Welcome to the second issue of NorDiNa in 2020, in which we present seven research articles, one book review as well as two recent PhD dissertations. We are also happy to welcome Clas Olander, Malmö University, as new co-editor of NorDiNa from the autumn 2020!

The first article by Jens Jakob Ellebaek entitled “Materiality in PCK – structures of knowledge and skills in the science classroom” presents a study based upon empirical data from three teachers’ practice in the field of primary science. The article discusses the relationship between materiality and the development of Pedagogical Content Knowledge (PCK). Methodologically, narrative inquiry was used as an approach in the analysis of multiple data from in-depth interview, classroom observation and stimulated reflection. The results show several types of connections and pathways for perceived PCK development. The analysis shows that teachers perceive the development of PCK as being linked to the availability of particular socio-material structures, and to meaningful collaboration with colleagues who can convey, exemplify and make available the knowledge distributed in the materials. As a result of the analysis, the concept of “Materialefaglighed” (Material-PCK) is constructed and stated as an analytical concept that contains the science teacher’s distributed and socio-materially linked knowledge, ability and doing.

In their article “Evaluation of a Chemistry Concept Inventory for general chemistry students at Finnish University” Tiina Kiviniemi and Pia Noura test and evaluate a chemistry concept inventory (Chemical Concept Inventory 3.0/CCI 3.0), previously developed for use in Norwegian universities, in a Finnish university setting. The test, designed to evaluate student knowledge and learning of chemistry concepts, was administered as both pre- and posttest in first year general chemistry courses at the University of Jyväskylä. The results were evaluated using different statistical tests, focusing both on individual item analysis and the entire test. Some individual questions were found to be not discriminating or reliable enough or too difficult, yet the results, as a whole, indicate that the concept inventory is a reliable and discriminating tool that can be used in the Finnish university context.

Karoliina Vuola & Maija Nousiainen’s article “Physics knowledge justification: an analysis framework to examine physics content knowledge” states that argumentation and knowledge justification have been noted as important skills to be learned in secondary and tertiary level of education. These skills are especially crucial in teaching and learning physics because physics knowledge and its structure is normative and has hierarchical structure. The purpose of their article is two-fold. First, they propose a framework to analyze pre-service physics teachers’ knowledge justification. Second, they show how this framework can be used to examine pre-service physics teachers’ knowledge justification. The results show that analysis framework revealed significant differences between pre-service teachers’ knowledge justification. The authors conclude that there is need and room for practical tools which help future teachers to organize and consider their own knowledge.

Torodd Lunde, Niklas Gericke and Michal Dreschler’s article entitled “From implicit to explicit – didactical models as tools to challenge selective traditions linked to inquiry-based science teaching” aims to illustrate how didactic models in science education can help in-service teachers to challenge selective traditions in a constructive way. The study was based on a teacher professional development program on inquiry-based science teaching in lower secondary school. Three didactic models were
used in both lectures and group reflections to initiate reflections on different ways of interpreting the aims and content associated with inquiry-based science teaching and the consequences of these interpretations. Data was collected from a group of four teachers and consists of written documentation, recordings of group reflections and a group interview. The study shows that it can be fruitful to provide teachers with reflection tools in the form of didactic models to avoid that ideas introduced in continuing education are selectively adapted to current teaching without critical reflection.

In their article “Never at rest”: developing a conceptual framework for descriptions of ‘force’ in physics textbooks Lars Rikard Stavrum, Berit Bungum and Jonas Persson, present an analysis of the ‘force’ concept, which has been shown to be challenging for many students. One reason for this may, according to the authors, be the multifaceted nature of the concept and how textbooks give different definitions and explanations depending on the context. The authors present a framework of eight categories for how the concept is described, based on fundamental principles in physics, their historical sources and an analysis of how ‘force’ is described in four physics textbooks used in upper secondary schools in Norway. Examples from one of the textbooks that constituted the empirical basis for the framework are given. These reveal that textbooks may present students with a variety of definitions and explanations of ‘force’. It is argued that students should be made aware of this variability in order to support their motivation and learning in physics, but also to understand the complex and evolving nature of the force concept and other important concepts in physics.

The article “Wow! Look at this! – Findings of nature elements as starting points for exploratory scientific dialogues between children (5-6 years) and pedagogues” by Ingunn Skalstad examines what characterizes situations that facilitate young children’s participation in exploratory scientific dialogues in outdoor education. By using action cameras mounted to the chest of three children (5-6 years) and two pedagogues during an outdoor session, recordings of 106 scientific dialogues were identified and analyzed in terms of categories describing the communicative project (the purpose) of the dialogues. The categories were: exploring, informing/presenting, and calling for attention. Children’s findings of nature elements initiated 60% of the scientific dialogues between children and pedagogues. Children’s utterances as “Look at this!” were often starting points for these dialogues. The study shows how pedagogues can extend the dialogue by using follow-up questions and encouraging children in applying their senses when exploring their findings. The study also indicates that visiting an area that offers rich possibilities of experiences and findings of nature elements, could enhance the children’s participation in exploratory scientific dialogues.

Mette Hesselholt Henne Hansen, Martin Krabbe Sillasen’s article entitled “Missing concordance between knowledge and efficacy among Danish science teacher students regarding education for sustainability”, present the results from a nation-wide survey of Danish science teacher students specializing in science subjects. The aim of the study was to investigate their knowledge, attitude and self-efficacy on central aspects of education for sustainable development. The findings show a high degree of positive attitude towards the importance of teaching sustainability, and a significant positive correlation between self-efficacy and self-assessed knowledge about the topics in the survey. However, in the study both self-efficacy and self-assessed knowledge correlate negatively with actual knowledge, indicating that some of the participants were subject to an overinflated self-assessment while others may underestimate their proficiency within the topics. In cognitive psychology, this phenomenon is known as the Dunning-Kruger effect, and the authors discuss its implications for how best to ensure quality in education for sustainable development in our schools.


We hope you enjoy your reading!

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