

A Pattern Approach to the Design of Technology Mediated Collaborative Learning in Primary Schools

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Abstract: In this paper we present an ongoing research project focusing how to use design patterns as a way to support teachers' design processes of their teaching supported by collaborative technology. The aim is to equip teachers with design methods and tools for a sustainable use of current and future technology in schools.

Keywords: design patterns, design methodology, participatory design, designs for (and in) learning

Introduction

Mobile technology of today has penetrated the everyday life of people and promises of the use of these in teaching and learning are being echoed in the research community. Research projects into the design and use of CSCL-tools in schools are continuously conducted and continue to contribute to the research field of CSCL. However, questions pertaining to appropriation and sustainability of these tools can be formulated, and more specifically if and to what extent these research artifacts are appropriated into everyday practice once a research project has ended, which has been identified as a problem (Cerratto-Pargman & Milrad, in press; Ramberg, 2013). Another question that can be raised in this direction is how teachers can come to good use of these artifacts when many of them are struggling with basic issues of the technical infrastructure (Jahnke et al., 2014). In such a context, an example of an implementation of a design-based research approach could be to initiate a design process building on the use of reliable design methods, with the aim to conduct interventions with a new better and more adapted technical solution.

Other approaches to support the use of technology in schools is to create and share good examples of technology use in teaching in the form of design patterns and pattern languages for learning (Goodyear & Retalis, 2010; Mor & Winters, 2008). As proposed by Ericksen (2000), design patterns could be used as a lingua franca for design and for capturing and structuring how technology is currently used (cf. Dearden & Finlay, 2006), and how it could be used in new ways. Much effort is invested in creating sound and pedagogically anchored design patterns and languages, and it is questioned what the impact actually is on everyday teaching practices due to the level of abstraction expressed in such patterns and pattern languages (ibid). The abstracted description needs to be understood and translated into a concrete practice by the teacher, which poses a problem. Winters and Mor acknowledge and approach this problem by developing a workshop format for how to create patterns together with teachers (Winters & Mor, 2009). The authors in their research thus not only focus the resulting patterns but also the process of creating these and how the process could count as a support for the teachers to continue to use in planning and carrying out of for instance tablet-mediated collaborative learning. Other research pointing at the importance and potential benefits to teaching of collaborative production and design of patterns has for instance been reported in (Laurillard, 2008; Karlgren & Ramberg, 2012).

Inspired by the pattern approach to support the use of technology in education as proposed by Mor, and others, we propose an exemplar-oriented approach to issues and problems of sustainability and communication of teaching practice. Our motivation for doing this is that pattern approaches, constituting welcome and important contributions to the research community, to practitioners run the risk of becoming too theoretical and abstract and thus creates a need and problem in terms of translating these into concrete situations and/or practices. The aim of our research is twofold:

1. together with teachers develop patterns and pattern languages through concrete examples of tablet mediated collaborative learning – patterns that are meant to be further shared and developed through practice.
2. to achieve the first aim, together with teachers adapt workshop formats and techniques to fit into the practical and organizational prerequisites of the school context.

Building on the aforementioned aims the following more specific research questions have been formulated: 1) Can the concept of design patterns be used to structure, document and propose solutions to problems of tablet use in schools? and 2) Can design workshops with design patterns provide sustainability to such processes? The overarching research goal is to contribute to conceptualizations and frameworks for how to

work with schools to enable and support their continued design and work with use of technology in school. The framework more specifically needs to include, but are not limited to; design patterns and pattern languages, workshop formats and design techniques, infrastructure for introducing, sharing and the continued development of patterns and pattern languages. A further motivation for assuming this particular approach is that in everyday practice, the schools and the teachers have their own design process with or without professional designers or researchers (Selander, 2008). They will for instance, decide on the design of the technical equipment in the classroom as well as how to use VLEs (e.g. Moodle, Sakai, Blackboard etc.) to communicate with the students, and maybe most importantly how the students' are meant to use technology in their learning, and how to connect this with pedagogical practices. Adapting the design methods and tools together with the teachers and eventually putting these into the hands of the teachers, should increase the likelihood of them being able to more easily adapt to the ever-changing technological landscape, and the design decisions taken also by other stakeholders in schools, such as principals, and of course in addition to the needs and expectations of the students.

The study and initial findings

In our ongoing study in collaboration with eight participating teachers, the design workshop format (cf. Muller, 2003) has been used, and the procedures that have been used are not part of the teachers' traditional work. In a first workshop the teachers focused current problems, contextualized and suggested solutions to these. An observed and possible weakness of design patterns is the problem-oriented focus of them following the general form of: problem, context, and solution. Introducing a focus on problems seems to have strongly framed the teachers thinking on problems rather than on pedagogical possibilities. To mitigate this other design tools and methods are needed as well as considering how the concept of design patterns is presented, i.e. focusing on problems or pedagogical possibilities. In a second workshop the concept of problem was reformulated to instead focus pedagogical possibilities and the teachers focused examples from their own practice and development of these, into a collection of design patterns. In this workshop the teachers used scenarios and storyboards to bridge their practices and their descriptions with design patterns. Both workshops conducted lasted 2 hours. We have collected data through observations and note taking, video and audio recordings. The patterns and other constructions from the teachers are seen as primary units of analysis.

Examples of pattern themes

Below we present two themes that recurred in the teachers' patterns.

Technology and logistics: Problems with different technologies and platforms; Solutions require coming to and making decisions and investments.

Pedagogy/didactics: Use of characteristics of existing technology to support teaching and learning (less innovative thinking from a technology perspective), to document, communicate, visualize; Open up for in- and outside of classroom teaching and learning; Support of "weaker" students in class; The use of computer games in teaching and learning as a way of capturing and maintaining student interest and motivation.

Additional findings

Other selected findings tailoring the use of design methodology are: Teachers clearly appreciated meeting and discussing; They picked up on the idea with patterns very fast; Use of concepts (problem vs idea) seems to strongly have governed their thinking; Sketching and narrating their ideas seems to have helped in contextualizing problems and ideas; this also made it easy to translate into a pattern structure and connect different patterns; they appreciated the idea of building pattern libraries for continued evaluation and development.

Conclusions

The design workshops and the use of design patterns have helped us (teachers and researchers) to put into words, and structure problems the teachers experience and propose ways of how to overcome these. Interesting and slightly surprising was the strong focus on the many problems teachers had with the existing technology, and that the solutions to these were fairly straightforward. And when thinking of technology from a pedagogical perspective the patterns that were suggested for technology use were mainly focused on basic and stable characteristics of ICT and infrastructure - there seems to be no room for or reason to think innovatively about use of ICT in teaching if the core functionality and infrastructure is not there. Another interesting observation that is not really about the use of design methodology or the use of design patterns, is the extent that the teachers appreciated meeting and having discussions about their practice, their use of ICT and the sharing of these

experiences. In our approach to introducing design methodology and design patterns we encourage teachers to continue to use the format and tools/techniques used, to continue developing new design patterns, to refine and evaluate existing patterns to create a structured approach to an ongoing discussion and development of the use of ICT in teaching. In evaluating our approach we will on the one hand evaluate the patterns and to what degree and how these inform the planning and carrying out of teaching supported by ICT. We likewise plan to investigate and evaluate to what degree and how the design patterns are refined and developed over time as well as if and in that case how the workshop format and techniques used are continued to be adapted in the context of the school.

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