News from Nordic mathematics education

In the previous issue of Nomad, this news column from NoRME (Nordic Society for Research in Mathematics Education) was missing. Instead Simon Goodchild reported from a successful Nordic activity in mathematics education. As the new chair of NoRME, I will on the following pages write a few lines about what has happened in our field in the Nordic and Baltic countries since the report in Nomad 16 (1–2) from Frode Rønning, the previous chair of NoRME. I will take the opportunity here to thank Frode for his fine work for NoRME as its chair! Like Frode I will encourage all of you having information that you feel would be relevant for this column, and/or also relevant for the NoRME web page (www.norme.me), to contact me by e-mail (christer.bergsten@liu.se).

The NoRME member associations

On the NoRME web page there is a link to the seven societies that presently are members of NoRME but I will here shortly update the information for the Nomad readers. In Denmark the society *Forum for Matematikkens Didaktik* has a newsletter and organises national meetings. There is a web page at www.matematikdidaktik.dk (I found no English translation of the name of the society). In Estonia the society *Association for Research in Mathematics Education*, established in 2008, is one of the most recent members of NoRME. It is a suborganisation of the Estonian Mathematical Society (see web page at www.matemaatika.eu/en). In Finland the *Finnish Mathematics and Science Education Research Association* (FMSERA) was founded already in 1984 and organises a yearly symposium, which in 2011 took place in Helsinki 27–28 October. A book of proceedings is normally produced. The web page of the society is found at www.edu.helsinki.fi/malu/tutkimusseura/eng. The Icelandic organisation *Association for Research on Mathematics Education* only recently became a member of NoRME. The journal you are just reading is also a member society of NoRME, *Nordic*

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Studies in Mathematics Education (most often referred to as Nomad). The journal is presently renewing its editorship, for which the NoRME board has given its support in line with the constitution of NoRME. The web page is found at ncm.gu.se/nomad. In Norway the NoRME member society is the network association *Matematikk i nettverk for kompetanseutvikling* (there is no English name for the society on its web page at www.hit.no/nor/HiT/Naeringsliv-og-offentlig-sektor/Samarbeid-med-oss/Kompetansenettverk/Nettverk-for-matematikk). A yearly network meeting is organised, which in 2011 took place in Trondheim. Finally, in Sweden the *Swedish Society for Research in Mathematics Education* (SMDF), founded in 1999, organises a biannual research seminar, MADIF, which in 2012 took place in Umeå on 24-25 January (see www.mai.liu.se/SMDF/madif8). A book of proceedings is published (refereed). The web page is found at www.matematikdidaktik.org.

A Nordic summer school

Thanks mainly to the initiative and hard work of Simon Goodchild, an application made in collaboration with the Nordic Society for Research in Mathematics Education (NoRME) to NordForsk for funding a Nordic summer school in 2012 was successful. In the application the arrangement was described "as part of the NoRME coordination of ME [mathematics education] researcher education in the Nordic countries", building on the tradition from the previous NoGSME summer schools, and had representatives from the NoRME board as members of the project group. The preparations for the summer school have now reached the state where applicants have been accepted and the invited experts, along with the Nordic project group, are in the process of setting up the detailed programme. With the support of Madis Lepik, the summer school will take place in Tallinn 11–15 June, where each of the four invited experts, Joao Pedro da Ponte, Eva Jablonka, Barbara Jaworski, and Jeppe Skott will give a lecture and lead a working group of 9–10 doctoral students mainly from the Nordic countries. The Nordic "support team" in the project group, Christer Bergsten, Anne Berit Fuglestad, Simon Goodchild and Tine Wedege, will also contribute to the programme, which in addition to lectures and group work will include workshops, individual tutoring, a discussion panel, and social activities. NoRME will work for that an application for a summer school also in 2013 can be submitted, to continue this fine tradition. That there is an interest in this kind of activity is shown by the high number of participants this and previous years. Also in the European context, the next YERME summer school (in Algarve, Portugal, 23–28 August 2012, see www.erme.unito.it) has attracted a large number of applicants.

