

Unboxing the process of revision between two design-based hybrid learning interventions

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Abstract

The paper investigates the revision process of a Design-Based Research (DBR) project, in which a hybrid continuing professional development (CPD) course for educators from three higher education institutions is developed, tested and redesigned. The course runs over two cycles and is based on a key design principle, which aims at fostering inter-institutional collaboration among participants in relation to developing, testing and evaluating new learning designs in the participants' respective teaching practices.

On the basis of semi-structured interviews with the course participants, it is discussed which aspects of the course should be revised and which design strategy to apply during the revision process. Moreover, the implications for the following intervention are discussed and the redesigned course is presented.

The empirical contribution of the paper lies in the detailed unboxing of the steps taken by the research and design team in the revision process between the two cycles of the course. As such, the paper exemplifies data-informed revision processes in which the key design principle of a course is maintained, but the adaptation of it is fundamentally revised though the strategy of branching out, i.e. central aspects of the design are revised to create a new solution.

Keywords

Hybrid learning; Design-Based Research; Continuing professional development.

Introduction

Design-based intervention studies have been criticised for rarely describing the reasons as to why given aspects of an educational design solution are revised in the succeeding intervention (Zheng 2015, Gundersen 2021). This leaves the revision processes of Design-Based Research (DBR) (Barab & Squire 2004; Design-Based Research Collective 2003) in a closed box that has yet to be opened to shed light on the methodological considerations and implications related to the revision of solutions in educational design research. In this paper, we look into the revision process of a DBR project, in which a hybrid continuing professional development (CPD) course for educators is developed, tested and redesigned. The intention is to unbox the kinds of challenges and choices that educational design researchers face when engaged in revising an educational solution between interventions. In the paper, we identify three aspects of an intended intervention that can be considered for revision and point to established design activities related to either opening up the solution space (branching out) or refining existing solutions (narrowing down) as strategies that can be applied during the

revision process.

The core of the article is the above-mentioned CPD course, which we describe in terms of the intended design developed by the research and development team (the authors of the present paper) and the course participants' reactions to it after the first intervention was carried out. We then seek to transparentise the revision work carried out by the research and development team by describing their considerations during the redesign phase. Lastly, we present the intended design proposal for the next intervention in order to explicate the changes that the revision process led to. The question we seek to answer is:

When redesigning the next intervention period in a hybrid CPD course, which aspects of the proposed solution must be considered for revision, which design strategy does the empirical findings call for and what are the implications for the following intervention?

The paper is structured as follows: We first present the method used for collecting and analysing data from interviews with the course participants. Next, a hybrid CPD course for educators, titled the Double Learning Community, is presented along with its guiding design principles. The findings from interviews with the course participants are subsequently presented. We move on to discuss the concept of revision in DBR, focusing particularly on the revision of theory, guiding principles and the adaptation of design principles. Next, we address the different strategies that can inform the revision process and discuss the difference between the strategy of narrowing down and branching. Finally, we present the redesigned course by highlighting the differences between the first and second interventions and discuss the aspect that was revised as well as the applied revision strategy.

Method

The empirical data analysed in the paper stem from a series of semi-structured interviews with nine course participants who are employed at three different HEIs in Denmark. The names of institutions and course participants are anonymised in the present study. The interviews, which were conducted in October-November 2021 after the first intervention of the course, were recorded, transcribed and subsequently coded using the coding software Dedoose. A total of eight codes that relate to the key design principle 'Fostering a double learning community' (further described below) were identified. The interview citations included in the analysis primarily address the following codes: 1) participants' interpretation of the key design principle, 2) attitudes towards inter-institutional collaboration, 3) challenges related to the enactment of the key design principle and 4) the participants' learning outcome.

