# The Nordic graduate school in mathematics education – planning for the future

The ninth seminar for supervisors of doctoral students took place in Tallin in April and the invited international guest was professor Gabriele Kaiser, who is the editor in chief of Zentralblatt für Didaktik der Mathematik. She talked about the publishing policies of international journals in mathematics education and the scientific profile of different journals. The participating supervisors from six countries worked in groups with copies of journals, descriptions of aims and goals for different journals and discussed issues in supervision related to choice of journal for papers. Questions were discussed, such as how insight into publishing policy can serve as support for doctoral students, and what kind of communication with the editors would be helpful. Should they be contacted with a pre-submission or rather after the reviews have been received? The review process was discussed and Gabriele Kaiser spoke about different criteria and principles used in the review process and by editors in their communication with authors. How early in the studies should doctoral students be encouraged to send papers to journals? The characteristics of a number of important journals in mathematics education were listed and discussed.

A NoGSME workshop took place on April 22 during Norma08. The theme of the workshop was *The use of ICT in mathematics education – neither salvation nor catastrophe? What can we learn from research and what are our conclusions?* Three short lectures focusing on research results served as an introduction to the work in smaller groups. Mette Andresen talked about *Use of ICT in School mathematics*, Per-Eskil Persson about *Use of graphic calculators in school mathematics*, and Christer Bergsten about *Teacher education and use of ICT in mathematics learning*. Intense discussions followed in seven groups led by Mette Andresen, Paul Drijvers, Per-Eskil Persson, Christer Bergsten, Guðný Gunnarsdóttir, Mary Billington, Ingvald Erfjord, and Hildegunn Espeland. The presentations and the reports from groups will be made available in the proceedings of Norma08. Some of the questions raised in the groups were:

- Pre-school children use computers today without any problems. How will this influence the learning of mathematics in schools?

- Development work is going on where mathematics classes in upper secondary school only use one tool during lessons: the computer. What could be the consequences of that?

- Teachers need competence development in the area of use of ICT-tools in teaching and learning mathematics. How could this issue be resolved? And what kind of competence is needed?

- What are the characteristics of use of ICT in teaching and learning mathematics at university level?

- What are the most strengthening features and most threatening features in use of ICT in school mathematics learning?

## Doctoral courses in Helsinki and Malmö

In April Erkki Pehkonen at University of Helsinki organised a course on *Conceptions in mathematics*. Fulvia Furinghetti from University of Genova acted as one of the teachers during the course. For the autumn 2008 a doctoral course in Malmö University College has been announced with the title *Mathematical literacies: construction of concepts and the implication for design of research and education*. The course teachers will be Tine Wedege, Eva Jablonka and Ole Skovsmose. For spring 2009 Jo Boaler, who is currently a Marie Curie professor at University of Sussex, is preparing a course which will be offered to the students in NoGSME. It will be a course on *Research into effective mathematics teaching*. The content will be a combination of findings of studies of teaching (Jo Boaler's and others) and issues related to the ways teaching and classrooms can be researched

Furthermore, in the autumn of 2008 students can take the courses given at University of Agder. The courses are *Theory of science from a perspective of didactics of mathematics* and *Theories of teaching and learning mathematics*. All courses given at Nordic universities entitle students to apply for travel stipends from NoGSME.

Also mobility stipends for doctoral students are available. They open the opportunity to visit another Nordic or Baltic university for a month and get both travel expenses and lodging covered by the stipend. Application can be sent to NoGSME at any time and information about the mobility stipend is given on the web page of NoGSME (see www.nogsme.no).

## Coming events in NoGSME

An international seminar for supervisors of doctoral students will take place in October 8–11, 2008 at Schæffergården in Gentofte just outside Copenhagen. NoGSME has received a generous grant from The Danish -Norwegian Collaboration Foundation, which enable us to host the seminar at this very nice place. The international contact persons of NoGSME have been invited and we will at least have the following international guests: Michele Artigue, Hyman Bass, Willibald Dörfler, and Jeremy Kilpatrick. The theme for the seminar will be *Local, global and international perspectives in mathematics education research* and we will look both into the future and into the past as we have now almost five years of experience from work in NoGSME and ask ourselves where do we stand and where are we going.