Nordic collaboration with BSRLM

It was reported already in this column in Nomad 16 (1-2), p. 116, that the British society for mathematics education research, BSRLM (see their web page at www.bsrlm.org.uk), through its chair John Monaghan took an initiative to arrange a common activity between BSRLM and NoRME. After support of this idea at the NoRME general assembly in Reykjavik (during the NoRME11 conference, from which Frode Rønning also reported in the same column in Nomad), and communication between John Monaghan (for BSRLM) and Christer Bergsten (for NoRME), a joint meeting has been decided to take place in Cambridge (UK) on 16–17 November 2012. The following pre-announcement has been sent to relevant e-mail lists:

> The British Society for Research into Learning Mathematics and the Nordic Society for Research in Mathematics Education are pleased to announce a joint event to be held at Cambridge University on 16 & 17 November 2012. Saturday 17 November will be organised like a normal BSRLM day conference. Planning is underway for the events on Friday which will start early afternoon. The programme of the two days will be available in May but, in the meantime, cross out these two days in your diary!

The first announcement of this joint meeting will appear during spring 2012.

New doctoral dissertations

To support Nordic cooperation in mathematics education research, it is necessary to distribute updated information about ongoing research activities and new researchers entering the field. For this purpose, the NoRME report in this column includes summaries of recent doctoral dissertations defended in the Nordic and Baltic countries. There was no report in the previous issue but in Nomad 16 (1–2) Frode presented six new theses and before that in Nomad 15 (3) eight theses. In this issue I can add those numbers and present recent 14 doctoral theses that can be said to belong the field of mathematics education. Together they show that research in mathematics education in the Nordic countries is very much alive and growing as a field, witnessed by the rich variety of research problems studied and theoretical and methodological approaches taken.

Due to the large number of dissertations for this report, the summaries had to be made rather short but hopefully long and clear enough to give a sense of the effort that has been invested in the research work, and an inspiration to read more about it in the original texts. In some cases, when

I did not have the thesis available, or did not read the language in which it was written, the summary given is based only on the abstract available on the Internet. Of these theses, three were defended in Denmark, four in Finland, one in Norway and six in Sweden. They are here presented in chronological order.

Tarja-Riitta Hurme defended her thesis on 24 September 2010 at the University of Oulu. The study, which includes three published articles and one submitted with an overview, has the title *Metacognition in group problem solving—a quest for socially shared metacognition*. She has investigated metacognition in students' collaborative mathematical problem solving within an asynchronous and text-based computer-supported learning environment, with the aim to recognize metacognition as a socially shared process embedded within group problem solving. A second aim was to find methods to study how metacognition becomes visible and shared in such situations. For the study, an operational definition of socially shared metacognition based on theories of individual metacognition and current views of socially shared learning processes is used. In the first of the two experiments conducted, 16 upper elementary school students (13 years old) worked with a learning environment called Knowledge Forum. For the second experiment, the Workmates learning environment supported 45 pre-service teachers' problem solving in groups. Discussion forum data, self-report questionnaires, and individual's feeling of difficulty graphs, quantitative and qualitative research methods, along with individual and group level analyses, are combined in the analyses which employ content analyses at individual and group levels, process-oriented graphs of group problem solving, and the combination of group members' individual feelings of difficulty with the results of the discussion forum data. The study showed that the process of socially shared metacognition made a difference for the success of a group's mathematical problem solving. However, the author also notes that a computer-based learning environment is not a guarantee for a high-level collaboration to occur as socially shared metacognition requires that group members participate intentionally in the collaborative problem solving through reciprocal interaction and acknowledge and develop further each other's ideas. Hurme also suggests that students may reduce their feelings of difficulty if the process of socially shared metacognition takes place. It could also become more visible if participants, instead of trying to implement unelaborated solution attempts, put their focus on the analysis of the task and verification of the process and outcome. It is also concluded that socially shared metacognition not only supports success at the group level, it also helps the individual's thinking grow, as a part of the group.

