

Conference theme: *Design-oriented Research vs. Design – theoretical and methodological issues.*

Working in a design group: Developing teachers' competencies through design-oriented research

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Keywords

Design group; role of the researcher; Design-Based Research; innovative teaching

Theoretical framework

This study is inspired by the concept of the 21st Century skills and the growing need to understand and use ICT (information and communication technology) in teaching and learning in the digital age. International studies have pointed out that it is not technology itself that creates a deeper learning, but the applied methods (Mayer 2010, p. 195, Bundsgaard 2005, 2010). Research also shows that the connections between ICT, teacher competencies and learning designs are complex (Luckin et. al., 2012; Koehler & Mishra, 2009). A more innovative approach to teaching can be a response to the demands for 21st Century skills and a possible way of achieving a higher degree of ICT-integration in teaching practices. Such an approach to teaching was developed and defined in the project *Innovative Teaching and Learning* (ITL 2011) which was an international comparative study carried out in seven countries. The ITL-project defines innovative teaching as teaching with a focus on student activities, real world problem solving skills, collaborative learning, communication and ICT-supported learning processes.

However, a recent report concludes that in the Danish *Folkeskole* (primary and lower secondary school) teaching with ICT can be described as traditional rather than innovative (EVA 2009). The same report also claims that in many instances ICT is used without being sufficiently integrated into the teacher's pedagogical practice. In order to develop the use of ICT further there is a need for ways of developing teachers' qualifications within the area of pedagogic ICT-use, and a need for practice-related and use-oriented qualifications development, the report concludes. Similarly, in a study focusing on three Scandinavian countries, it is claimed that "teachers play a crucial role in redeveloping schools into modern, technology-enhanced institutions" (Ottestad, 2010). In a British study, Littleton claims that "as technologies change and develop, teachers need support, time and space to explore the associated implications for their pedagogy and practice" (Littleton, 2010). In its present form, it seems that the Danish teacher training education does not deal with use of ICT in a sufficient way. This means that both newly graduated and experienced teachers may experience a need for further developing capacity within the field of pedagogical use of ICT, including skills, experience and qualifications to develop learning designs with ICT. In this paper, we report from an ongoing research project which aims to develop new methods for teacher qualification.

Research Question

Based on the above, we formulated the following research question:

How are teachers' competencies with learning design including ICT developed through a design-based research approach? More specifically, how is such a development supported by a design group which consist of both teachers and researchers?

Project aim:

The aim of this project is to produce knowledge about how teacher competencies can be developed in Danish primary and lower secondary schools. Through interventions and design experiments conducted in authentic school settings, the project aims to develop models for teacher capacity building. Furthermore, the project will confront the challenges of making contextual experiences, methods and learning designs sufficiently resilient to be re-used by others in other contexts. Based on experiments and results, the aim is to provide input for teachers' further education and develop new methods for contextually situated teacher capacity building.

Methodology and research design

As stated in the research question, the main challenge addressed in this project is development of adequate competencies for teachers. This section explains the reasons for choosing a design oriented approach for this purpose.

Learning environments in schools are characterised by a high degree of complexity, and neither analytically or in the design process can teaching be separated from the context where it happens (Barab and Squire 2004). This approach is in opposition to positivistic and structuralist science-paradigms which hold the view that knowledge is objective and can be tested and measured in comparable environments. Contrary to the positivistic approach, this project is based on a methodology which focuses on the messy and interwoven complexity of the learning environment as a unity (Hanghøj 2008, Elf 2009).

In order to interfere with and create changes in the learning environment, a design oriented approach is chosen. Furthermore, we seek to conduct qualitative studies in the field and use interventions in the classroom as a method to develop the teachers' competencies. The methodology chosen is strongly inspired by *Design-Based Research* (Barab & Squire, 2004). The purpose of Design-Based Research (DBR) is to design an intervention in an iterative process in order to strengthen the design and to generate theoretical knowledge of the design. In design-based research, the researcher creates a learning design together with the involved actors, and for this purpose the following three-phased research design is being carried out (phases 1 and 2 completed in 2013, phase 3 to follow in the spring of 2014):

1. Initial authentic inspiration and problem analysis: A pilot study carried out in one school where different kinds of learning environments and learning designs were observed and discussed with the local teachers. This took place over a period of a year with the purpose of acquiring a broader understanding of the field and developing ideas for the later design interventions. This phase played a central part in formulating the research question.
2. First intervention: A design group was created with two teachers of the subject Danish teaching two different classes; and three researchers. In the group, the researchers presented an initial learning design with ICT which was then carried out by the two teachers. Before and during the process of teaching, the two designs are discussed, modified and further developed in the design group, which meet once a week. In the design group, theoretical and practical aspects of the

learning design were discussed in accordance with a set agenda suggested by the researchers. This collaboration took place over an intense three weeks period.

3. Second intervention: This phase is due to take place in two or three different schools in Denmark in 2014. The objective is to strengthen the work in new design groups in different environments.

For the purpose of studying the interaction in the classrooms as well as conducting a broader case study related to capacity building and integration of ICT into pedagogical practices, a multitude of techniques are being used in the data collection process such as video observation, field notes, focus group interviews and analysis of pupils' products. The focus of the observations is primarily on the teachers' actions and conversations when planning, executing and evaluating the didactical design.

Expected results

The preliminary findings from data analysis show promising results, and also points new research questions to be addressed in the future. Furthermore, some methodological concerns with this way of working have manifested themselves in the early experiences, and will be addressed in future work (see below for a short introduction).

Firstly, the intervention demonstrated it is possible to alter and develop the way teachers work with learning designs, both in their approach to developing them, and in their teaching practice. The most noteworthy element so far has been the work within the design group. This design-approach can be compared to the Japanese method called Lesson study, although the design-approach differs in the way it is part of an overall design, and by the participation of researchers in the design work.

Secondly, the empirical work calls for a discussion of the role of the researcher in the design-based research methodology, compared to e.g. action research (Levin 1946) which is commonly applied in educational research. In design-based research, the researcher identifies the pivotal problem and introduces a design, whereas in action research the problem is defined by the involved actors and is closely related to their practice. In our case, this is seen in the fact that the concept of innovative teaching and learning is introduced by the researchers. Furthermore, DBR is theory-driven and aims to develop theory as a result of collaboration between teachers and researchers.

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