

NORMA 11 - ABSTRACTS OF PLENARY SPEAKERS

POLARITIES IN (NORDIC) MATHEMATICS EDUCATION RESEARCH

Bharath Sriraman

Department of Mathematical Sciences

The University of Montana

This plenary will address progress and polarities in (Nordic) mathematics education research as a field. This stems from having edited two comprehensive books on Theories of Mathematics Education: Seeking New Frontiers (Sriraman & English, 2010) and The First Sourcebook on Nordic Research in Mathematics Education (Sriraman, Bergsten, Goodchild et al., 2010) which required a decade of digesting the developments of a continually developing field. The metaphor of a polycephalic creature with polarities appropriately characterizes the nature of mathematics education and ways in which it has developed in the Nordic world. A critical view of polarities in mathematics education both in and outside the Nordic world is presented by examining its connections to mathematics, psychology, social sciences, feminist theories, critical theory, the history and philosophy of mathematics/science and the design sciences. The post modern identity of mathematics education is questioned even though it offers multitudes of paradigms, methodologies and the possibilities for innovative research.

References

Sriraman, B., & English, L. (2010). *Theories of Mathematics Education: Seeking New Frontiers*. Springer, Berlin/Heidelberg

Sriraman, B., Bergsten, C., Goodchild, S., Palsdottir, G., Dahl, B., & Haapasalo, L. (2010). *The First Sourcebook on Nordic Research in Mathematics Education*. Information Age Publishing, Charlotte, NC.

LEARNING TO MODEL: LESSONS FROM WORD PROBLEMS

Roger Säljö

Department of Education, Communication and Learning

The Linnaeus Centre for Research on Learning

University of Gothenburg

Modelling plays a central role in human knowing in most areas. The sign systems in which knowledge is codified – concepts, numbers, graphs, operations etc. – have to be coordinated with events and objects in the world. When modelling we take a step outside intra-mathematical meaning-making in order to describe and make claims about states of affairs in the world. Pupils encounter issues of modelling in the context of learning how to solve so-called word problems, where they have to bridge between descriptions of the world and mathematical notations and operations. The research on how pupils learn to solve word problems is interesting from many perspectives. First, it illustrates the situated difficulties children encounter when engaging in such inter-semiotic reasoning in text-based realities. Second, teaching that builds on attempts to ground children's understanding of mathematical reasoning in everyday realities must grapple with the problems of how the generic modelling aspect can be made salient and part of what is learned. Otherwise, solutions to problems risk being perceived as local and as ad hoc. Third, analysing how word problems have been designed since the earliest days of documented mathematics instruction gives an interesting perspective on ideologies of education and cognitive socialization when teaching literacy and numeracy

THE USE OF LANGUAGES IN MULTILINGUAL MATHEMATICS CLASSROOMS

Núria Planas

Universitat Autònoma de Barcelona

There is a continuing debate in mathematics education research and practice regarding the use of languages in multilingual mathematics classrooms in which children are not yet fully fluent in the language of learning and teaching (LoLT). Research in mathematics education supports the use of the learners' home languages (e.g. Khisty, 2006; Moschkovich, 2002; Setati, 2005) for teaching and learning, however, there is not much take up on the ground. The question is why?

In this plenary, I will draw on my individual journey in this area of study to explore some social and political aspects of mathematics education and language diversity. Through this I will provide a window into the political tensions and questions that illustrate the complexity of this work and illuminate/illustrate some of the research findings that seem to hold across differing multilingual contexts. To put this debate in perspective I will begin with a brief overview on the political role and use of language.

LEARNING CONVERSATION IN THE CONTEXT OF TEACHERACY

Marit Johnsen-Høines

Bergen University College

Connections between the qualities of communication in classrooms and the qualities of students' learning, have been identified and discussed by Alrø and Skovsmose (2002). Mathematics education research focusing on language are, from different perspectives, investigating communicative conditions for learning. Communication is seen both as an analytical tool - in order to get insight into what is learned - and as a methodological tool for obtaining learning outcome. The project *Learning conversation in mathematics practice (LCMP)* aims to develop *learning conversation* as a concept and as a tool for describing and facilitating learning processes; it focuses on the learning of student teachers as well as children. LCMP collects research data from schools that have established partnerships with industrial companies. Here student teachers' develop alternative models for teaching in collaboration with teachers and didacticians. Their inquiries into educational possibilities create conditions for developing conversation-and-learning.

I will focus on the student teachers and their processes of professional development as mathematics teachers in this plenary, and the collaborations described above serve as a point of departure. The developmental practices that arise are characterised as communities of inquiry in which the student teachers take active part in the analytical research and in developing concepts such as *subject oriented conversation* and *learning conversation*. The developmental work is influenced by a critical perspective involving mathemacy (Skovsmose, 2009) and landscapes of investigation (Alrø & Skovsmose, 2002). The concept of teacheracy (concerning critical professional competencies) and students' development of teacheracy will be introduced, and seen as parallel to the concept of mathemacy (concerning critical mathematical competencies) and students' development of mathemacy. Learning conversation is introduced as an educational tool in the context of student teachers' professional development. (Alrø & Johnsen-Høines, 2010; Johnsen-Høines, 2009; 2010)

References

Alrø, H., & Johnsen-Høines, M. (2010). Critical dialogue in mathematics education, In H. Alrø, O.R. Christensen & Valero, P. (eds.) *Critical Mathematics Education: Past, present and future*. (p.11-22) Sense Publishers.

Alrø, H. and Skovsmose, O. (2002). Dialogue and learning in mathematics education. Intention, reflection and critique. Dordrecht: Kluwer Academic Publishers.

Johnsen-Høines, M. (2009). Dialogical inquiry in practice teaching. *Nordisk matematikdidaktikk NOMAD*, 14(1), 39-60

Johnsen-Høines, M. (2010). Interpretative research as collaborative inquiry. In B. Sriraman et al. (eds.), *The sourcebook on Scandinavian research in Mathematics education*. (p 109-123) Charlotte NC: Information Age Publishing.

Skovsmose, O. (2006). *Travelling through education. Uncertainty, mathematics, responsibility*. Rotterdam: Sense Publishers.