At the University of Tampere, Päivi Portaankorva-Koivisto defended her thesis *In search of lived experiences – a narrative research on the growth process of becoming a teacher of mathematics* (written in Finnish, *Elämyksellisyyttä tavoittelemassa – narratiivinen tutkimus matematiikan opettajaksi kasvusta*) on 16 October 2010. The interest in this thesis (a monograph) lies in prospective mathematics teachers' growth into teachership and, more specifically, the role of different kinds of lived experiences during this process, as formulated by the questions What do the individual narratives of growth tell us about the growth of the prospective teachers to become teachers of mathematics? and In what ways have the prospective teachers' notions of lived-experience-oriented mathematics education developed during the years of teacher education? To study these questions, a framework was developed, during the research process, based on six aspects: interaction, experientiality, illustrativeness, research-orientation, collaborativeness, and orientation to mathematics as a language. The growth into teachership is analysed as changes in and enrichment of key notions and conceptions: the notions of mathematics, how to teach it and how to learn it; the notions of a good teacher and good teaching; the prospective teachers' notions of themselves as teachers and of the grade in which they believe they will work in the future. Six students in a Master's teacher education programme took part in a three years longitudinal study, with a focus on narratives, building on an analysis of three written essays and four interviews for each student. In addition, materials from lectures along with notes of the researcher have been used. Three emerging perspectives in the professional growth process of the prospective teachers were observed: the perspective of the pupil, based of their experiences at school as pupils; the perspective of the prospective teacher during teacher education, with teaching practice and feedback forming the basis of assessing the teachership; and the perspective of the novice teachers who distance themselves from the earlier stages to assess their personal teachership, first, as an on-going process and, second, as part of a particular working community. In the reflections on lived-experience orientation, the students' notions of mathematics, and of the teaching and learning of mathematics, were strongly interlinked. Their attitudes to the aspects illustrativeness, experientiality and interaction remained positive. However, they felt not very familiar with the aspects research orientation, collaborativeness, and orientation to mathematics as a language, requiring of a prospective teacher a strong mastery of the subject and an ability to create research-type classroom activities.

At Luleå University of Technology on 21 January 2011, Ylva Jannok Nutti defended her thesis *Grouse steps towards front line knowledge in Sámi mathematics – teachers' perspective on transformations activities in Sámi*

preschool and Sámi school (written in Swedish, *Ripsteg mot spetskunskap i samisk matematik. Lärares perspektiv på transformeringsaktiviteter i samisk förskola och sameskola*). In the thesis (a monograph), activities of transformation of education in mathematics are described from a teacher perspective so that Sámi culture becomes the point of departure of the education. Data are analysed and interpreted from the perspective of Smith's theory of indigenous perspectives, Banks' theory for integration of multicultural and intercultural content in the teaching, and Bernstein's recontextualisation theory. As a background for the thesis, Sámi traditional knowledge is described and analysed based on the six basic mathematical activities outlined by Bishop. The study was conducted in collaboration with teachers at Sámi schools within an action research project, based on Nielsen's and Aagard Nielsen's critical utopian action research model. The analysis is based on talks with different groups of teachers about present mathematics education and challenges that the teachers envisage on a Sámi perspective on mathematics education, reflection talks based on their transformation activities in mathematics from a Sámi perspective the teachers had taken part in, and how they experienced challenges when performing the transformation activities. The protocols are analysed using a hermeneutic method. The result shows that before the transformation activities took place, the experiences of challenges focused mainly on external obstacles such as lack of teaching materials, restricting policy documents and national tests. The transformation activities consisted of thematic work with mathematical elements, mathematical assignments where the arithmetic problems included Sámi cultural elements, or activities where the Sámi culture served as the basis for attempts to transform the learning of mathematics. Through the activities, a recontextualisation of Sámi culture for education in mathematics points to a distance between traditional Sámi knowledge and educational knowledge. Yannok Nutti therefore concludes that transformation activities require reflection about the goal of the recontextualisation. The teachers expressed mainly the same challenges after the activities as before, but their stories indicated a change in attitude to these challenges as the obstacles were described more as internal – the teachers became agents of change. In the process decolonisation, i.e. a deconstruction of the consequences of colonisation, was made visible through the teachers' active efforts to focus on the Sámi traditional knowledge together with mathematics in preschool and school.

Eva Pettersson defended her thesis *Mathematically gifted students' study situation* (written in Swedish with the title *Studiesituationen för elever med särskilda matematiska förmågor*) at Linneaus University on 18 May 2011. In her monograph, the situation for the mathematically gifted

