The fifth year of the Nordic Graduate School

The ninth seminar for supervisors organised by NoGSME

The board of the Nordic graduate school has invited all supervisors in NoGSME to participate in the ninth seminar for supervisors (or prospective supervisors) in mathematics education. It will take place in Tallin on April 10–11, 2008. The theme of this seminar will be *Scientific profile, scientific characteristics and publishing policy of the journals in mathematics education*. The invited guest lecturer will be editor in chief of ZDM (Zentralblatt der Didaktik der Mathematik), Gabriele Kaiser from Hamburg. Editors in chief of other journals as for example ESM, JRME and MERJ have sent working material to us, which will form the basis for group work during the seminar. With a growing number of researchers in the Nordic and Baltic countries there is a need for raised awareness of publishing policies and about where to turn when you want to publish from your studies. Universities today have increased their demands on researchers to publish in high status international journals, which give better credits to the university. Thus knowledge about profiles and characterstics for such journals is important.

Summer turns to winter

The doctoral students of NoGSME have already started to send us inquiries about the summer school of 2008. As we have informed earlier the summer school will turn into a winter school this time and take place in Sigtuna in week 48, November 2008. The reasons for this is the many activities that are already planned for summer 2008 (among them ICME-11 in Mexico) and we want to avoid a collision with them. So all doctoral students, who plan to take part, should already now book that week for the winter school. More detailed information will be sent out directly to doctoral students later.

Plans for a Nordic umbrella society for research in math ed

In 2005 during the Norma05-conference a meeting was held with participants belonging to the national societies for research in mathematics education from the Nordic countries, to Nomad and to the Norma

programme committee. The theme of the meeting was to discuss a suggestion to try to create a Nordic umbrella organisation in order to link together the organisations and strengthen them. At the meeting it was agreed that the idea of a Nordic umbrella organisation was worthwhile and a small group was selected to work further with the idea. Appointed to the group were Markku Hannula, Frode Rönning, Tine Wedege and Barbro Grevholm (chair). This group has worked on the task with email contacts and some personal meetings with parts of the group.

Thus the group has considered the regulations or constitutions for the existing societies in Denmark, Finland and Sweden and from them tried to sketch regulations for a future umbrella organisation. The intention is to create an organisation that is as easy as possible to get running and does not take up a lot of energy but adds much to the existing societies. A first draft of such a document has been sent to all the societies and to Nomad with requests to give suggestions about how to improve it. A second meeting is planned to be held during Norma08 about the possible umbrella organisation.

The arguments that have been put forward for creating a Nordic umbrella organisation are among others:

1 to strengthen and widen the Nordic cooperation in research on mathematics education (didactics of mathematics),

2 to enable joint applications for grants from Nordic and other resources (like NordForsk and EU),

3 to offer a 'home' for Nomad,

4 to create an organisation that can stand behind the Norma-conferences,

5 to enable new ways for Nordic and Baltic collaboration in mathematics education,

6 to open activities and work in each society to a wider audience and thus make more efficient use of all work done,

7 to share information, newsletters and books or other printed material,

8 to continue parts of the work of the Nordic graduate school in mathematics education (NoGSME) when NoGSME ends in mid 2009,

9 to link with the other national societies for mathematics education in Europe and to ERME, and

10 to further scientific discussions in mathematics education, create for a and meeting points and support newcomers in the field.

Any one interested in sharing the draft for the constitution that has been sent out can contact the group members and get it. We hope that a good discussion will take place before Norma08 in all the Nordic societies and the Nomad editorial board about the suggestions and that the formation process can go on.

Dissertations in mathematics education

Three more dissertations, one in Norway and two in Sweden, have been defended since the last issue of Nomad in 2007. Short reports are given here to raise some interest but those who want to know more are recommended to contact the new doctors directly and ask for a full dissertation. A short notice can never do justice to the work done, a more rich and fair insight is needed.

