university and be one of the staff members in a new programme. Thus the seminar this time investigated different existing research programmes in mathematics education and we discussed some characteristics and crucial questions to be aware of in the creation of new programmes (and continuation of existing ones). The sixth seminar will take place during autumn 2006 and suggestions for themes to deal with are welcome to the NoGSME board.

Half way through the life of NoGSME

NoGSME has now existed and acted for two and a half years and the same amount of time is left for our joint work. We have offered two summer schools, many doctoral courses in all of the Nordic countries, five seminars for supervisors, two workshops, five mobility stipends for doctoral students, and travel support to courses for a number of doctoral students. As NoGSME started it was clearly said by the funding organisers, NordForsk, that this is a one time commitment. It is not possible to get a prolongation of the grant. Thus we ask you all to think carefully about how to use the rest of the time and money accessible in line with the application from 2003.

As said before, the board of the Nordic Graduate School welcomes suggestions for future doctoral courses, seminars and workshops and we look forward to offers from different universities to host such events. Just send an email in order to start a planning process.

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