student in Swedish school is investigated by ten case studies, some longitudinal, of highly able students as well as questionnaire survey studies, involving 180 teachers from compulsory school and 284 mathematics developers from 229 municipalities in Sweden. Issues of interest concern what is seen as mathematical ability and how students' mathematical aptitude is acknowledged and supported by their teachers, parents and peers. A historical overview of research on giftedness and the development of talent is provided. For the empirical study, *mathematical ability* is defined, based on the work of Krutetski, as a complex of various abilities (e.g. ability to formalize, generalize, and memorize mathematical information) each of which may be more or less pronounced in a given individual. The results show that the case study students were strongly motivated and inquisitive, could concentrate on demanding tasks and had a strong will to learn and master complex tasks. They also all had the ability to formalize mathematical material, to grasp the logical structure of problems, and employ a holistic approach without losing the details. Despite differences in personality and ways of expressing their mathematical abilities, there seemed to be a close relationship between the students' personalities and ways of expressing their abilities. A connection is observed also between the development of the students' mathematical abilities and the activities offered to them. Pettersson points to a need for pedagogical support for this group of students. But due to lack of resources (only 1% of the teachers in the survey study said that their school provided special resources for gifted students) and policy documents that address the support for high achieving students, teachers themselves have no support for developing ways to support able students to develop mathematically. From her results, Pettersson points to the importance of social and mathematical norms in the classroom that place considerable demands on the teachers' mathematical competence.

At the University of Lapland on the 28 May 2011, Anna-Maija Partanen defended her thesis *Challenging the school mathematics culture: an investigative small-group approach*. In her dissertation, which is part of the "teachers as researchers" tradition, Partanen describes a situation where reform mathematics was applied in a Finnish upper secondary school by an ordinary mathematics teacher. Asking her high level students to investigate the basic concepts of calculus in small-groups appeared to be a more radical approach for teaching mathematics than the author had expected. The clash of different cultures is described by analyzing what kind of social and sociomathematical norms were negotiated or produced in the peer and teacher-student interactions of two small groups. Also the connections of occurrence of learning opportunities and acting according to these norms are studied. The strength of the study shows in

the fact that the author combines both theoretical and practical points of view in her discussion.

Paulina Lindström defended her thesis *Understanding as experiencing a pattern* on 1 June 2011 at Lund University. The thesis, a collection of published papers with a preamble, conducted within cognitive science, describes understanding as experiencing a pattern. This involves seeing how a task, a principle, or a problem space is structured but also to attend to the relevant information and to be able to use it. An attempt is thus made to explore how the everyday idea of understanding can be framed to become measurable. The thesis studies how understanding develops with a specific focus on the role of attention to relevant visual stimuli: does attending to critical areas correlate with understanding? Eye tracking as well as other complementary methods were used to identify underlying cognitive processes. One of the two projects conducted in the work was performed in a controlled laboratory setting, the other one in a classroom. Both projects investigated how students attend to relevant visual information in mathematical problems to examine parts of the process leading to understanding. A new methodology, using both quantitative and qualitative measures, was developed in order to capture the dynamic reading of mathematical representations. It is found that attention to areas of visual stimuli seen as relevant to the task does correlate with understanding and performance of the task. The thesis has also provided a relatively fine-grained description of some aspects of what students are doing when they come to an understanding. Pedagogical implications of the findings are finally discussed such as for example the design of learning/teaching materials.

On 8 June 2011 Jörgen Sjögren defended his thesis entitled C*oncept formation in mathematics*, including five papers and a preamble, at Gothenburg University. The focus is on concept formation in mathematics, not in the psychological sense how individuals acquire already established concepts but how concepts find their way into mathematics. In the first part the possibility to define a measure of the power of arithmetical theories is discussed, i.e. their capability to prove theorems, and a partial such measure is constructed, while it is shown that other such measures found in the literature do not satisfy natural conditions on a measure. In the second part of the thesis a theory of concept formation in mathematics is developed, inspired by Aristotle's idea of mathematical objects as abstractions, employing Carnap's method of *explication* as a means to formulate these abstractions in an ontologically neutral way: in mathematics, initially rather vague ideas need to be replaced by more precise notions to be useful in the relevant contexts, and become integrated in a more clear conceptual or formal structure, productive and

as simple as possible. In the thesis this process is illustrated by several basic mathematic concepts, and it is observed that in mathematics this explication seems to result in only one robust concept, in contrast to for example physics where the theory dependence is much stronger. Finally, some problems of philosophy of mathematics are discussed, for example how the relation between formal and informal proof can be understood, how mathematical theories are tested, and some questions about realism. Sjögren suggests that mathematical concepts involve both an empirical (synthetic) and a logical (analytic) component, where the former refers to the empirical origin of the concept, and the latter to the need to consistently integrate the concept in a deductive system. It is concluded that a concept is characterized as mathematical when it is uniquely explicable.

