

## NorDiNa Editorial 1/2020

Welcome to the first issue of NorDina in 2020, in which we present seven research articles.

In the first article, “The potential of chest mounted action cameras in early childhood education research” Asbjørn Magnar Hov and Henrik Neegaard investigate the potential of GoPro action cameras as a data collection tool in outdoor early childhood education research. The authors state that using GoPro action cameras in outdoor early childhood education research provides great possibilities. The cameras can provide researchers with natural data about children’s interactions, play, and communication. The cameras function well under difficult outdoor conditions and provide the researcher with good sound and image quality. However, the use of action cameras raises ethical considerations. Children’s rights to privacy may be breached using these cameras. Informed consent is crucial, and professionalism, human knowledge, and tact are required. The study concludes that ethical considerations need thorough attention if these cameras are to be considered for use in research about children.

Jaana Herranen, Sakari Tolppanen, Veli-Matti Vesterinen, Maija Aksela’s article entitled “Challenges and tensions in collaborative planning of a student-led course on sustainability education” states that student-led courses have been described as a promising approach to improve sustainability education. However, there is a lack of systematic studies about the benefits and challenges of such an approach. This qualitative case study examines the challenges and tensions that arose in the planning of a student-led higher education course on sustainability education. The identified challenges concerned sustainability and sustainability education, roles of the course designers, and collaborative decision-making. To relate the challenges to wider discourses on these topics, five underlying tensions were recognized. Finally, the authors discuss how, and to what degree, the challenges and tensions can and should be mitigated.

The article “Ski lifts, bowling balls, pipe system or waterfall? Lower secondary students’ understanding of analogies for electric circuits” by Erik Mogstad and Berit Bungum studies students’ learning of electric circuits. These have been shown to be challenging for students to understand, and a wide range of analogies have been developed in order to support their learning. The article investigates how lower secondary students understand four analogies as they are presented in teaching material for science for Norwegian schools. The analogies compare electric circuits to a ski lift, a water pipe system, a waterfall and moving bowling balls, respectively. The data in the study consisted of interviews with 12 students in lower secondary school, who were interviewed in groups about how they understand the analogies. The results show that students are able to reason about continuity and the concept of current in circuits based on all the analogies, but that the concept of voltage remains a challenge. It seems from the results that analogies relating voltage to energy transfer as an effect of height difference in

a gravitational field are constructive, despite the need for the more abstract concept of field. In addition, the results demonstrate that weaknesses in how the analogies are presented may cause major problems for students in building a fruitful understanding. These types of weaknesses are prevalent in the teaching material studied.

Tuva Bjørkvold's article "Working texts in inquiry learning" departs from the idea that inquiry learning depends on a variety of writing in order to plan, collect data and keep track of the information. In school science, however, writing to document teacher-initiated experiments, following a setup, is widespread. The article follows a class of students during inquiry learning. Most of the students' texts are so called working texts, texts used to gather and process their data. Thus, the students' writing practice is closer to that of scientists, as opposed to the common practice in school science, characterized by the reproduction and memorizing of typical school texts, such as textbooks. The author argues that the term *working texts* can pose a useful contribution to the view of writing in school science.

The article "Pedagogical considerations when educators and researchers design a controversy-based educational programme at a science centre" by Ingrid Eikeland and Merethe Frøyland reports on a 1,5 year-long co-design process where mainly one researcher and four science centre educators collaboratively designed a controversy-based educational programme for upper secondary school in a Norwegian science centre. The aim of the program was to contribute to our understanding of the transition in science centres from embracing neutral, science facts, to inviting visitors to discuss and think critically about contemporary issues. The data consisted of sound recordings from one group interview, eight workshops and three informal meetings. In the analysis, the authors identified barriers related to both choosing a controversial issue and choosing pedagogical activities. Based on the findings, the authors recommend paying special attention to the role of sparking students' emotional engagement, the aspect of no right or wrong answer, and the balance between hands-on activity and dialogue.

In their article "Biology teachers' border crossing between cultures – from a scientific culture to a school culture", Mari Sjøberg, Tone Fredsvik Gregers, Marianne Ødegaard, and Kristin Glørstad Tsigaridas present the analysis of a survey answered by 314 Norwegian Biology teachers about how their education prepared them for the job as a biology teacher and about their practice in the laboratory. The majority of the respondents had a master degree in biology and highlight content knowledge as the most valuable outcome from their education. Further, several teachers report that they lacked didactical knowledge. The authors argue that one of the challenges with the transition from being a student to becoming a teacher involves a cultural border-crossing from having a vision of scientific literacy more in accordance with vision 1 to a vision more in accordance with vision 2. Further, the authors argue that this perspective is valuable for understanding teachers' struggles with laboratory work; particularly, the conflation of methods of teaching and methods of scientific inquiry.

In the article "Finnish Secondary Students' Mental Models of Magnetism" Anna-Leena Kähkönen, David Sederberg, Jouni Viiri, Anssi Lindell and Lynn Bryan examines Finnish lower secondary students' mental models of magnetism through their drawings, written explanations and interviews. Secondary students engaged in six lessons designed specifically to target three key concepts in understanding magnetism: structure and organization (magnetic domains), magnetic fields and magnetic interactions. The authors describe how, with a finite number of key concepts introduced, students reflected upon and revised their mental models of magnetism and magnetic interactions toward more sophistication and normative scientific views.

We hope you enjoy your reading!

Are Turmo and Carl-Johan Rundgren  
Editors

# NorDiNa – Nordic Studies in Science Education

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