Proposal

Design your CBL: a tool in spreading and deepening the understanding of CBL within TU/e

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Background and justification of the project

With the rapid approach of the data of '2030', pressure rises within TU/e to engage more and more TU/e faculty to participate in the renewal. This concerns both the innovation of education by staff throughout TU/e and the collaborative building up and deepening the concept of CBL. It is a process in which sharing ideas goes together with building up practical insight and theoretical underpinnings. Co-design on an organization wide scale.

Developing CBL in university

A key aspects of this university-wide innovations is finding ways to include the whole university while developing and implementing the new concepts and education. Here, TU/e has taken a strategy of simultaneous implementation and further development of the concept in close interaction between management and teaching staff.

The development of the concept of CBL is firstly driven through the active involvement of University staff. This requires an active role of teachers throughout the university. Empowering teachers within the university is the primary task of Teach. Teacher Support is to support and initiate innovations within the departments. Teach has been asked to develop a professionalization program for university staff. The Teacher Support chain is now developing a professionalization training on CBL for Teacher Support staff, so that they can support the teachers in the design of the CBL projects.
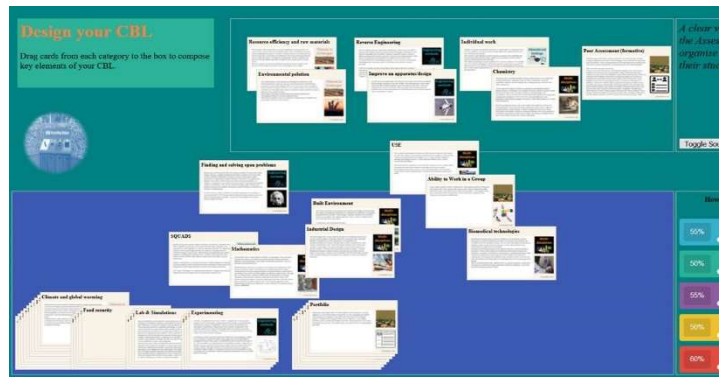
Secondly, the development of the concept of CBL and the best way of realizing it in educational practice is also fed by research. In this ESoE plays an important role. ESoE will actively support Teach and the Teacher Support chain in deepening and developing the professionalization in and use of the CBL concept.

Finally, the university wide innovation would benefit from a way of monitoring de development of ideas on CBL, its core characteristics, and the proposed practices for implementing it throughout university. As will be described below, the this projects provides a tool for doing so.

'Design your CBL' tool

The 'design your CBL' tool currently is a prototype (e.g. http://www.platform-cheiron.nl/drag/dyCBLv1.7e3.html) (Taconis et al., (submitted)). In short, the participating teachers will design the outline of a CBL educational unit while discussing ideas and receiving reflection oriented feedback on their design. In this, the design is built up on the basis of 5 - 7 crucial design components (e.g. challenge, educational aim, engineering method, assessment), on which the participants have to make informed choices. These elements are derived from a literature research in a previous project: 'Challenge based tasks for fundamental knowledge'.

The prototype has been prepared for two modalities of use. Both modes create an open participative and reflective atmosphere apt for effective professionalization en empowerment of teachers as reflective professionals and 'challenge based education designers' (Schon, 1984). In both modes, the cards make available background information, and – ultimately – discloses resources for further professionalization. But the main focus is on enhancing teacher reflective engagement in designing CBL education. This is described more extensively in recently submitted conference paper (Taconis, Hobbelen & Bekker, submitted).

One mode is employing physical cards and applicable to physically gathered teams that can share ideas and arguments while using the card to jointly design CBL education. In the other mode, cards are presented over the internet. Through AI, the online system presents real-time theoretically underpinned reflective feedback on the users' currently made design choices. Aim is to deepen thoughts and arguments concerning the CBL education being designed. The online tool can be used individually or in a group setting and records and maps the design decisions taken by the users. Hence, it can be seen as an instrument in monitoring perspectives on CBL amongst TU/e staff. Alternatively, the online tool can be used outside TU/e as to help advertise the CBL educational renewal of TU/e.