The Double Learning Community

The Double Learning Community (DLC) is a continuing professional development (CPD) course that targets in-service educators from three higher education institutions (HEIs) in Denmark. During the course, the participants are engaged in (re)designing a selected number of learning designs through the integration of digital technologies. The participants are expected to take part in a double learning community (hence the name), which constitutes an inter-institutional learning community, comprising participants from the three HEIs, and a local community, comprising one or more course participants and a given number of colleagues from their home institution. Even though the course has no formal curriculum, the contents of the DLC address a set of specific learning outcomes as the participants are expected to develop knowledge and skills within three subject areas related to digital technologies: visualization, collaboration and flexible access to education. The DLC is enabled by a digital learning platform in the form of Moodle where participants can access learning materials and participate in different types of learning activities, including forum discussions with participants from other institutions and the course facilitators.

The course runs over two intervention periods from August 2021 to June 2022 and is redesigned prior to each intervention. The first intervention took place in August to November 2021 and the second intervention will take place in February to June 2022. The course participants represent different academic disciplines and they are employed at three different HEIs in Denmark, including a university, a university college and a business academy.

A hybrid learning configuration

The DLC constitutes a hybrid learning configuration, which Wals, Lans and Kupper (2012) define as a social practice focused on authentic, ill-defined tasks or challenges whose resolution relies on transboundary learning, e.g. by transcending forms of learning, disciplines and traditional structures and sectors. In this context, hybridity is not to be confused with the use of digital technologies to support learning such as flipped or blended learning. Rather, the concept of hybridity emphasises the combination and integration of elements that are traditionally considered separate to form a new hybrid in its own right. The DLC constitutes a hybrid learning configuration as it seeks to transcend the disciplines which the course participants represent as well as the sectors they come from to foster inter-institutional collaboration and learning in relation to the use of digital technologies in education. Although there is a growing body of conceptual and empirical literature emphasising the importance of hybrid learning (e.g. Cremers et al. 2016; Ryberg, Bertel, Sørensen, Davidsen & Konnerup 2020; Hilli, Nørgård & Aaen 2019), there are few studies on the development and implementation of such configurations designed for educational staff at HEIs.

Key design principle of the DLC

One of the characteristics that sets DBR apart from other research traditions is the generation and application of design principles, i.e. generalised, domain-specific knowledge that inform educational designers of how to achieve a specific outcome (Herrington & Reeves, 2011; van den Akker, 1999; van den Akker, Gravemeijer, McKenney & Nieveen, 2006). According to Baumgartner and Bell (2002), design principles can be either explanatory, i.e. produced after an intervention has been carried out to explain why it was successful, or generative, i.e. produced before the execution of an intervention to support and guide the educational designer in generating new solutions. They suggest that both explanatory and generative design principles should be produced with three questions in mind:

- Who are the design principles for (audience)?
- When are the design principles generated (type of principle, cf. the distinction between explanatory and generative design principles)?
- What makes the design principles useful to their audience (characteristics)?

Baumgartner and Bell (2002) further argue that generative design principles should include

- Information on how and when they should be applied (procedure)
- Information on their underlying rationale (theory)
- A description of the criteria of success (outcome)

The DLC is based on the following six design principles (rendered here as titles), which have been produced with inspiration from Baumgartner and Bell (2002) as generative design principles targeting the course designers:

- 1 Fostering a double learning community (key design principle)
- 2 Encouraging problem-oriented and project-based learning
- 3 Utilizing the exemplary principle
- 4 Stimulating codified knowledge acquisition
- 5 Promoting learning through experimentation
- 6 Assisting reflective practitioners

The principles were developed by the researcher and development team prior to the first intervention. Due to the scope of the paper, we initially focus on the key design principle of the DLC (principle no. 1), which frames the DLC as a hybrid learning configuration with special focus on inter-institutional learning. The remaining five design principles serve the function of supporting the key design principle. Table 1 describes the key design principle, including its four characteristics and their respective criteria of success.

