Programme for Nordic Summer course May 25-30, 2010

	Tuesday 25th	Wednesday 26nd	Thursday 27rd	Friday 28th	Saturday 29th	Sunday 30th
0730		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
0830 -1000		Lecture 1 Jeppe Skott	Lecture 2 Birgit Pepin	Lecture 3 Jo Boaler	Lecture 4 Willi Dörfler	Lecture 5 Fulvia Furinghetti
1030 -1200		Working group 2	Working group 4	Workshop with Jo Boaler	Working group 7	Working group 9
1200		Lunch	Lunch	Lunch	Lunch	Lunch
1300 -1430	Coffee/tea and sandwich	Working group 3	Workshop session 1 BG/CVB	Study visit in an upper secondary school in Grimstad	Working group 8	Final session and Farewell
	1400 Arrival					1400 Departure
1430	Opening BG	Break	Break		Break	
1530-1700	Working group 1	Local excursion Getting acquainted	Workshop session 2 BG/CVB	16.30-18.00 Working group 6	Group discussion and evaluation	
1700-1900	Informal conversation		17.30-19.00 Working group 5	18.00 Informal conversation	Informal conversation	
1900	Dinner	Dinner	Dinner	Dinner	2000 Final dinner	

10.00-10.30 Morning break every day with coffee/tea and cake

Lectures

Jeppe Skott, Aarhus University, Denmark & Linnaeus University, Sweden

The problems and prospects of belief research

Abstract
Belief research on and with teachers has been a major field in mathematics education for a quarter of a century. However, from the beginning it has been haunted by significant conceptual and methodological problems, most of which are still unresolved. In my talk I take these problems as point of departure and suggest that it is time to challenge the position of beliefs as the dominant construct for the purpose of understanding the role of the teacher for emerging classroom practices. More specifically, I suggest shifting the direction of research on and with teachers from *beliefs* to *patterns of participation*.

Birgit Pepin, University College of Sør-Trøndelag, Norway

Student learning in transition into Higher Education mathematics

Abstract
In this presentation I investigate student learning mathematics in transition from school/college to university mathematics, more particularly the different types and levels of feedback available to and used by students, in their efforts to adapt to and engage in learning mathematics in higher education, either for mathematics or mathematics related subjects (e.g. engineering; physics; etc). Firstly, I shall outline the main project (TransMaths), its predecessor (TLRP) and the parallel projects that were conducted at the University of Manchester, including the methodological characteristics of the studies, in addition to the research literature in the field. Secondly, I address particular findings. Transiting into higher education mathematics students are generally assumed to become independent learners `by themselves'. I challenge that assumption and claim that any self-regulated activity is supported by `feedback', and that feedback is one of the main ingredients and an inherent catalyst for successful learning. Leaning on the literature I have reconceptualised feedback and developed a framework for studying feedback at different levels (e.g. task; process; self) which I subsequently use for the analysis of selected data. The aim of the presentation is to give the audience an overview of issues involved with ‘transition’ into Higher Education, the methodological challenges of studying transition, and to provide a flavour of selected findings and conclusions.

Jo Boaler, University of Sussex, England

Bridging the Gap between Research and Practice: International examples of success.

Abstract
In this presentation I will consider the pervasive gap that exists between research and practice in mathematics education and report upon a small survey of research studies that had made an impact in seven different countries. An illustrative look around the world, with examples collected from Asia, North America, Europe, and Australasia reveals some interesting cases, both of research that has had a tremendous impact on practice, changing the experiences of students in thousands of school classrooms, and country systems that serve to encourage the transfer of research knowledge into practice. In conclusion I consider the importance of researchers paying careful attention to the issue of teacher learning in the design of research studies.

