A Tool for Developing Design-Based Learning Activities for Primary School Teachers

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Abstract
The paper describes the iterative design process of a tool to support primary school teachers in creating Design-Based Learning (DBL) activities.

DBL is a promising approach for teaching 21st Century skills. In developing DBL activities teachers face challenges such as determining the right level of openness of the challenge and mapping appropriate learning goals to activities. The DBL tool is being developed in collaboration with three primary schools. The process has led to user requirements for such a tool, and an understanding of how to map curriculum/learning design decisions to a design process.

Method
To develop a successful DBL-creation tool, we adopted a design research approach [1], an educational methodology which comprises cycles in which – after an initial start design – experimental teaching and evaluation and ‘redesign’ alternate.

We collaborated with three schools of the PlanOOlab organization in the design process. The second phase consisted of the following activities:

- Two design workshops with teachers and directors to examine how a DBL activity would be organised in practice and requirements for a DBL creation tool.
- An expert review by educational experts to determine the support for the teacher’s reflection process.
- Observations of three teachers using the tool and observations of children engaging in the DBL activity created by the teacher.

Design-Based Learning Tool
The web-based DBL creation tool supports teachers in mapping learning design decisions to a design process. The tool provides support for (see Fig. 2):

1. Handling the openness of design activities
2. Linking a design problem/challenge to a theme and learning goals
3. Building up a set of learning activities linked to concrete learning goals
4. Selecting methods related to design phases
5. Selecting collaboration forms for the different learning activities

Relevant Literature
A suitable approach to teach 21st century skills is Design-Based Learning (DBL) [1, 2]. A teaching approach in which students learn by collaboratively creating solutions to open (societal) challenges by means of design. DBL can be defined by six components:

1. Design elements and design process
2. Collaborative learning and reflection process
3. Assessment and learning goals
4. Project characteristics and design brief
5. Teacher and student role
6. Learning materials and learning environment

How the tool supports teachers in developing DBL activities.

The tool provides good support for teachers to develop a learning activity integrated in a design process. The observations of the tool’s use showed that improvements can be made to the outcome of using the tool in terms of the presentation of the learning activities.

The collaboration with the three schools has been very valuable in developing an understanding of the challenges of getting DBL activities embedded in school contexts.

More research is needed to determine how to adjust the amount of exploration teachers to develop high quality learning activities to the experiences and affinity they have with design-based learning.

Conclusions and Discussion
The importance of a good structure in a DBL creation tool.

Observations of the web-based tool showed that the design process-inspired structure did not work well for considering the basic learning design components.

A redesign has been made where a mapping is provided between the learning design components and a design process (see Fig. 3).

DBL related properties that need special attention in the tool.

Teachers frame a design brief in terms of a specific domain and related themes. To result in a design challenge with the correct level of openness, it is important to provide a balance between open design challenges with enough guidance to ensure pupils reaching learning goals.

The tool supports translating a design brief to detailed learning design decisions such as working from a global domain, to more detailed themes, with roles and perspectives to be taken by children, and defining possible involvement of experts and other people from the school network.

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References