Table 1: Key Design principle of the DLC - Fostering a double learning community

Underlying rationale	Characteristics - how to apply the principle	Criteria of success
The DLC constitutes a hybrid learning configuration (Wals,	1 You must ensure that participants from each of the three participating HEIs are enrolled	A number of participants from each HEI have completed the course

Lans and Kupper 2012; Cremers et al. 2016). The term 'double' refers to the fact that participants take part in an inter-institutional community (with peers from other HEIs) and a local community (with colleagues from their home institution).	2	You must facilitate the development of a learning community which stimulates inter-institutional and local collaboration between participants	Participants have shared and developed their teaching practice in collaboration with their inter-institutional and local communities
	3	You must facilitate learning activities that are anchored in both the inter-institutional and local learning communities	All participants have actively participated in the learning activities in their inter-institutional and local communities
	4	You must establish clear links between inter-institutional and local learning activities	The output produced by the participants illustrates the knowledge gained in their inter-institutional and local communities

Adaptation of the key design principle in the first intervention

In the following, we briefly outline how each characteristic of the design principle 'Fostering a double learning community' was adapted by the course designers to the specific context in the first intervention in the autumn of 2021.

To ensure that educators from each of the three HEIs were enrolled (characteristic no. 1), the heads of department at the participating institutions were asked to select a number of course participants and a digital flyer describing the aim and contents of the course was distributed. A total of eleven participants from the three HEIs were enrolled, including six educators from a university, two from a university college and three from a business academy.

The development of a learning community that stimulates inter-institutional and local collaboration (characteristic no. 2) was facilitated through two onsite seminars: a kick-off seminar at the beginning of the course and a final seminar at the end of the course. Also, participants were given access to an online learning platform in the form of Moodle where they were encouraged to study selected reading materials and share and give feedback on their respective learning designs in an asynchronous discussion forum.

To ensure that the learning activities of the course are anchored in both the inter-institutional and local learning communities (characteristic no. 3), the course was divided into 5 design phases in which participants were asked to test in their local contexts the learning designs they had developed and subsequently share their reflections with the other course participants on the online platform.

Links between inter-institutional and local learning activities (characteristic no. 4) were established through three content themes (flexibility, collaboration and visualization), which were presented at the kick-off seminar. The reading materials and the learning designs developed by the participants were centred around one or more of the themes.

The adaptation of the key design principle in the first intervention can be illustrated as follows:



Figure 1. Legend: Square = online, circle = onsite, yellow = local, blue = inter-institutional, size = number of hours allocated to each activity.

The two circles represent the onsite kick-off seminar and the final seminar. The four blue squares represent inter-institutional collaboration, which takes place on the online platform. The yellow square represents the participants' experimentation with learning designs in their local contexts.

Empirical findings – Participants' reactions to the adaptation

In the following, we present data in the form of clustered statements from a series of semi-structured interviews with nine course participants who are employed at three different HEIs in Denmark, including a university (five informants), a university college (two informants) and a business academy (two informants). The interviews were conducted in October and November 2021 after the completion of the first intervention. The findings are discussed in the subsequent section with a particular focus on the revision of aspects related to the key design principle and its adaptation for the second intervention as well as the design strategy applied by the research and development team in the revision process.

The intention underlying the ‘doubleness’ is unclear

The interview data show that there is considerable variation in how participants understand the ‘doubleness’ of the Double Learning Community. As previously mentioned, the term ‘double’ refers to the fact that participants are expected to take part in an inter-institutional learning community (as established through the online platform and during the onsite seminars) and a local learning community (comprising the participants’ colleagues at their home institutions). However, none of the informants seems to be aware of the underlying intention. Rather, they relate the concept of ‘doubleness’ to either double-loop learning (two informants), blended learning (one informant), the fusion of content and pedagogical knowledge (three informants) or the fact that the participants represent different levels of expertise in using digital technologies as either experts or novices (two informants).

