Learning in Projects and Programming & Case Studies: Models and Concepts

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This section will discuss papers on various learning projects and case studies. The papers describe teaching experiments and projects that aim to enhance learning and teaching practices in craft, design, and technology.

Anna Lundberg, Eila Lindfors and Saija Kuusisto discuss about students' goal orientations during a pedagogical innovation process in their paper. Their research data consists of student teachers' learning diaries. The results provide new understanding about factors improving or lowering goal orientation. In the next paper, Stephanie Hoebeke, Ingri Strand and Peter Haakonsen argue that programming in art and crafts has the potential to act as a tool for in-depth learning and creative problem solving. They conducted their study in Norway and applied the perspective of critical realism. The study aimed to understand whether programming should be implemented in primary school and, if so, whether it can be applied to creative subjects, in particular arts and crafts. Programming, in this context, is categorized as a creative medium whose purpose is to code projects that are expressive rather than functional. In their study, Susanne Engström, Per Norström and Henni Söderberg focused on systems thinking by analysing how technology teachers conceptualize systems thinking, and how it is described in technology textbooks for compulsory school. They analysed four Swedish technology textbooks intended for years 7–9 in compulsory school and conducted a group interview with three technology teachers working in compulsory school. Based on the findings, the authors conclude that systems thinking in compulsory school could be explored further.

David Gill provides a Canadian perspective on the teaching of technology. He explores factors that support and hinder the teaching of technology education and skilled trades at the secondary level (grades 10-12), in relation to a previous intermediate level (grades 7-9) case study. The findings show that teachers who teach technology and skilled trades at the secondary level share similar beliefs. Additionally, these teachers share pedagogical practices with their counterparts who teach at the intermediate level. The results showed that professionalism and systemic marginalization developed as supporting and hindering teachers' efforts However, the results also show that, at this level, there is an observable tension between the values presented in the technology education and skilled trades curricula. Yakhoub Ndiaye, Jean-François Hérold and Marjolaine Chatoney write about the four-component instructional design (4C/ID) model and how it helps students to structure their knowledge system when learning about the concept of force in technology. Their paper presents findings from the implementation of this teaching approach. Additionally, they explore the model of designing interventions using a whole-task approach. The results show that the research intervention had low-to-moderate effects on learning progression since students developed a more comprehensive understanding of the concept of force. The learning experiment assisted some students to develop a more elaborated conceptual understanding of the different kinds of force through the simulation analysis.

Alamäki Ari and Dirin Amir explored the issue at the level of higher education, and analysed student projects which designed and developed AR applications. Their paper examines learning projects where students combine virtual and physical worlds in design processes. They state that combining the virtual with the physical world establishes a robust learning environment that integrates digital problem solving and with physical surroundings. Finally, Rauli Lehtinen, Mikko Huhtala and Eila Lindfors write about spatial visualization. They suggest that spatial visualization plays an important role in learning mechanical design drawing skills and understanding mechanical design. Using problem-solving tests with student-teacher applications, they show that the participants in their study already had sufficiently developed spatial perception skills. Despite this, they recommend the teaching of spatial visualisation skills in existing CDT courses.