

Research education activities in the Nordic graduate school in mathematics education

The 11th seminar for supervisors organised by NoGSME attracted 35 participants and became a lively activity at University of Agder. Frank Lester, in his introductory plenary presentation, began with some philosophical, theoretical and methodological considerations about how to make mathematics education research more effective. Frank Lester referred to what Paul Cobb writes in the *Second handbook of research on mathematics teaching and learning*. Paul Cobb mentions many of the theoretical perspectives used in mathematics education, such as radical constructivism, sociocultural theory, symbolic interactionism, distributed cognition, information-processing psychology, situated cognition, critical theory, critical race theory, and discourse theory. In this rather bewildering array of theoretical perspectives Cobb seeks to address how researchers might make and justify their decisions to adopt one theoretical perspective rather than another. Frank Lester also quoted the National Research Council about scientific research in education, saying "at its core scientific inquiry is the same in all fields".

They present six scientific principles, namely, to pose significant questions and study them empirically, to link research to theory, to study questions directly, to create a coherent and explicit chain of inferential reasoning, to replicate and generalise across studies and to disclose research to allow for scrutiny and critique. Frank Lester asked how we are to pursue both our desire for fundamental understanding and the need to put our results into practice.

The American Statistical Association report presents components of a research programme in the following way: Generate ideas about a phenomenon, clarify goals and define concepts and constructs, develop concepts and constructs, make assessment of measurement and feasibility, implement small scale studies, confirm and generalise, and extend and

Barbro Grevholm
University of Agder

create long-term community follow up. Finally Frank Lester discussed some design experiment research like Gravemeijer's teacher-developer-researcher collaboration, Battista and Clement's curriculum research as design, Lesh and Kelly's design research and teaching experiments as described by Coob and Steffe and Thompson. Design research could be seen as one of the recent trends in development of methodology.

A lively discussion was followed by a panel debate about methodological issues. In the panel Mogens Niss, Eva Jablonka and Simon Goodchild all presented their personal preferences and views about methodologies and argued against each others views.

In his second presentation Frank Lester asked what methods doctoral students should learn and how they should learn them. He claimed that from the 1960's to the present the nature of doctoral programmes changed from highly structured studies with little or no actual experience in doing research to apprenticeship training. Earlier, students were trained primarily in mathematics but today they come from a wide variety of degrees. Research used to focus on teaching but today there are more wide ranging interests, today there are also more interest in continuing doing research. Frank Lester presented four questions that were discussed during the seminar: What "core" knowledge should all doctoral students have? What research training should they receive? Who should be responsible for preparing doctoral students? What should be the purpose of a doctoral programme? These are all vital questions to handle for the doctoral programmes in mathematics education in the Nordic countries. Other questions that created lively discussion in the small groups during the seminar were: Should research in mathematics education be transformative in nature? How do you distinguish between methods and methodology? What other ways of categorising research methods in addition to the distinction between qualitative and quantitative could be useful. What methods for triangulation are used in research in mathematics education? What can we learn from these examples?

The seminar concluded with a discussion among NoGSME board members concerning the way forward for research in mathematics education and what challenges there are for the mathematics education community. Wishes were expressed that the new organisation NoRME will secure continued activities in the spirit of NoGSME and that the collaboration built so far in the NoGSME network can survive and continue to support both doctoral students and supervisors in the Nordic and Baltic countries.

Summer school 2009 in Denmark

The NoGSME summerschool in 2009 will, as announced before, take place in Søminestationen in Holbæk in Denmark. Almost all accessible places for participants are taken by the 30 who have registered by the end of April. There are possibilities for a few more to be accepted. Contact the director of NoGSME at once if you have missed the chance.

This year the summer school is formally a doctoral course organised by Roskilde University. Thus the demand on participants will be somewhat different from earlier summer schools. The paper prepared by students in advance will be more elaborated and students will also have to prepare questions to fellow students about their research studies. After the summer school there will be a formal examination in the form of an essay to write.

Group leaders will be Mogens Niss, Morten Blomhøj from Roskilde University and Marta Menghini from La Sapienza in Rome. A fourth group leader will take part if the number of students exceeds 32.

Summer school in Norway in 2010?

An application has been sent to NordForsk for a summer school in May 2010. NordForsk will make the decision in June 2009 and if the summer school is supported financially it will be announced as soon as possible in order to ease students planning. It is planned to take place in Dømmesmoen, which is part of the campus of University of Agder, and beautifully situated in Grimstad, on the south coast of Norway.