Johanna Leppävirta defended her thesis on 5 August 2011 at Aalto university: *Engineering students' proficiency in electromagnetics: role of procedural and conceptual knowledge, and mathematics anxiety in learning of electromagnetics*. In the thesis, which consists of five published papers and an overview, 133 engineering students' conceptual and procedural knowledge, and mathematics anxiety, related to knowledge of electromagnetics, are studied. Procedural knowledge was assessed by the students' achievement of problem tasks and the exam. Conceptual knowledge and mathematics anxiety were measured by standardized test instruments. Descriptive statistics, correlation, factor analysis, analysis of variance, linear regression, and Fisher's exact test were used for the analysis of data. The findings point to a relationship between procedural and conceptual knowledge in the context of electromagnetics, suggesting that a basic conceptual knowledge is a necessary but not a sufficient condition for acquiring procedural knowledge. Prior conceptual knowledge did predict success in the exam, but work on students' procedural skill through complex problem exercises during the course did not significantly improve their conceptual knowledge. 16 % of the engineering students experienced high mathematics anxiety, which is found to have an impact on their procedural but not on their conceptual performance. From the results, the author suggests that there is a need to broaden the view of what types of knowledge are valued and assessed in engineering courses.

Arne Mogensen defended his thesis, a monograph entitled *Point-driven mathematics teaching studying and intervening in Danish classrooms*, at Roskilde University on 14 October 2011. The Danish report *Fremtidens matematik i folkeskolen* (*Future mathematics in primary and lower secondary school*) from 2006, where the notion of "didactical point" (basically the moment of a sharpened insight of a mathematical concept or method) is central and recommended, provides a background of the study. The dissertation set up three main research questions: To what extent, how

and why do teachers articulate mathematical points in Danish mathematics teaching?; In what way can the occurrence and role of mathematical points be strengthened in mathematics teaching practice?; and To what extent and by which means can mathematics teachers be supported in point-driven mathematics teaching? Here, a mathematical point is defined as a statement presenting a clearly delineated and significant mathematical content or climax. The thesis presents a quantitative study of 50 mathematics teachers in grade 8 at public schools representatively and randomly selected from Denmark's five regions. The data collected consists, for each teacher, of a video recording from one mathematics lesson, a questionnaire, a brief memo and copy of teaching material. It is found that mathematical points of four types were articulated by teachers: conceptual, procedural, result, and interpretation point. Students also articulated a point. The quantitative data show that 58 % of the lessons contained one or more points and that the teachers articulated a point to the whole class in 44 % of the lessons and to individual students or groups in 30 % of the lessons. It is also noted, however, that many points did not seem planned and in nearly half of the 50 lessons no points articulated by the teacher were observed. Points of a procedural character were the most common and result points rare. In terms of teacher background, points were mostly articulated by teachers with mathematics as a major subject or teaching in large schools. No differences are found due to gender, teaching experience or textbooks. To investigate possibilities to strengthen the role of points in mathematics teaching, two intervention studies were done, one with 5 of the original 50 teachers and one with all 18 mathematics teachers at one large school in a lesson study course, indicating different opportunities and challenges. Mogensen concludes that interventions using modest resources, with an introduction to the idea and importance of points, can support teaching without change in the overall framework, and recommends that all schools appoint a math tutor with responsibility to arrange peer coaching and guidance, including that teachers in subject teams arrange systematically peer coaching as lesson study.

Åse Hansson defended her thesis *Responsibility for mathematics learning - effects of instructional responsibility in the multilingual classroom* (written in Swedish, *Ansvar för matematiklärande – effekter av undervisningsansvar i det flerspråkiga klassrummet*) at Gothenburg University on 28 October 2011. A background for Hansson's study, which consists of three published/accepted articles and an elaborated preamble, is the development in Swedish mathematics education of the balance between the teacher's share of the responsibility for students' learning and the students' own part of that responsibility, as well as the balance of the

