

The important and difficult task of improving mathematics teacher education

In 2003 an international symposium on mathematics teacher education was held in Malmö. The symposium was planned in connection with the preparation of the ICME-10 congress in Copenhagen in 2004, where mathematics teacher education also was one of the main themes. The Nordic mathematics education community took advantage of the symposium to raise and discuss issues and problems related to mathematics teacher education in the Nordic countries in dialogue with many prominent international researchers in the field. The book *Educating for the future – proceedings of an international symposium on mathematics teacher education* (Strässer et al., 2004) contains a wide range of reports about research related to mathematics teacher education.

In connection with recent reforms in the structure of teacher education in Norway and Sweden, a team of researchers-teacher educators produced a background document focusing on the current state of affairs in teacher education in these two countries. The main intention of the document was setting the scene for relating theoretical discussions emerging from research in different countries in the world, to the particularities of the educational systems in the Nordic countries (Bergsten et al., 2004). The background document highlighted five issues that needed academic and political attention: (1) The recruitment of teachers, (2) the contents of initial teacher education, (3) the relation between initial education and school practice, (4) the demands of a changing society and (5) the need for research on teacher education.

We believe that these points are crucial in the development of mathematics teacher education at all levels of the educational systems in the Nordic countries. Raising the quantity and quality of mathematics teacher education is becoming an economic and democratic imperative in the development of modern societies. At the same time research in mathematics education has documented that the practice of mathematics teaching is very stable and resistant to reform processes. Changes leading to improvement in the practice of mathematics teaching are more likely to occur gradually through changes in initial teacher education and in-service professional development, where teachers' mathematical

knowledge gets closely related to didactical knowledge in contexts of teaching experience or concrete teaching situations.

The papers in this issue address all, in one way or another, different aspects of teacher education and teacher practice. In the paper *Education of lower secondary mathematics teachers in Denmark and France*, Carl Winsløw and Viviane Durand-Guerrier present a comparative study of teacher education in these two countries. Besides describing the general characteristics and structure of teacher education in the two countries, they show the results of a qualitative study in which a group of teacher students in their last year, in each country, was asked to handle two hypothetical teaching situations that the researchers have designed. The researchers interpret the differences in students' way of engaging in the situations in relation to the emphasis that each one of the educational systems places on the different aspects of mathematics teacher education. While French students seem to be more clearly competent in the handling of the mathematical content involved in the situations, their sense of how to bring that knowledge in an educational situation is less clear. On the contrary, Danish students have a better understanding of the pedagogical dynamics of a classroom and can easily imagine concrete teaching situations; however, their possibilities for acting as a teacher seem to be constrained by a not so rich mathematical understanding. Winsløw and Durand-Guerrier conclude that student teachers could gain in qualifications if teacher education emphasized

an earlier and more comprehensive work with didactics and pedagogy in France, paying attention to the potential of advanced mathematical knowledge; and a considerably broader basis in both mathematics and its didactics in Denmark, while maintaining the attention to students' awareness and knowledge about pupil perspectives.

This paper, we think, illustrates clearly some of the predicaments related to the contents of initial teacher education and the relation between initial education and school practice, identified in Bergsten et al. (2004).

Even though international research has been addressing the issue of what the contents of initial teacher education should be in order to equip student teachers with tools that could help becoming an effective teacher, the issue is far from being resolved. As more research allows having an insight into the complexities of teacher education, the question of what should be the core of teacher education is transformed in many directions, among those what are the competencies and qualifications that may help a teacher when entering the teaching profession. Raymond Bjuland, in his paper *Mathematically productive discourses among student teachers*, focuses on the characteristics of this type of discourse in a teacher education

setting. Building on the assumption that it is important for student teachers to engage in collaborative reasoning processes where rich mathematical discourses can emerge, he studies concrete cases in which the conversation among teacher students when solving geometry problems develop the special characteristics of being mathematically productive. Bjuland presents the set of theoretical constructs that supports the idea of learning being a discursive and communicative activity and identifies the features that research has identified to be associated with productive mathematical discourse – in opposition to ineffective mathematical communication. Using few cases of a larger study, he exemplifies how such mathematically effective communication among teacher students can emerge. Besides providing insight into communication processes among students when working in groups, we think that this paper indirectly opens the discussion of what it takes to educate good mathematics teachers: more than a matter of the right contents and the right organisation of activities, teacher education could be thought of as a communicative space where teacher students should experience productive mathematical discourse with the hope that such communicative competence can be a solid basis for entering the practice of teaching in schools.

In Bergsten et al. (2004) the need to think about mathematics teacher education in a broader social perspective was emphasised. The preparation of teachers should take into account the complexity of the teacher profession, since qualifications and competencies gained in initial education are always at stake when entering teacher students graduate, get their first job and enter the institutional settings that shape the life of mathematics teaching in schools. Teacher education and its potential to bring change in the teaching and learning of mathematics in schools are always under examination. Laila Pehkonen in her paper *To change or not to change – how primary school teachers speak about stability and change* invites into the world of in-service teachers and how they perceive their work and, in particular, the demands on changing their practice. In contrast to many studies that ask teachers directly on how they see transformation, Pehkonen addressed the issue of change through seeing how teachers view stability, since change and stability and continuity are complementary notions. In her case study in Finland, the teachers interviewed expressed a series of dilemmas related to their practice. Teachers have to operate in the midst of several demands and, before engaging in changing something as policy makers, teacher educators or researchers suggest, they need to feel confident with the possible results of such changes. The need of stability and continuity is not a simple desire of preserving tradition; it is rather part of a professional critical stance in search of good reasons for change. We see Pehkonen's paper as a

contribution to understanding teachers' practice and teachers' good professional reasons for action in a turbulent time of increasing demands to the work of mathematics teachers.

The book review presented in this issue has clearly relevance for the education of mathematics teachers. The book in Danish *Didaktiske elementer – en indføring i matematikkens og naturfagenes didaktik* by Carl Winsløw is meant to be a textbook for teacher education on the didactics of mathematics and the natural sciences. In his review Mogens Niss highlights both the achievements and shortcomings of the book and certainly welcomes this contribution within the community of teachers and researchers in mathematics and science education.

We hope that the reader finds in this number of *NOMAD* good sources of reflection on the difficult, yet absolutely important task of understanding teachers' work and improving teacher education.

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Editors

References

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