At the Norwegian university of science and technology in Trondheim Kjersti Waege defended her thesis about *Elevenes motivasjon for å lære matematikk og undersøkende matematikkundervisning* (Pupils motivation for learning in mathematics and investigative mathematics teaching). This took place in 2007 already. This dissertation focuses on students' motivation for learning mathematics. The aims of the study are to gain insight into the ways that students' motivation for learning mathematics can develop when they experience an inquiry teaching approach and into possible relations between the students' motivation and this teaching approach. The informants are seven students in upper secondary school (16 years). This is a design study and it involves both instructional design and classroom based research.

The students' motivation in terms of needs and goals is analysed, and the emphasis is on the needs for competence and autonomy. An analytical framework is developed, which is useful in describing the complexity of the students' motivation. The analyses contribute to insight into the students' motivation for learning mathematics. The students' motivation in terms of intrinsic and extrinsic motivation was also analysed.

The results of the study indicate that the inquiry mathematical teaching approach provided the students with opportunities to satisfy their needs for competence and autonomy. Particularly three aspects of the teaching approach lead towards students' feelings of competence and autonomy during action. They are the instrumental design, the students'

collaboration with each other, and the encouragement and acceptance of the students' strategies for solving problems. These three factors are closely related to each other.

Johanna Pejlare defended her thesis O*n axioms and images in the history of mathematics* at Uppsala university in January 2008. She was one of the doctoral students in the Swedish graduate school in didactics of mathematics during 2001–2006. This dissertation in history of mathematics deals with aspects of axiomatization, intuition and visualization. The thesis consists of three papers. The first paper deals with the Swedish mathematician Torsten Brodén (1857–1931) and his work on the foundations of Euclidean geometry from 1890 and 1912. The second paper is about different aspects of visualizations in mathematics. The author claims that the meaning of visualization is not revealed by the visualization. It is also claimed that visualization can be problematic to a person if this person, due to a limited knowledge or experience, has a simplified view of what the picture represents. The third paper concerns certain aspects of the thinking of Felix Klein (1849–1925) and Heinrich Hertz (1857–1894). Klein emphasized his belief that intuition plays an important part in mathematics. Hertz argued that we form images in our mind when we experience the world, but these images may contain elements that do not exist in nature.

At the University of Gothenburg Kerstin Pettersson defended her dissertation in February 2008. She has also partly participated in the activities of the Swedish graduate school. The title is *Algoritmiska, intuitiva och formella aspekter av matematiken i dynamiskt samspel. En studie av hur studenter nyttjar sina begreppsuppfattningar inom matematisk analys* (Algoritmic, intuitive and formal aspects of mathematics in dynamic interplay: A study of students' use of their conceptions in calculus). The aim of the thesis is to investigate how students use their conceptual understanding when they work with mathematical tasks in calculus. In her first study Petterson explored engineering students' understanding of limit and integral. The second study was a problem-solving study and included students in a mathematics programme, who were working on challenging tasks. The tasks concerned functions and derivative and included proof by induction. When these students expressed their understanding in a formal context their intuitive ideas also played an important role. The engineering students expressed their conceptions in an algebraic context which was dominated by procedural knowledge. How to operate the concepts was a basis for understanding. When students were faced with probing questions they appeared to make a shift in contextualisation so that conceptual dimensions of calculus came more into the foreground. The author claims that these "conceptual shifts display

the transformative aspect of threshold concepts allowing the development of conceptions and students' awareness of ways of thinking and practicing mathematics".

The three dissertations illustrate the many options that exist for research in mathematics education. For one of them data is collected in the mathematics classroom, for one data comes from written historical documents and for one they are collected in university mathematics groups. The questions asked are different and the studies are dealing with the role of motivation in students learning in an investigative teaching approach, historical aspects on axiomatization and the interplay between intuitive ideas and formal aspect of mathematics. A question that can be raised, when you reflect on this disparity, is if there is need to try to build more holistic research pictures in our field? Are new research students building on earlier knowledge to a satisfactory degree?

Suggestions and ideas for future activities in NoGSME are as always welcome to the board. For our programme see www.nogsme.no

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