About this issue

In this issue of NOMAD we publish three research papers and a report on the *Mathematics education PhD summer school* in 2011 by Simon Goodchild.

The first paper is in Norwegian and is entitled *Introduksjon til vektorer i norske lærebøker og i en undervisningsfilm*. It is written by Anne Birgitte Fyhn, who is a mathematics teacher educator, as well as a climbing instructor and an enthusiastic climber herself. The paper takes as a point of departure the author's experiences with young climbers, who have learned vector algebra in upper secondary school, but who were unable to connect the concept of a vector and the methods of vector algebra to their experiences with climbing. To the author, this indicates a problem in the introductory teaching of vector algebra at the upper secondary level. Therefore, the author on the one hand sets out to analyse the national curriculum related to vector algebra and the way in which the most common Norwegian mathematics textbooks introduce vectors and vector algebra. While on the other hand she directed a video to be used for teaching of geometrical representations of vectors and of vector algebra in climbing situations. The paper reports on the analyses of the curriculum, the textbooks and the video, which is made public on the national web site for digital learning materials (NDLA). The theoretical basis for the analyses consists primarily of Fischbein's work on the duality between mathematics, as a formal system and as a field for human activity and intuition, and on empirical studies and theoretical analyses of the teaching and learning of vector algebra. The analyses show that although there are some variations between the textbooks they do not really support the students in building upon their experiences and intuitions from out of school contexts in their learning of vector algebra. The relationship between the different aspects of the vector concept and the algebraic rules are not tried systematically and not supported by references to the students' possible experiences. Although the textbooks comply with the curriculum they do not manage to base the formal mathematics in real life experiences. The video and the related analysis show that climbing has a particular potential of anchoring and developing the students' understanding of vectors and vector algebra based on embodied experiences and subject matter intuition. It would be interesting to research the possible learning effects of integrating the video on vectors

and climbing and other real life contexts in the teaching of vector algebra, but that is for a possible next research project to take up.

In the second paper, *Development of self-regulated learning skills in mathematics in lower secondary school in Sweden*, by Joakim Samuelsson we find a report on a large quantitative study involving 219 students. The development in students' self-regulated learning skills are related to their performance in arithmetic scored by means of a pre-test at the beginning of grade seven. The method adapted is factor analysis on data collected through a questionnaire originally designed and used in PISA 2003. The questionnaire was used three times, in the beginning of grade 7, in the middle of grade 8 and at the end of grade 9, to collect data about the development of the students' self-regulated learning skills. The classes involved were taught in a "traditional" way following the curriculum and with commonly used textbooks. The variation in students' ability in mathematics at grade 5 measured by the national test was representative for the variation on the national level. So the study at hand investigates the development in self-regulative learning skills through lower secondary schooling in "the normal situation".

In the analysis the four factors *enjoyment and internal motivation*, *instrumental motivation*, *self-concept* and *anxiety* are identified as explanatory for the students' self-regulated learning skills with reliabilities over 0.85 measured by Cronbach's α. The students were divided into three ability groups: low, average and high ability based on their scores in an arithmetic test in grade seven. All four factors are shown to be strongly related to students' grades measured by means of Pearson's product moment correlation test with positive correlations for *enjoyment and internal motivation* and for *self-concept*. However, no significant developments were found in the four factors during the period from grade seven to the end of grade nine in any of the three ability groups. This is quite a remarkable result, which calls for further research and actions to be taken as to how to improve students' self-regulated learning skills during lower secondary schooling. Even more, since self-concept, as the only one of the four factors, is shown to be a strong predictor for the students' grades in mathematics after grade nine. In the paper other interesting aspects of the findings are discussed as well.

In the third paper, *Farmers do use mathematics: the case of animal feeding*, by Laia Saló i Nevado, Gunilla Holm and Leila Pehkonen we find an ethnographic and ethno-mathematical analysis of the daily life of farming. It is argued that farming is a rich context for studying the usages of mathematics in real work life, and that this is not well researched within the branch of research on mathematics in and for work. Beyond the use of mathematics in relation to the financial aspects of farming,

farming activities, such as animal feeding, shearing, vaccinating, preparing the animals for reproduction, or simply identifying animals, are tasks from the farmers' daily routines, which include various mathematical elements. Mathematics teaching in rural areas could possibly benefit from drawing on the students' experiences and interests for such contexts. As part of the study, field observations on a particular farm are carried out during one period of 4 days and two periods of 8 days each. So the data is resulting from in total 20 full workdays of observations. The data was collected by means of a variation of ethnographic methods such as photos, acting out, shadowing and apprenticeship interviews, recorded field notes and participant observation. The analyses of the data are based on ethnomathematical approaches and are related to research in ethnomathematics. Examples of practice in the handling and feeding of animals involving the numerical and quantitative domain and the geometrical-spatial domain of reasoning are identified and analysed.

The Editors