Considering the confusion among the participants as to the concept of doubleness, it is tempting to discard the key design principle in the next intervention. However, several of the informants mention how they appreciated interacting with peers from other institutions during the onsite seminars. For instance, one informant describes the kick-off seminar as ‘exciting’ (informant F) and another found that ‘an open and safe atmosphere where you could discuss your teaching experiences and ideas with the others [i.e. participants from other HEIs]’ was quickly established (informant D).

Moreover, the participants generally hold a positive attitude towards inter-institutional collaboration and learning. One informant explains that he:

[...] would like people from other traditions within education [to participate]. The more minds from different locations, the more diverse perspectives we’ll get on how to handle teaching situations. Other perspectives on teaching and learning will be represented. (Informant A)

Another informant argues that the participants can learn from each other across institutions because they, broadly speaking, are teaching the same target group:

We all teach students who have finished high school [...]. It’s interesting to hear how students act in other contexts. It’s inspiring and makes me think ‘why don’t my students behave like that?’ Which factors cause them to act differently? What can I change in the way that I plan lessons? (Informant I)

The attitudes expressed above are echoed in varied forms throughout the interviews. Generally speaking, the informants find that their respective teaching practices share a number of similarities, which allows for them to understand the challenges that they are each facing in relation to using digital technologies in education. At the same time, they believe that their prior teaching experiences and the contexts in which they teach are also sufficiently diverse for them to learn from each other.

Lack of participation and little sharing of knowledge

The variation in how the informants understand the ‘doubleness’ of the Double Learning Community seems not to be rooted in a negative attitude towards the key design principle, but rather in the fact that - for a majority of the participants - inter-institutional learning and collaboration did not take place. Commenting on the relationship between the intended idea of doubleness and his actual experiences with the course, one informant explains that:

On the first day [of the course] I was given another definition: that the double refers to our collaboration with other institutions. But I haven’t experienced that. (Informant C)

Several informants express similar attitudes. Their experiences are in most cases linked to the adaptation of specific characteristics of the key design principle, e.g. the adaptation of characteristic no. 2 (developing a learning community that stimulates inter-institutional and local collaboration). Although the onsite seminars

were found useful for developing a learning community, the online discussion forum was not used by the participants. One informant explains that she:

[...] haven't used it at all [the online discussion forum]. I haven't exploited the potential that it might have. And there may well be potential to it. (Informant G)

Similarly, another participant explains that once the onsite kick-off seminar was completed and the online periods of the course began, she experienced that:

[...] the feeling of being part of something across institutions, it wasn't there anymore. (Informant C)

Furthermore, the adaptation of characteristic no. 4 (establishing links between inter-institutional and local learning activities) through the use of reading materials on the three content themes was unsuccessful. Both the amount and types of texts available on the platform were described as showstoppers by the participants. Asked if she had consulted the assigned literature, an informant says:

No, in fact I haven't. It didn't trigger me. I found it too peripheral and heavy, so it wasn't something I looked into. It's what I can use here and now [that interests me] because we already have... or I have... a lot to read as it is. (Informant G)

Thus, two central elements of the online platform, the discussion forum and the reading materials, did not meet the needs of the course participants, which adversely affected their engagement in the double learning community.

Feedback and experimentation considered useful

Conversely, the interview data show that the informants experienced a high learning outcome when the learning activities and feedback from the course participants and facilitators were tied closely to their experimentation with new learning designs. One informant explains that she appreciated:

[...] Exemplary learning, you know, one to one, someone who gives feedback on my problems. Or when I need new [digital] tools, someone who can show me what to do [...] That's something I can use in my daily working life. (Informant G)

Another informant gives a concrete example of how (s)he gained hands-on knowledge from another participant during the kick-off seminar:

She [a participant from another HEI] showed me how to insert a link on the Moodle platform in a different way. I used this trick and it worked just fine. So it's important to me that we focus on problem solving. (Informant H)

Along the same lines, yet another informant explains that:

