NorDiNa Issue 1 2015

Welcome to the first issue of NorDiNa this year! In this issue of NorDiNa, we present eight research articles, as well as two recent PhD dissertations from the Nordic science education community.

In their article *12 to 15 year old pupils' perceptions of the concept 'species' related to formulations in textbooks in Biology*, Maria Ferlin and Per Sundberg analyse pupils' views and expressions on the concept of species and how these correspond to the presentations in Biology textbooks in Sweden. Their findings are based on analyses of seven textbooks and a questionnaire answered by 12–15-year-old pupils. The results demonstrate that pupils tend to base their perception of the species concept on morphological similarities, thus explaining why pupils' perceptions deviate from textbook presentations. According to the authors, this is an issue which teachers, textbook authors and producers of other teaching materials need to be aware of.

Ingela Bursjö's contribution entitled *To create coherence: science teachers, interdisciplinary collaboration and ethical perspectives in the educational practice* focuses on how experienced science teachers talk about interdisciplinary collaboration and ethical perspectives in their educational practice. The teachers involved in this interview study were asked about how they integrate such components in their teaching practice. The findings indicate that the teachers in the study value interdisciplinary collaboration and try to integrate ethical aspects in their teaching. However, the science teachers experience problems in the practical implementation in their teaching. Furthermore, the science teachers rate their ethical competence as rather low. The process of interacting with and learning from others is vital for interdisciplinary collaboration and integration of ethical aspects. According to the author, such issues place strong demands, not only on the science teacher, but also on the whole educational system.

Eva Björkholm has made a study in primary technology education. In her article, *Technical knowing in the early school years – A learning study of the meaning of knowing how to construct a linkage mechanism* she explores the capability to construct a specific linkage mechanism in the context of a Learning study. The study was carried out in collaboration with two primary school teachers and their two classes: a preschool class and a grade one class. The study reports on the analysis of the video-recorded pre- and post-tests which were analysed using a phenomenographic approach. The analyses resulted in four categories describing qualitatively different ways of experiencing the object of learning. The results indicate the importance of discerning the two joints of a paper figure and their different characteristics in terms of a fixed and a moving joint as well as the placement of the moving joint in relation to the resulting movement.

In her article *Ninth-graders' and geography teachers' understandings of climate change as a phenomenon and its consequences*, Mikaela Hermans compares teachers' and pupils' understanding of climate change. The purpose of the study was to investigate ninth-graders' and their geography teachers' understandings of climate change as a phenomenon and its consequences. The respondents represented eleven secondary schools from all parts of Swedish-speaking Finland. A mixed methods research design was applied, combining data from questionnaires (549 students) and interviews (13 teachers). According to the author, the results can be seen as worrying in so far as the students' as well as to some

extent the teachers' understandings were inadequate and a common conception in both groups was that climate change does not affect them.

In the article *Children's meaning making in a project on biodiversity and ecology* Cecilia Caiman and Iann Lundegård analyse a group of children and teachers when exploring animals in a preschool project concerning biodiversity. They examine the ways in which children create meaning of the content, the order in which the content emerges, and what impact teachers have on how the process develops. The results reveal that the organisms' appearances and movements received morphological and physiological explanations. The knowledge was gained profoundly in a manner which has similarities with ecological and evolutionary ways of explaining biological phenomena. The teachers' utterances were few, but significant, by raising productive questions in close relation to what the children anticipated they embraced a listening approach.

The article written by Torodd Lunde, Carl-Johan Rundgren and Shu-Nu Chang Rundgren is entitled *When curricula and teaching tradition meet – how lower secondary science teachers meet external expectations on inquiry-based science teaching*. The aim of the study is to illuminate how a group of teachers within the Swedish teaching tradition, based on the prevailing condition, met the external expectations of involving pupils in inquiry-based science teaching. The results indicate that teachers, despite shortage of activities, wanted to involve pupils in inquiry-based science teaching to meet the curricula's and national tests' request for such activities. The teachers did this through hybridization, in which the teachers opened up and transformed existing laboratory activities; and by imitation, in which they imitated how investigative inquiry is carried out on national tests. Inquiry-based science teaching, as it emerges in this study, possessed several characteristics which might limit the potential for pupils to develop an understanding functional for critical thinking in private and public lives.

Science education research has long taken an interest in how we may make full use of analogies and metaphors in science teaching. In the article *Metaforer och analogier inom termodynamik i kemiläroböcker för gymnasiet* David Hedberg, Jesper Haglund and Fredrik Jeppsson analysed the use of analogies, and explicit and implicit metaphors in two Swedish upper secondary chemistry textbook, and interviewed two of the authors of the textbooks. Abstract states and processes were found to be construed by means of the Object-Event and Location-Event Structure metaphors. Explicit metaphors and analogies were presented, but the comparisons were not always elaborated sufficiently in order to guide the students' interpretations and avoid possible misunderstandings.

In the article *Supporting student learning processes before, during and after fieldwork in geoscience education: Examples from upper secondary school in Norway* Kari Beate Remmen and Merethe Frøyland investigate ways in which fieldwork can enrich students' learning in science. In the context of a research project on geoscience fieldwork for upper secondary students in Norway, the article discusses how student learning processes can be supported throughout sequences of classroom and fieldwork activities. From the analysis of six cases of fieldwork, the authors found only one case in which the students showed deeper learning processes and the teacher was satisfied with the activities and the students' learning outcome. The discussion focuses on the most successful case to see if recommendations for fieldwork can be reconsidered in order to support student learning processes more effectively.

A special issue of NorDiNa with contributions from the NFSUN conference last year in Helsinki is planned during 2015. Kalle Juuti and Veli-Matti Vesterinen will be the guest editors for this special issue.

We hope you enjoy reading this issue!

Are Turmo & Carl-Johan Rundgren