The winter school 2008 for doctoral students will take place in Sigtuna in November 24–29 and the first announcement has been sent our in May. The second announcement will be sent in June to all who have indicated an interest in coming. There will be a limit of 28 participants this time, for financial reasons.

The updating of the web page of NoGSME is going on continuously so it is worth checking now and then the information available. Recently the self-evaluation from 2007 and the evaluation from NordForsk have been made accessible and also a paper about doctoral programmes in the Nordic and Baltic countries (see www.nogsme.no).

## A Nordic Society for Research in Mathematics Education

During Norma08 a meeting took place to follow up an earlier meeting in Norma05 and an initiative to create a Nordic Society for Research in Mathematics Education (NoRME). In order to make it easier to access funding from NordForsk and EU-funds a joint Nordic society was considered useful. Some of the arguments for the society were presented in NOMAD nr 1, 2008. In the meeting the decision was taken to establish such a society and current members are the national societies in Denmark, Finland, Norway and Sweden and the NOMAD-society. The aim of the society is given in the constitution:

> The aim of the society is to support and raise the quality of Nordic and Baltic research in mathematics education, and especially through the collaboration among researchers in the Nordic and Baltic countries. An important aim is to achieve funding for the activities among members in NoRME by initiating applications to funding bodies. The member societies are autonomous and NoRME will not

interfere with their internal affairs. The aim of the society is also to support the aims of the member societies concerning research in mathematics education and to ensure the continuation of Nomad and Norma-conferences, as well as to create forums for discussions and constructive meetings for researchers in mathematics education. The aim is also to ensure the collaborative continuation of activities such as those carried out by the Nordic Graduate School of Mathematics Education, NoGSME.

The constitution has been distributed to all individuals in the societies that are members in NoRME. For NoGSME this is one way of assuring that the activities created by NoGSME will continue after the funding of NordForsk has ended in 2009. A board of NoRME was elected. *Frode Rønning*, Sør-Trøndelag University College, was elected to be the chair and the four members of the Board of NoRME are *Christer Bergsten*, Linköping University, *Morten Blomhøj*, Roskilde University, *Markku Hannula*, Helsinki University, and *Tine Wedege*, Malmö University College. Two substitute board members were elected, namely *Guðný Gunnarsdóttir*, Iceland University of Education, and *Madis Lepik*, Tallin University. The new board will work in close connection with NoGSME initially in order to take over some of the traditions and experiences from NoGSME.


## Recent Nordic dissertations in didactics of mathematics

Currently there seems to be a continuous stream of doctoral theses coming up in the different countries in the Nordic area. New students are taken up in doctoral programmes, thus the situation seems to have come into a stable phase of development. Recently new professorships in didactics of mathematics have been advertised in Trondheim, Bergen and Stavanger following earlier ones in for example Växjö and Turku. Research and doctoral education in mathematics education have developed into a viable state and seem to survive, although many universities struggle with recruiting new students in mathematics and science.

Martin Carlsen at University of Agder in Norway has defended his thesis *Appropriating mathematical tools through problem solving in collaborative small-group settings*. The aim of his thesis was to give both empirical and theoretical contributions to the understanding of appropriation processes in mathematics learning of students at upper secondary school, 17–18 years of age. In particular he investigated how the students appropriate the concepts of dot product and geometric series. Through analyses of student collaborative problem solving in small-group settings Martin was able to present the following research findings. The students steadily improved their accuracy in using mathematical, concept related terminology. The students were able to explain mathematical components of

the concepts to their fellow students. Opportunities for learning to occur were created by student questioning, externalisation of thinking, and calling for help. The issue of resistance in the appropriation process was documented. The students made use of semiotic means of objectification throughout their participation in joint activity. Finally, the process of appropriating mathematical concepts is a time-consuming enterprise.