ambition to explain in a correct way the mathematical content to students and having students themselves working on this content. Different groups of students also have different needs of support. In Sweden mathematics education has increasingly become a private and individualistic mission rather than a public one. The thesis thus has a focus on the significance of this kind of balances for students' mathematics achievements. Crucial conditions for students' mathematics learning are investigated, such as the design of mathematics teaching, group composition in terms of family background and language skills, as well as the relation between these two dimensions. The analysis is performed on large scale data from the TIMSS 2003 study on mathematics for Swedish 8th grade students, using those classes in the sample where all teaching was done by only one teacher and both the students and the teacher have completed the questionnaires (a total of 3237 students in 217 classes). Methods used are *Multilevel Confirmatory Factor Analysis* and *Multilevel Structural Equation Modelling*. A model is developed that simultaneously highlights three dimensions of teacher's responsibility: to actively and openly support students in their mathematics learning, for example by explaining mathematics content issues, and to question and discuss with students creating conditions for interaction (teacher activity); to pass over responsibility for knowledge construction to the students, for example by encouraging them to reflect and reason on mathematical problems (student activity); and to highlight the relevant mathematical content as object of teaching (mathematical content). The results show that when teachers take such responsibility for their students' learning it will have a positive affect on achievement, especially for students with weak skills in the language of instruction. The results also show that mathematics education in Sweden is pedagogically segregated in the sense that in groups where many students have need of support, teachers take less responsibility for their learning than is done in other groups. It is argued in the thesis that such pedagogical segregation may have contributed to the negative development in school mathematics achievement in Sweden during the last decades.

On 11 November 2011, at Aalborg University, Annica Andersson defended her thesis *Engagement in education: identity narratives and agency in the contexts of mathematics education*. In the dissertation, which is a monograph, the interest is on the relationships between individual students' engagement in mathematics, and different contexts in and outside the classrooms that impact on what occurs in the mathematics education practice. The discursive concept of identity narrative, defined as the stories students tell about themselves, is used as a way to understand the complexity of individual students' decision making about engaging in

classroom activities at certain points in time. The empirical data in the study was collected in a Mathematics A course in a Swedish upper secondary school, where a "disturbance" of the traditional teaching was realized to make it possible to study students' narratives in a 'different' kind of mathematics teaching. The focus is on the students and their identities, experiences and emerging relationships with mathematics during this particular mathematics course. In order to introduce elements of a critical pedagogical discourse, a collaborative process was established with the mathematics teacher at the school. Within the standard curriculum, the new pedagogy thus introduced project blocks that changed the activities and the relationships between participants, with the intention to bridge the gap between students' experiences outside school and in the mathematics classroom. Based on the assumption that contextual changes to the way that mathematics is presented can alter the way students talk about their relationship with mathematics and mathematics education, the stories that students told about themselves and their relationship with mathematics are analysed. The analysis show that different levels of contexts affected students' decision-making on whether to engage in mathematics learning activities at specific points in time. It is also concluded that students' identity narratives, such as that of being a "math hater" or having "math anxiety", are intertwined with the learning opportunities offered. The ways used in the study to connect students' identity narratives to contexts is presented as a methodological result from the study, pointing at problematic issues when research outcomes generalise students' learning of mathematics and conclude that specific groups of students act or behave in certain ways, or that certain pedagogies are to be preferred. It is instead argued in the thesis that the usefulness of how students are categorised in mathematics education research need to be re-evaluated, with reference to the impact that such labels may have on individual students' agency and decisions to engage in mathematics studies.

Alexandre Pais defended his thesis *Mathematics education and the political: an ideology critique of an educational research field* at Aalborg University on 8 December 2011. The dissertation includes eight published papers/book chapters and an overview with a theoretical introduction. Instead of investigating teachers and students by way of traditional empirical data collection, Pais decided to question research in his thesis: he develops an "ideology critique" of mathematics education as a field of research, based on a combination of the dialectics of Hegel, the psychoanalysis of Lacan and the critique of political economy by Marx, carried out by the philosopher Žižek. The focus of the analysis in the thesis is on five recent key research areas in mathematics education: the

role of theory, the achievement of equity in mathematics education, the importance of the use-value of mathematics, ethnomathematics, and critical mathematics education. What works within the research discourse often encounters obstacles in practice that pervert the official intention. Instead of proceeding by eliminating such obstacles, to be able to actualize the research goals of an equitable mathematics education, an ideology critique analyses these obstacles as they point to the symptoms that provide insight into the political and economical relevance of the school system. The discussion is not directed only towards the didactical approaches closed around the disciplines of mathematics and psychology, but also in studies within social, cultural and political perspectives Pais' critique points to problems due to not considering the economic dimensions of schooling. He argues that even if these latter approaches made issues of social justice, equity, culture, power and identity recognized as influential for the learning of mathematics, problems of failure and inequity in school mathematics persist. Research within the sociopolitical paradigm often acts as if those problems could be resolved within mathematics education practice. Pais argues that the persisting problem of failure in school mathematics is an integrative part of current school education. For its conceptualization one needs to consider the relation between scholarized education and capitalism as the dominant mode of social formation: seeing schools as key institutions for the reproduction of capitalist economy and ideology can increase our understanding of the complex situations teachers and students experience in schools. Research therefore needs to report not only successful experiences but also analyses of failed attempts to promote a meaningful and equitable mathematics education. It is concluded that the problem of failure in school mathematics is political and economical, linked to the way schools are structured as credit systems, where teachers are obliged to mark students with a grade that will determine their future possibilities.