The prototype has currently been used by the faculties of AP and EE (cards mode) on the occasion of their 'education days', and within the E3 design group (online mode). Next to strong points, such as the deepening discussions provoked, this has revealed some practical issues and some weaker points that in this project will resolved. Issues eligible for further development are: increasing usability of the online tool, improving and balancing the set of cards, putting forward best practices in the field of CBL in a more systematic way, and systematic including of sequencing and planning the 'student journey' in learning in a CBL-project (for an example see (Bekker et al., 2018).

Objectives and expected outcomes of the project

Though the prototype appears well usable, it still has to be developed further, in order a) to make it better and more usable, b) to make it co-evaluate with the progressing insights and definition of the concept of CBL in TU/e, and c) to make it more effective as a tool in professionalising and empowering teachers. The project aims at: *fostering the use of the 'design your CBL' tool in various modalities as to propagate and deepen insight and competence in designing CBL and its design within a large group of university personnel.*

For this, ESoE, the department of industrial design, TEACH, and the Teacher Support Chain collaborate as to assure both optimum underpinning, design and implementation within TU/e. TEACH will apply the continuously updated tool in their current professionalization activities. The Teacher Support chain helps disseminate new approaches and methods on CBL in educational programs, and will promote the use of the tool amongst faculty teacher supporters. Industrial design is particularly proficient in handing the subsequent redesign and further development of the tool, while ESoE brings in educational and research expertise.

Research and development questions

As a design research project, the project is structured around a set of questions concerning research, development and design issues. The general aim is to develop and partially redesign the tool as to

optimize its use for staff professionalization by Teach and in the teacher support chain by teacher supporters within the various departments. The aim is that 15% of TU/e teaching staff is effectively reached. Hence, the project will contribute to educational quality throughout TU/e and the elicitation of the CBL concept. From a research perspective, the project seeks to elicit:

1. How do groups using the tool go about, and how do they arrive a 'shared mental model' of CBL (DeChurch & Mesmer-Magnus, 2010)
2. What is the impact of the use of 'Design your CBL' on knowledge, skills and attitudes towards CBL of the participating staff (e.g. insight in characteristics and design of CBL, possibilities of practical implementation etc.)
3. How does is answer to Q1 and Q2 depend on particular staff characteristic and/or domain/department. Doe particular 'styles' exists within TU/e comprising particular ways of conceptualizing and designing CBL as constructed using the tool?
4. How can the tool be further developed e.g. by including more / less card-types (such as 'Engineering method') as to optimize Learning impact of using the tool?

Particularly the analysis of the use and design results of engineering educational experts may help deepening the concept of CBL.

Project design and management

The project is set-up as 'design research' – an approach in which the use, improvement of the tool, and build-up of educational theories take place within one coherent process (Van den Akker et al., 2006). To reach optimum use of the tool in teacher groups, Teach, Teacher Supporters and ESoE will collaborate to create a suitable training arrangement around the tool, comprising an introduction, concluding discussion, background etc. In practice, this methodology implies that the 'design your CBL' tool will be used to professionalize participating staff during Teach professionalization meetings. The Teacher Support chain will serve as a platform to promote the use of the tool within departments with teachers, also involving use-sessions.

During and after these sessions, evaluative data will be gathered The use and the learning result are methodically evaluated as to feed the gradual improvement of the tool through redesign. For this a multi-method methodology will be used in which the results of observations, interviews and document analysis are linked to each other; the so-called triangulation (Meijer et al., 2002). This will not only feed the further development of the tool, but also produce deeper insight in CBL.

Dissemination and sustainability of the project

In a way, the project's aim IS dissemination. But the project simultaneously explores and develops ideas on CBL within the broader TU/e community and helps foster know-how and understanding amongst TU/e faculty. Externally, and on a more formal level, dissemination is supported by products such as papers and (departmental) meetings.

Products
- Tool (consecutive versions and modalities)
- Professionalization material embedding the tool as a component in teach courses and as an instrument for teacher supporters
- 2 conference papers e.g. CEE, Sefi (engineering education), CSEDU (ICT supported education), Educon (IEEE)
- Various departmental CBL design meetings
- Scientific research paper

References

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