Didactic modelling in science education research

Welcome to the third issue of NorDiNa in 2018, which is a special issue on didactic modelling. In this issue, we present five scientific articles, and an introduction to didactic models and didactic modelling in science education research. The articles present research conducted by research students from two research schools for in-service teachers in Sweden.

In the introductory essay, Per-Olof Wickman, Karim Hamza, and Iann Lundegård review what didactic models are, how they can be produced through didactic modelling and how didactic models can be used for analyses of teaching and learning and for educational designs.

In the first empirical article, entitled “Creative drama in chemistry education: a social semiotic approach”, Kerstin Danckwardt-Lillieström, Maria Andrée, and Margareta Enghag present a study on the use of drama in teaching chemical bonding at upper secondary school. The research study explore what kind of semiotic work students are engaged in when given the opportunity to use their own bodies as semiotic resources. Different types of transductions and transformations which had consequences for students’ meaning-making were found in the study. The authors conclude that when creative drama activities open up for students to use the bodily mode in combination with a variety of other semiotic resources, the students are afforded to explore intermolecular forces in new ways.

In the second empirical article, entitled “Didactic modelling of complex sustainability issues in high school chemistry education”, Cecilia Dudas, Carl-Johan Rundgren, and Iann Lundegård analyze how complexity can become visible in students’ deliberation on sustainability issues. The study examines how a didactic model and design principles can be developed and used to analyze complexity in students’ deliberation on sustainability issues. The analysis highlighted four different kinds of considerations needed to visualize complexity, which were used to construct a didactic model. Design principles were also developed, which together with the model can support teachers in didactic analyses regarding complex sustainability issues in chemistry education.

In the third empirical article, entitled “Student impulses and teacher feedback. The relevance of teacher feedback for the classroom discourse and students’ meaning making in teaching on socio-scientific issues”, Cecilia Eriksson and Iann Lundegård explore how classroom communication can be modelled to increase the possibility of classroom discourses and students’ areas of interest to coincide with the overall teaching purpose through teachers’ feedback. The data consisted of recordings from science lessons at lower secondary school. The analysis resulted in a categorization of five different ways the teacher is taking care of and reconnecting the students’ impulses in relation to the overall purpose of the teaching. The article offers opportunities for teachers to reflect on different strategies for discourse feedback in teaching.
In the fourth empirical article, entitled “How teachers can support students with a second language in upper secondary school to talk chemistry”, Dana Seifeddine Ehdwall and Per-Olof Wickman investigate how two didactic models can be used by chemistry teachers to improve teaching to support students with a second language to “talk chemistry”. The study shows how these models can be used by chemistry teachers to organize, perform and assess chemistry lessons in a way that better supports second language students to become more active in talking and so learn chemistry. Their findings show how teachers can support also second language students’ learning to “talk chemistry” by using the didactic models developed for mono-lingual classrooms when planning and performing chemistry lessons.

In the fifth empirical article, entitled “Using organizing purposes to plan and analyse learning progressions in context-based science teaching”, Malin Lavett Lagerström, Jesús Piqueras, and Ola Palm make use of the didactical model organizing purposes to plan a lesson within a context-based teaching unit in Biology with the Ebola disease as the overarching context. The analysis of the enacted lesson showed that the students’ experiences from the model used in the teaching unit were effectively used by the teacher to establish a learning progression towards the learning goals. This was done by eliciting questions, comparisons between the model and real diseases, and recalling specific situations that allowed the use of students’ everyday experiences and incorporation of scientific concepts. Moreover, through these actions the teacher constantly directed the discussion towards the learning goals having the context of the unit in focus.

We hope you enjoy your reading!

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