Willi Dörfler, University of Klagenfurt, Austria

Mathematical objects as indices in diagrams: the case of real functions

Abstract
When reading text books on Real Analysis a kind of stylistic analogy or similarity can be observed among propositions from natural sciences and propositions in mathematics generally and specifically in analysis: both types of propositions make assertions about properties of and relationships between the investigated objects. The question is about the quality of this analogy and further what in mathematics corresponds to the role of observation and experiment in the natural sciences. This is investigated by using examples of proofs from real analysis. The tools for this investigation are the semiotic notion of sign by Peirce and the concept of rule following as discussed by Wittgenstein. A main insight is that the mathematical objects like numbers and functions occur within the proofs as indices in diagrams the meaning of which is regulated by a system of rules. Mathematical observation concerns the diagrams and their transformations. Thereby the intended mathematical objects are - using a term from S.Krämer- symbolically constituted which means that the symbols and their use determine the referents and not the other way round. In other words, the mathematical objects appear as variables (indices) regulated by rules which thereby constitute the range of possible referents. What a sign stands for is not determined by its objects but by the operation rules we apply to it.

Fulvia Furinghetti, Dipartimento di Matematica dell'Università di Genova, Italy

Reflection and action in teacher training: an example from algebra

Summary of the talk
As Frank (1990, p. 12) put it, "teachers teach the way they have been taught". Many authors share this opinion: in the present times Skott (2001) for one, in the past the famous mathematician Felix Klein (1911). Starting from the acknowledgment of this situation I planned a course for pre-

service teacher training. My students have (at least in theory) a strong mathematical background because they have a degree in mathematics or physics, but they have not sufficiently meditated on some subjects that they will teach.
Here I report as an example how I act in the case of algebra. The topics of my work are the following:

- Discussion on understanding
- The construction of mathematical objects
- Discussion on the nature of school algebra
- Proposals of historical problems
- Collective discussion of the solving processes carried out by the pre-service teachers attending the course
- Reflection on the passage from the arithmetic to algebra

About the subject of my talk
I have chosen this subject for my talk because it combines my interest in research: students learning, teacher education, history of mathematics, and history of mathematics education.

References
Frank, M. L. (1990). What myths about mathematics are held and conveyed by teachers?. *Arithmetic Teacher, 37*(5), 10-12.
Furinghetti, F. (2007). Teacher education through the history of mathematics. *Educational Studies in Mathematics, 66*, 131-143.
Klein, F. (1911). *Elementarmathematik vom höheren Standpunkte aus*, Teil I: Arithmetik, Algebra, Anaysis, Vorlesung gehalten in Wintersemester 1907-08, ausgearbeitet von E. Hellinger, Zweite Auflage. Leipzig: B. G. Teubner.
Skott, J. (2001). The emerging practices of a novice teacher: the role of his school mathematics images. *Journal of Mathematics Teacher Education, 4,* 3-28.

Workshop with Jo Boaler and all groupleaders

Designing Research to Impact Practice
Abstract
In this workshop we will consider the ways that research may be designed to impact practice. We will consider some reflections from successful researchers, consider different aspects of the research cycle and think together about ways participants' own studies may be designed to have a greater impact.

Workshops, two parallel programmes on Thursday

1 How to read a scientific paper, and how to write one for a journal. (Barbro Grevholm, University of Agder, Norway) For newcomers in doctoral studies.

The workshop includes discussion and sharing of experiences from reading a common paper. Important issues to consider when you write a paper yourself will then be presented and discussed. Participants will be invited to sketch their next paper and hand it in for comments.

2 Mathematics education as a design science: addressing the centrality of designing, implementing and analysing mathematical tasks.
(Claire V. Berg, University of Agder, Norway) For more experienced students.

The workshop consists of two parts. In the first part an overview is offered of research projects concerning task design and analysis. Here reference to several research projects will be given, both in the United States and in Europe, while emphasising on the adopted theoretical frame. The aim is to present "the state of the art" in this field.
In the second part participants are invited to engage with some mathematical tasks. Then we build on the participants' reflections as a means to conduct an analysis of the presented tasks. Finally we try to link the results of our micro-analysis to the wider picture drawn during the first part of the workshop.

The time for informal conversation can be used by participants to book individual conversation time with any group leader as a kind of external supervision. Initiative lies with the doctoral students.

Evaluation and reflections
All are kindly asked to answer the questionnaire. There might be some interviews, and a box for suggestions. One time slot is set aside for the students to discuss among themselves the experiences they have had during the winter school.