On 9 December 2011 Maria Reis defended her thesis (a monograph) at the University of Borås. The thesis, entitled *To order, from order to order: toddlers' mathematizing* (written in Swedish with title *Att ordna, från ordning till ordning. Yngre förskolebarns matematiserande*) aims to contribute to the knowledge about how very young children ("toddlers") develop mathematical knowledge and understanding through activities with concrete material. It wants to make visible children's intentions and mathematizations and to identify aspects that influence children's learning in the preschool setting. In a longitudinal study everyday activities and arranged situations of 16 toddlers (from one and a half to three years of age) were video taped and a "fine-grained analysis" is performed of four toddlers' activities and their verbal and non-verbal interaction.

The material, as well as how long it was used, was chosen by the children themselves and consisted of rings and cups that could be ordered according to their size and slope in series or in a tower. The matematizing of the toddlers is here approached as informal and process oriented, with the aim to find information to solve the problems that emerge to them in the situation. The language of description used for the study employ key concepts mainly from variation theory but also from ecological psychology and the notion of differentiation. From such analysis of the observations it is concluded that the children handle the specific situation in five different ways, i.e. Building a tower without apparent order, Making an order, Bringing and maintaining size order, Challenging order, and Creating new order to challenge peers' knowledge. The results thus show that the child, based on previous knowledge, could discern and open up, one at a time, some dimensions of variation, particularly orientation, tower property and size, and values within these dimensions of variation; all cups and rings have a certain place in the order, all rings and cups are important for the ordering. The children spontaneously try to find order in the material but are constrained to the properties of the particular objects. Teachers at preschool therefore need to analyse what mathematical properties may be approached by different materials available.

Heidi Strømskag Måsøval defended her PhD thesis, entitled *Factors constraining students' establishment of algebraic generality in shape patterns: a case study of didactical situations in mathematics at a university college*, at the University of Agder on 9 February 2012. In her thesis Måsøval studies two groups of student teachers, three in each group, in teaching-learning situations that deal with algebraic generalisation of shape patterns. Her research focus is on factors that constrain the students' establishment and justification of formulae and mathematical statements that represent generality in the shape patterns that they are engaging with. The study is based in Brousseau's theory of didactical situations in mathematics, and also in sociocultural theory, more specifically in Vygotsky's theory of concept development. It is argued for why Brousseau's theory is compatible with Vygotsky's theory. Måsøval characterises her study as an educational case study within a qualitative research paradigm. There are two cases, one for each of the two groups of student teachers, with teacher intervention. The small-group teaching situation is taken as the unit of analysis and it is analysed from the perspective of the different phases of a didactical situation. The data, mainly consisting of transcribed video taped lessons and the tasks that the students engaged with, are analysed using the constant comparative method. The analysis of the students' work is based on a comprehensive epistemological analysis of the mathematical concepts contained

in the tasks they are given. The findings of the study are presented in three analytic categories. The first category deals with how the adidactical milieu is constrained in the way that it does not provide adequate feedback to inform the students whether their solutions are appropriate. This category refers to the level of design and devolution of adidactical situations and can be seen as embracing the second and the third categories, which refer to the level of implementation of adidactical situations. They conceptualise properties specific for situations of formulation and of validation, respectively, in the work with algebraic generalisation.

Upcoming post-doc announcement

Two two-year international post-doctoral fellowships will soon be announced from Umeå Mathematics Education Research Centre (UMERC) in Sweden. Applicants must come from outside of Sweden, and are expected to have a PhD degree and research experience in mathematics education or some closely related field.

The announcement will be published on the UMERC website, where also more information about the research center can be found.

Website: http://www.ufm.umu.se/english
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