

# The Nordic Graduate School into its fourth year of activities

The year 2007 is the fourth year of the Nordic Graduate School. The funding from NordForsk will be given for five years and then it is expected that the community of doctoral students and supervisors that we have created will survive on its own. Will it do so? The group of persons involved is growing and new institutions giving doctoral education enter into the work. In the end of 2006 letters were sent out to all environments participating in the Nordic Graduate School in order to get updated information on the students and supervisors that are active in mathematics education. The updated lists are available on the NoGSME webpage and now contain names of 106 supervisors (current or prospective) and 87 doctoral students. As many doctoral students have taken their degree during 2006 the list of doctoral students loses names but they enter into the list of prospective supervisors instead. It is valuable if information about changes can be sent to us regularly.

## The seventh seminar for supervisors in Trondheim

The seventh seminar will focus on review reports for scientific journals. How can such a report be designed in order to be valuable for both the author of the paper and for the editor of the journal? How can supervisors support their doctoral students both in the use of a received report and in learning how to write such a report? The editors of *NOMAD* and the editorial board will be part of the programme and discuss the review process and how decisions are taken when reviewers have different opinions. Two editors in chief will be interviewed about the policy of a scientific journal and its function. There will be work in small groups where participants will address authentic review reports. Different review guidelines will be investigated and discussed.

## The fourth workshop will be about mathematics and language

In April 26-27 NoGSME will organise a research workshop on mathematics and language in Sweden, near Stockholm. It will be done in cooperation with the Swedish Society for Research in Mathematics Education, SMDF, and build on an earlier workshop on the same theme

that SMDF arranged in the spring of 2005. Workshops by NoGSME are for both doctoral students and supervisors who are doing research related to the theme.

### The third summer school by NoGSME will be in Iceland

As announced earlier, the summer school in 2007 will be in Laugarvatn in Iceland. Many doctoral students have already given us notice of their interest to participate. As before, the group leaders will be excellent international researchers in mathematics education. The evaluation of the summer school in Dømmesmoen in 2006 convinced us that a summer school is a valuable and important event for doctoral students. We welcome all doctoral students in mathematics education from the Nordic and Baltic countries. The second announcement for the summer school will soon be available.

### Seven new dissertations in mathematics education

In NOMAD, volume 11 numbers 1-3, I have written about fourteen dissertations from 2006. Here I can report on still seven more and maybe there are still more that I have not been told about. Please inform us if you know of such theses in mathematics education.

*Ole Einar Torkildsen* defended his thesis for the academic degree of doctor philos at Oslo University. It has the title *Mathematical archaeology on pupils' mathematical texts. Un-earthing of mathematical structures*. The data basis for his work is the pupils' solutions for six tasks given in a competition in Tangenten in the early 1990's. They make up 23 mathematical texts. The purpose of his analysis method is to make explicit the mathematical structures that are inherent in the pupils' solutions. Thus he is intending to uncover the mathematical structures by analysing pupils' solutions through the glasses of a mathematician. The analysis revealed that the pupils in their solving process heavily relied on some fundamental mathematical structures. The relationships in the answers can be identified as functions, in some instances functions with more than one independent variable. The mathematical structures are localised at two levels and factors influencing the solution process are studied. Finally Torkildsen argues that mathematical archaeology is a suitable tool for increasing the knowledge about pupils' mathematical activity.

*Åse Streitlien's* thesis has the title *Room for participation – a study of interaction and communication in mathematics classrooms*. It is written in

Norwegian and makes up an extensive text of 350 pages and was defended at Oslo University. The aim of her work is to study interaction and communication between the teacher and her students in mathematics classrooms. The research focus is concerned with the opportunities young students have for participating in the discourse of mathematics and how the dynamics of reasoning and discussion gives rise to mathematical meaning. Taped lessons from two classrooms were analysed using discourse analysis. Focus was on how discourse patterns influence what counts as mathematics knowledge and what communicative competences the students need for participating in the classroom discourse. Streitlien suggests that what students learn in mathematics depends on how their teacher responds to their responses and the opportunities there are given them in the negotiation of mathematical meaning.

