NorDiNa Editorial

Welcome to the first issue of NorDiNa in 2019. In this issue, we present five empirical research articles, two contributions to the curriculum development section, and one abstract of a recent PhD dissertation.

The article “Two science teachers and their teaching in school science for vocational students” by Mette Nordby, Berit Reitan, and Guðrún Jónsdóttir depart from an argument that the curriculum in school science for vocational students has three different purposes: 1) preparing the students for later participation in society and coping with everyday life; 2) qualifying the students for further studies; and 3) offering the students science adapted to the various vocational programs. Their study examines what influence two teachers’ choices when designing science teaching for vocational students. Action research is used as research approach and the study is conducted by two teachers and a researcher. The data consists of audio files from weekly meetings throughout one year. Based on their findings, the authors discuss to what degree the current curriculum in school science offers the teachers enough possibilities to adapt the teaching to various vocational programs.

Maria Svensson, Katharina Dahlbäck, Ann-Marie von Otter’s contribution is entitled “When a problem in a fairy tale challenge and inspire - a study of preschool children’s work on technological solutions”. The aim of this study was to contribute knowledge about children’s practical work and communication in a technology-related problem solving activity, based on a fairy tale. The authors argue that more research about technology in preschool is needed, especially concerning children’s knowledge in relation to the technology (design) process. The study was conducted in a pre-school with two pre-school teachers. Children’s problem solving activities were documented by video recordings on four occasions. The results show that the children worked with most parts in the technology process. Combining the known (the fairy tale) and the unknown (the technology content) proves to be fruitful when solving a technology-related problem where children use their imagination, knowledge and experience.

Per Schubert and Maria Johansson’s article is entitled “Geographic information systems as an integral part of the teacher and school education”. The authors argue that the Swedish school education in geography has developed slowly and still focuses on names of,
for example, countries and capitals, rather than geographical concepts and processes. To implement the secondary and upper secondary school curricula, teachers need both broad and deep geographical knowledge. For example, teachers need knowledge of geographic information systems (GIS), which are computerised information systems for analysis and presentation of geographical data. The literature-based discussion article aims to analyse opportunities and difficulties with using GIS programs in the teacher and school education. In summary, the preconditions are good, with few technical barriers, for developing GIS-based teaching in the teacher and school education that promotes active, inquiry-based, cooperative, and problem-based learning.

The article “In Pursuit of Authenticity in Science Education” by Jens Anker-Hansen and Maria Andrée presents a systematic review of how authenticity is used in science education research and discusses the implications these uses have for the design of science education classroom practices. Authenticity has been discussed in education for decades. However, the authenticity of science education not only concerns the design of educational activities, but also the content of what is being taught. The article reviews research articles published in 2013 and 2014, in the three highest ranking journals in science education, regarding how authenticity is framed in science education. The findings suggest that the uses vary greatly from referring to externally defined practices to student relevance. The findings are discussed with the notions of cultural and personal authenticity to suggest important aspects involved with designing science classroom activities authentic to the different references. Based on the review, the authors have developed a strategy for balancing authenticity in science education classroom practices between cultural and personal authenticity.

In a study from Germany entitled “Hands-on science for recently immigrated students: possibilities for language acquisition and motivation for science”, Mario Schmiedebach and Claas Wegner study the project, “Biology for Everyone”, which teaches newly arrived secondary school students science through the use of hands-on experiments. While addressing scientific content, students build new language structures and improve their German. To help integrate and accelerate language acquisition in German schools, these students are often enrolled in “international classes”. Using 13 interviews, the authors study students’ evaluations of the project in relation to science as well as language acquisition with a qualitative content analysis. The results show that students value this action-oriented approach as it helps them understand scientific concepts. Furthermore, they notice an improvement in their German and an increase in their science content knowledge. The authors conclude that such “international classes” should be considered for use in additional subjects in order to ease integration into the regular school system.

Iann Lundegård and Cecilia Caiman’s article is entitled “Education for science and Sustainable Development - Five modes of Democratic Participation”. Education is often argued as crucial to reverse development towards a more fair and sustainable world. This article uses a wide range of research and literature in the field of education for sustainable development, to discuss an educational, ‘didactic’, framework on areas in the intersection between science, technology and society. First, the introduction outlines an overview of the nature of the issue and its relevance. This is followed by a theoretical approach to education and learning that primarily challenges the normativity of schooling, puts the democratic teaching processes, and the value of authenticity at centre. Finally, based on this the authors present the framework, “Five didactic forms of participation”, focusing on student participation in deliberation, agency, creativity, criticism and authenticity as well as recommendations for, research and further development of education in these areas.
In their article entitled “The potential of palaeontology for science education”, Eliza Estrup and Marianne Achiam conclude that science education frequently portrays science as a monolithic and experimental endeavour. The authors argue that to counteract this simplistic conception of science, a reintroduction of the historically oriented sciences could be of value. To meet this goal, they analyse the discipline of palaeontology and its educational relevance. Kuhn’s disciplinary matrix is used in order to deconstruct palaeontology into elements for educational purposes, and subsequently examine how these elements can be utilised to enrich contemporary science curricula. Estrup and Achiam discuss how including palaeontology in science education can encourage diversity, pluralism, and ultimately, public interest in science.

We hope you enjoy your reading!

Carl-Johan Rundgren & Are Turmo
NorDiNa – Nordic Studies in Science Education

NorDiNa is a Nordic journal of science education publishing scientific articles in the field of science education; both research based and reflective perspectives. Articles on related topics such as technology and geography are also welcome. In addition to scientific articles we publish descriptions of curriculum development and ongoing projects and short abstracts of dissertations in the field. Contributions are in English as well as in Swedish, Danish and Norwegian. All articles have an English abstract regardless of the article’s language.

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