Welcome to the first issue of NorDiNa in 2021.

Bodil Halvars’ article “Children’s questions about trees” aims to scrutinize children’s meaning-making in a tree project during one year in a preschool class. The purpose of this article is to shed light on what happens in children’s encounters with the trees and how an exploratory approach might encompass children’s own questions and working theories. By mapping the children’s explorative process from the Deluzian concept *learning as a relational field of potentiality* (Dahlberg & Elfström, 2014), the connections were identified and analyzed. The data has been generated through ethnographical methods: participant observations, focus groups and stimulated recall. Also, the children’s aesthetic works and the concluding exhibition with additional walks were part of the data generating. The mapping of the tree project helps to make meaning-making visible, where the children’s questions center on complex issues with further connections to ecological issues and sustainability. The driving force of the project was the questions the children posed, while the pedagogues supported their explorations in order to deepen and develop the learning possibilities.

The article “Using Flipped Classroom in middle school science” by Ina Camilla Lauvli Engan, Kirsti Marie Jegstad and Christine Lindstrøm investigate how Flipped Classroom with Just-in-Time Teaching and Peer Instruction could be implemented in middle school science. The study was carried out over four weeks in two year eight classes with one teacher. Data collection comprised student completion of pre-work, responses to in-class Peer Instruction questions, and teacher interviews before, during and after the intervention. The results show that Flipped Classroom worked quite similarly in middle school as in higher education. Pre-reading made the students better prepared for and engaged in class activities, and they particularly liked the instant feedback of Peer Instruction questions. The teacher experienced increased joy in planning and teaching her classes, and the time spent for planning did not increase significantly.

Pernilla Granklint Enochson and Eva Davidsson’s article “Teachers contextualization of science in schools – hybrid contexts in science teaching” analyse how teachers, in authentic situations, relate science content presented in lesson introductions to other contexts such as everyday life or other school subjects. The data consists of observations of lesson introductions in grade nine, from six different schools, in all eight hours of video recordings. The results point to that teachers adopt a variety of ways in order to integrate the science content to other contexts, such as relating to students’ everyday life, to different language perspectives or to other school subjects and thereby initiate hybrid contexts. However, the results indicate that the teachers in this study initiate hybrid contexts to a low extent especially when it comes to contextualising the science content by using news from media. The results do not indicate any differences in the ways teachers use hybrid context in high- and low achieving schools. Considering the low extent of hybrid contexts in this study, one important question is how teaching can to a greater extent be related to student interest and everyday life.

The article “The brain needs nutrition’: pupils’ connections between organizational levels” by Alma Jahic Pettersson, Lena A.E. Tibell and Ragnhild Löfgren investigates pupils’ written responses to a question in a national biology test concerning how nutrient molecules are adsorbed by the small intestine and transported to the brain. The authors aimed to investigate what awareness the pupils
have of the connection between the digestive and circulatory systems. They mapped the pupil’s expressed knowledge by using content analysis which was performed in five steps including connection between the systems, organizational levels and scientific explanations. The authors found that the most correct descriptions contained the highest number of connections between the digestive and the circulatory systems and linking of the different organizational levels. The most correct descriptions included the highest proportion of the meso level. Therefore, knowledge at the meso level seems to be essential for grasping connections between macro- and submicro-level processes, and connections of digestion and circulation systems.

In the article “Should we be afraid of Ebola?” A study of students’ learning progressions in context-based science teaching”, the authors Malin Lavett Lagerström, Jesús Piqueras and Ola Palm explore how learning progressions were established in a context-based science teaching unit. A science class in secondary school was followed during a teaching unit in Biology, in which the Ebola disease was used as context. Teaching was planned using the didactical model organizing purposes. Learning progressions were studied as continuity between teaching purposes, the science content and the context in four sequential lessons. The analysis of teaching evidenced a considerable variation in how learning progressions were constituted within lessons, and showed how learning progressions could develop between lessons through the combination of different teaching activities. By consistently mentioning and referring to Ebola, the teacher had a pivotal role in establishing relations between teaching purposes, the content and the context. Furthermore, the results evidence the important role of the context in supporting students’ learning of science content. Finally, the authors discuss concrete actions in the planning of the unit to improve lessons that evidenced a weaker connection to the context.

Per Anderhag, Madeleine Björn, Birgit Fahrman, Annika Lundholm-Bergström, Maria Weiland and Tove Wållberg’s article “Code as technical solution: A study on primary school students’ perception of fitness of purpose in their spontaneous programming language” examines primary school students’ perception of functionality in their spontaneous programming language for controlling a simple robot. Classroom activities were designed in order to create opportunities for the students (year 1 and year 4) to discuss and develop together with their teachers a shared programming language for controlling a simple robot. The students spontaneously used (a) natural language, (b) images or (c) symbols when they created their programming language. The findings show that the students primarily perceived a code’s functionality as a question of readability, rather than how well it fit the purpose of controlling the robot. Possible consequences of the findings for teaching in technology education are discussed.

In their article “Student teachers’ misconceptions and learning of chemical reactions”, Kåre Haugan and Anna Marie Holand present a study of misconceptions and the learning process of chemical reactions. 14 student teachers performed a written test consisting of 28 multiple choice questions and after participating in five chemistry classes the students were interviewed individually focusing on misconceptions and experienced learning events. Several misconceptions and hindrances for the learning of chemical reactions were identified in the study. Some of these were previously identified, but two were more surprising; three out of 13 students were confused when switching between the terms chemical “reaction” and chemical “change”, a confusion generated by a chemistry textbook. In addition, one student mixed the symbolic meaning of the letter “C” in NaCl to C for the element carbon. Another student learned the profound difference between two states of a substance when the symbols (aq) and (l) were used to differ between “dissolved in water” and “liquid”. Finally, the students identified dialogue and laboratory work and as important for their learning of chemical reactions.

Elisabeth Iversen’s article “A nature trail in science at an upper-secondary level: A study of the posts and students’ experiences from a nature trail about radioactivity and radiation” explores how a nature trail can be used as an approach in science education at an upper-secondary level in Norway. The topic of the trail was radioactivity and radiation. The article illuminates obstacles and possibilities connected to the trail’s posts, how the students experience the posts, and what takes place during the transport between posts, which could give ideas about how the nature trail can be redesigned. The findings point to that the assignments given in the posts were typically closed questions that to a
small degree are related to phenomena at the location. The redesign was based on didactical reconsiderations in form of seven questions that can be adapted to other contexts. The research contribution of the article consists of knowledge and experiences concerning a nature trail in science, which is a rather unexplored area within the field of outdoor education pedagogy.

We hope you enjoy your reading,

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Editors of NorDiNa