The 10th international conference in the Baltic countries

This year is the 25th anniversary of the Baltic yearly conference and it took place in Tallin University in May 14–16. There were four themes during the conference: Teaching and learning mathematics, Extracurricular activities in mathematics education, Education and professional development of mathematics teachers, and Technology in mathematics education. The first plenary session was about didactics of mathematics as a research discipline and speakers were Markku Hannula and Barbro Grevholm. The second plenary session dealt with mathematics education research and researcher education in Baltic countries. In the third plenary session Erkki Pehkonen spoke about how Finns learn mathematics: what is the influence of 25 years of research in mathematics education? According to him there is no easy explanation to the good results in international comparisons by Finnish students. In the final plenary session the focus was on *Developments of school mathematics in Baltic countries*.

In addition to the regular conference a research seminar was organised on May 16. The aim of the seminar was to initiate joint Nordic-Baltic comparative research projects in different areas of mathematics education. The proposed topics for the projects were:

- proof and proving in school mathematics,
- mathematics teachers' educational beliefs, and
- mathematics textbooks.

Experienced researchers from Nordic countries acted as project leaders, and they will also be responsible for methodology and general planning of the project. The leaders were Markku Hannula, Kirsti Hemmi and Barbro Grevholm. Researchers from Baltic countries interested in these topics were invited to participate and the projects were started. Funding has been applied for over a period of three years. A web page will be created to make the projects accessible for interested colleagues.

Two new doctoral dissertations in the Nordic countries

Stine Timmermann Ottesen defended her thesis on April 17 at Roskilde University. *Relating University mathematics teaching practices and students' solution processes* is the title of her work. The teaching practices were examined via observations, according to a new instrument developed by her, building on earlier studies. The students' solution processes were examined through a specifically developed research design. In a pilot study a hypothesis was presented and then tested in the main study. The findings show that it is difficult for students to find a proof strategy, which could provide them with a proof structure. For many of the students signs can be found indicating that a sociomathematical norm of proof production has been established among them. This norm sometimes says that a proof can be constructed just by combining the wordings of some well chosen theorems that combine and include words appearing in the tasks. That norm could be related to the norm that proofs are constructed through the use of tricks. Students hesitate to search for the formal definitions of the concepts involved and prefer to base their reasoning on the concept images they have developed. The students find it difficult to understand the explanations of details in the proofs and this might be because the structure is unclear to them. A factor that sustains the misconceived sociomathematical norms could be the lack of attention given to the connection between the structure and the details in the proofs.

Ole Kristian Bergem defended his thesis at University of Oslo on May 19 with the long title: *En analytisk redegjørelse for relasjonen mellom allmenn-didaktikk, realfagsdidaktikk og matematikdidaktikk, med særlig henblikk på en belysning av sentrale forskningsmessige bidrag fra de respektive feltene til forståelsen av matematikklasserommet* (An analytical account of the relation between general didactics, natural science didactics and mathematics didactics, with special focus on enlightenment of central research contributions from the fields to the understanding of the mathematics classroom). The empirical material in the study is observations in grade 9 classrooms and analyses of the video recordings and interviews with pupils and teachers. Focus of the study is challenges related to implementation and use of new learning tools in mathematics. From observations and interview data it is shown that use of work plans mediates pupils' learning work in mathematics. This new learning tool is discussed from a perspective of activity theory. Work plans seem to be a reply to the demand for individually designed learning, but the author argues that these plans generate new pedagogical and didactical challenges for mathematics teachers. The didactical contract in the classroom seems to change and the new role- and responsibility distribution seems unclear to both pupils and teachers. For example, work plans allow pupils to work with mathematics only one or two days per plan period of two to three weeks. This might reduce the learning opportunities of the pupils. The use of work plans also leads to much individual written work, which can be seen as problematic in relation to sociocultural theories of learning.

Another part of the thesis investigates the relation between tasks from daily life and different discourses in the classroom. The analyses show that when pupils discuss among themselves they have serious problems to relate the mathematical knowledge to the authentic tasks. They end up in an everyday discourse with little mathematical relevance. In the whole class discussion the teacher holds the discourse in a mathematically relevant track through his balancing interference. With empirical data from classrooms and practice oriented questions these analyses and findings should be useful and relevant both in school and teacher education.

The two theses investigate teaching practices in relation to the learning opportunities that pupils/students are offered. The different theoretical approaches allow authors to find answers to different kinds of questions. But both studies offer insights that can be used by mathematics teachers in their development of teaching and reflections on their own professional identity.

Already now we see more theses coming up before summer

It has been announced that Lovisa Sumpter in Umeå University, Kajsa Bråting in Uppsala University, Claire Berg at University of Agder, and Liisa Näveri at University of Helsinki will defend their theses in the beginning of June. We will return to these dissertations in the next issue of *Nomad*. Thus, in the first half of 2009 there seems to be at least 8 dissertations in mathematics education. The year 2009 might be as productive in number of dissertations as 2006, with 21 theses.

Barbro Grevholm
Director of NoGSME
University of Agder