NOMAD – a regional journal in mathematics education research

This second issue of NOMAD 2010 contains four research papers. One of them is in Norwegian while the others are in English. This mirrors the general tendency in the increasing number of submissions to NOMAD – more than three out of four submitted papers are in English. However, NOMAD is still maintaining and developing its identity as a regional scientific journal for the Nordic and Baltic area in the sense that the authors or the contents of the published papers have connections to, or specific relevance for, the mathematic education milieus in the region. We are very happy for the increasing number of submissions in English, and we happily receive new submissions in English. Nevertheless, we would also like to encourage mathematics educators in the Nordic countries to consider writing papers for NOMAD in the Scandinavian languages. We consider the publishing of research papers in the Scandinavian languages as an important means for maintaining the connection to the mathematics teacher education milieus in this region.

In this issue

In this issue you will find four very different papers. However, incidentally the authors of all four papers have working connections to Norway.

In the paper *Learning opportunities offered by a classical calculus textbook* Mira Randahl and Barbro Grevholm presents an analysis of the introduction of the concept of the derivative in a widely used textbook. The analysis is part of a study of an engineering programme at a university college in northern Norway. The concept of the derivative was chosen due to its central role in calculus. The authors employ the notions of *concept image* and *concept definition*, and of *conceptual* and *procedural knowledge* to characterise how the concept is treated in the textbook and what kind of knowledge is emphasised. The results show that the concept is presented in a formal way in mostly "pure" mathematical contexts and further that the analysed parts of the textbook emphasises learning of algorithms and procedures. The authors conclude that, if the aim is to help students build rich concept images and move away from a procedural

approach when studying mathematics, there is room for improvements in the studied parts of the textbook.

In the paper *Affektive sider ved lærerstudenters arbeid med matematikk* by Leif Kværnes you find an analysis of teacher students' affects in relation to their own learning of mathematics. Data from 24 students' logs have been analysed from a textual and a discourse perspective. The paper establishes a basis for the analysis by combining a social cultural perspective on learning from Melling-Olsen and Säljö, a communicative approach to cognition from Sfard, and a pragmatic and critical textual analysis from Ongstad and Vagle. Through analyses of logs from two of the students and selected utterances from other students the paper illustrates how the theoretical apparatus can be used to give a detailed analysis of the teacher students' affects and emotions in relation to their learning of mathematics and to their future teaching of mathematics. The analyses combine interpretations of the data in relation to the situation context, in which the teacher students are learning mathematics, and in relation to other contexts such as mathematics as a school subject and the student teachers' future teaching practices. It is shown that many teachers express an affective position that could be labelled *learned helplessness* in relation to their learning and future teaching of mathematics. Such a position causes lack of agency in relation to mathematics and mathematics teaching and is therefore prohibitive for the development of their mathematics teaching practices.

In the article *Cooperation and collaboration as zones of proximal development within the mathematics classroom* Sharada Gade examines the role of guidance, imitation and cultural resources in the formation of ZPD and in the development of mental functions. The data comes from a classroom study in the Norwegian upper secondary school. Classroom episodes – where students, the teacher and the researcher interact in whole-class, as well as, in small group settings – are used to illustrate the formation of the zone of proximal development and how maturing mental functions can be located. The role of ZDP and available cultural resources are discussed in relation to the notion of learning of mathematics as a move from imitation to an ability to act independently. It is suggested that it may be possible to implement an emphasis on processes that enable students to become independent in mathematics classrooms. This suggestion could lead to questions regarding contemporary mathematics instruction in the Nordic countries and what measures to be taken in order to make improvements.

The paper *Communication and learning at computers: an overview* by Rune Herheim is a review of the research literature on computer supported face to face learning situations. A special emphasis is put on the

relationship between communication and learning, and the computers role in this relationship. The review includes both research with a general approach to learning and mathematics education research. The criteria for including research articles in the review, which are explained and discussed in detail, have lead to a selection of 27 articles for further analysis. The analysis has produced findings within the following four main categories: establishing a common ground for communication among students and between teacher and students; communication characteristics e.g. different types of computer mediated communication, communicative acts, shared meaning and knowledge; the role of teachers, computers and pupils; and software design and task structure. The analysis point to the fact that research in this field has produced many interesting and coherent findings, which have the potential of supporting the improvement of the practices of mathematics teaching. Just to give one example: "Researchers emphasize not only the pupils' verbal activity but also their development of meta-language. The extent to which the pupils are in control of their work depends on how the teacher arranges the lesson and on the software design". So inclusion of computers in mathematics teaching increases rather than decreases the need for the teacher's didactical leadership. The author ends by arguing for a stronger interdisciplinary approach to research in mathematics education in general. Mathematics education research can learn from general pedagogic and psychology! And maybe also vice versa?

As always, in addition to the research papers you find information about recent activities in the Nordic mathematics education community, including announcement of the next Nordic conference on mathematics education, NORMA 11, and presentations of new doctoral theses.

The editors