Eva Riesbeck at Linköping University in Sweden presented and defended her thesis *På tal om matematik: matematiken, vardagen och den matematikdidaktiska diskursen* (Talking about mathematics: mathematics, the every day and the mathematics didactical discourse). The aim of the dissertation is to describe and analyze how discourse as a theoretical and didactical concept can help in advancing knowledge about the teaching of mathematics in school. The author takes a socio-cultural perspective, where active participation and support from artefacts and mediation are viewed as important contributions to the development of understanding. In order to grasp language use, knowledge construction and mathematical content in the teaching practises discourse analysis was used as a theoretical point of departure. The empirical data consisted of video and audio tape recordings of the interaction of teachers and pupils in mathematics classrooms and of discussions between student teachers. The results of her studies demonstrate that often discussions are located in either a mathematical or in an every-day discourse. The results also demonstrate how change between every-day and mathematical language often takes place unknowingly. Further the results underline that a specific and precise dialogue can contribute towards teachers' and pupils' conscious participation in the learning process. Translated into common vocabulary such as speak, think, write, listen and read teachers and pupils would be able to interact over concepts, signs, words, symbols, situations and phenomena in every-day discourse and its mathematical counterpart. When teachers and pupils become aware of crossing the discursive boundaries in mathematics an understanding of mathematical phenomena can start to develop. Teachers and pupils can construct a metalanguage leading to new knowledge and new learning in mathematics.

Johan Häggström defended his dissertation with the title *Teaching systems of linear equations in Sweden and China: What is made possible to learn?* at Gothenburg University in Sweden. A starting point for his study is the aim to better understand the relation between teaching and learning of mathematics. The assumption is that what is possible for students to learn about mathematics must be related to how they experience the mathematical content. This in turn must be related to how the content is handled during the mathematics lesson. Mathematics teachers must always make decisions about the handling of the content – what examples to use, what aspects of concepts and methods to emphasise, what exercises

students should work on etc. Häggström intends to produce results that can inform practice on the classroom level, as well as teacher education, and to contribute to the development of methods for analysing teaching that focus on the specific content of instruction. Sixteen lessons from six classes in Sweden and China – video recorded within the Learners' perspective study – were analysed, based on variation theory and with focus on differences in how the same mathematical content was taught. The concept 'object of learning' was used to denote what teachers try to teach and what students are supposed to learn. Three objects of learning were analysed from the perspective of a student: systems of linear equations in two unknowns, solutions to systems of linear equations in two unknowns and the method of substitution. An aspect was considered made possible to experience if the corresponding 'dimension of variation' was opened, and not taken for granted during teaching and kept invariant. The analytical approach employed made it possible to detect even subtle differences in how the teachers handled the content and made it possible to learn for the students. The description of these differences points out several aspects that could be so familiar to many teachers that they face the risk of being taken for granted in teaching.

A common feature of these three studies is the use of video recordings for the data collection. The two first studies use socio cultural theory and the third one is based on variation theory as the theoretical framework. The discourse, the communication between learners and between learners and teacher is crucial in all three studies. Although there are different foci in the three studies, appropriation of concepts in collaborative settings, discourse as a theoretical and didactical concept for advancing knowledge about teaching, and differences in how the same mathematical content was taught, respectively, the studies are using similar methods for data creation and analyses. In all three cases there is a clear aim to inform practices in the classroom and the authors should be encouraged to work closely with teachers to make their findings become tools for teachers in their everyday work with pupils or students in mathematics.

Any suggestions for activities for NoGSME or themes for courses, workshops or seminars are as always welcome. Please contact any member of the board or the director of NoGSME. Well met in the upcoming events of NoGSME.

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