*Ewa Bergqvist* calls her thesis *Mathematics and mathematics education – two sides of the same coin: some results on positive currents related to polynomial convexity and creative reasoning in university exams in mathematics*. It was defended at Umeå University in Sweden. The dissertation consists of two different but connected parts. Part A is based on two papers in mathematics and part B on two papers in mathematics didactics. In part B the focus is on what kind of reasoning university students in mathematics use in courses and exams. Bergqvist differs between imitative reasoning and creative reasoning. About 70% of the tasks in exams can be solved by imitative reasoning. The teachers constructing the exams are pleased with this situation. They claim that otherwise the exams would be too difficult and lead to too low passing rates.

*Sharada Gade* was the first to present her thesis in the doctoral programme of Agder University College in Norway. The title is *The micro-culture of a mathematics classroom. Artefacts and activity in meaning making and problem solving*. The work is based on a yearlong classroom study in the first grade in upper secondary school in Norway. The thesis points to the centrality of both meaning-making in teaching-learning and goal-directedness in problem-solving, as important parts of the instruction in a mathematics classroom. The classroom was bilingual with emphasis on cooperation or group-learning by students. The thesis offers a synthesis based on socio-cultural perspectives of the micro-culture of teaching-learning of mathematics established and situated in the classroom.

*Magnus Österholm* defended his thesis at Linköping University. The thesis has the title *Cognitive and metacognitive perspectives on reading comprehension in mathematics*. The purpose of the dissertation is to examine whether

a reader needs special types of knowledge or abilities in order to read mathematical texts. The reading of mathematical texts is studied from a cognitive perspective and from a meta-cognitive perspective. In the first case reading abilities and content knowledge are studied in relation to reading comprehension. In the second case the focus is on beliefs and how a reader determines whether a text has been understood or not. The results show that courses at upper secondary level and at university level do not affect the special reading ability. There is a need to focus on reading but it does not need to be about learning to read mathematical texts but to use existing, more general reading ability also for mathematical texts.

*Markus Hähkiöniemi* at the University of Jyväskylä has written and defended the thesis *The role of representations in learning the derivative*. The aim of the study is to find out how students may use different kinds of representations for thinking about the derivative in a specific approach. To achieve this, the author designed and implemented a five-hour teaching-learning sequence introducing the derivative concept in a Finnish high school (grade 11). Five students were selected to take part in carefully designed task-based interviews. He found that the embodied world offered powerful thinking tools for the students. They used increase, steepness, horizontalness and tangent of the graph for thinking about the derivative qualitatively without calculating anything. On the basis of the analysis, of the students' use of representations, a hypothetical learning path to the derivative was constructed.

*Per Nilsson's* thesis presented at Växjö University has the title *Exploring probabilistic reasoning. A study of how students contextualise compound chance encounters in explorative settings*. The focus is on what learners with little experience of formal theories of probability do and can do then they are dealing with compound random situations in which they are offered opportunities to integrate different probabilistic lines of reasoning. Two part studies have been done on 12 to 13 year old students and one study on 14 to 16 year old students. The younger students acted within a dice-game setting and the older with ICT-versions of compound, independent events. Prior to instruction students were able to devise ideas of underlying probability distributions in the case of compound random phenomena. The students brought into the discussions geometrical and numerical considerations as well as arguments reflecting principles of the law of large numbers.

## How will these theses influence classroom practice?

The twenty-one theses in mathematics education that have been defended during 2006 are probably pointing to the highest number of theses in the area during one year in the Nordic countries. The year 2006 has been an exceptional year for mathematics didactics in the Nordic countries. Will the dissertations have an effect, in the long run, on mathematics classroom practice? What will the effects be, if any? Is it possible for mathematics teachers to learn about the research results and try to interpret them and implement some outcome of them in the classroom? These are questions that could be interesting to try to answer through future research studies. We will have to show some patience before we can answer the questions.

## Contact the NoGSME board if you have suggestions

The work of the Nordic Graduate School is intended to support and develop research education in mathematics education in the Nordic and Baltic countries. If you have any suggestions for activities that are of value for doctoral students or supervisors and follow the intentions of our sponsors NordForsk, please contact us and let us know about your ideas.

The NoGSME board is looking forward to another year with many exciting activities and collaboration with colleagues in all the Nordic and Baltic countries.

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