The doubleness for me was when I received feedback from you and online feedback from Charlotte... and also from Anne [all course facilitators] because it gave me a whole new perspective on things. (Informant C)

Unboxing the revision process

In the following we seek to unbox our revision process with reference to the interview findings presented in the previous section. A challenge related to revision processes in DBR is the question of how to determine which aspects of a given educational design solution to revise. We argue that at least three aspects of an intended solution must be considered for revision, namely 1) the initial pedagogical theory guiding the intervention, 2) the transformation of the theory into guiding principles and 3) the adaptation of the principles in the proposed design solution.

It may be argued that the context in which the intervention takes place should also be considered for revision. However, a central characteristic of DBR is that interventions take place in messy settings and therefore researchers must take the particular context into account when designing their solution. Once a proposed design solution has been put forward it can be enacted in practice through the interactions between materials, teachers and learners (Design-Based Research Collective, 2003, p. 5). Subsequently, the enactment produces an outcome of which judgments can be made about the promise of the intervention. In relation to this, Dede (2004)

questions approaches where the enactment is deemed unimportant as long as the principles of the intended design are realised. Dede warns that such interventions can easily lead to situations in which DBR presents unfalsifiable propositions, with failures always attributable to defects in implementation rather than flaws in the theory-based design itself (ibid, p. 108). Instead, Dede calls for standards for determining when to abandon suboptimal solutions, while at the same time acknowledging the complexity of generating such standards in the field of education.

Revision strategies: Narrowing down or branching out

Additionally, we suggest that researchers consider the overall purpose of their revision activities when revising the theory, the guiding principles or the adaptation of the principles of a tested solution by determining whether the analysed data call for further exploration of the solution space or refinement of a confined set of predetermined criteria. Such broad categories of design purposes can be found throughout the history of design theory, e.g. divergent and convergent thinking, also at activity level in the shape of sketching and prototyping (Buxton 2007). Sketching is a communicative activity (traditionally between designer and sketch), which is characterised by being quick, readily available, dense, self-generative, plentiful, suggestive and ambiguous (Buxton 2007; Belardi 2014). A design-based researcher immersed in the activity of sketching is thus investigating the range of possible solutions regardless of whether he is focused on revising the underlying theory, the guiding principles or the adaptation of the principles. In contrast to the purpose of sketching, Buxton argues that the activity of prototyping is linked to convergence where designers seek to refine, test and resolve specific issues in a narrower funnel of possible solutions. It is difficult to determine whether branching out or refining is the most efficient strategy for a design team to adopt at a given time of a design project. However, we argue, speaking from a research perspective, that analysis of data that stem from interventions should be a determining factor.

Data-informed revision

The informants' less positive experiences with certain elements of the Double Learning Community seems not to be rooted in a negative attitude towards the key design principle, but rather in the adaptation of the principles. What the data show is that the informants hold a positive attitude towards inter-institutional collaboration but, at the same time, they do not have the time for or are not interested in contributing to the online learning community.

Returning to the key design principle of the DLC, the participants appreciate the intention underlying the four characteristics, but they also find that the success criteria were not met. Particularly with regards to active participation (characteristic no. 3), the informants find that the principle was adapted in an unsuccessful manner. Additionally, as success criterion no. 3 was not fulfilled, the participants inevitably did not share knowledge with each other across institutions as intended (characteristic no. 2).

The data show an interest among the informants to explore the potential of receiving further immediate feedback when experimenting with new learning designs. This pointed our attention to the supporting design principles of promoting learning through experimentation (principle no. 5) and assisting reflective practitioners (principle no. 6).

Considering the above findings in relation to the two design strategies previously discussed, i.e. narrowing down versus branching out, we had the option of either refining the adaptation of the design principle or redesigning the way it was adapted. Based on the data, we have decided to impose a strategy of branching out. The fundamental criticism brought forward by the informants, especially regarding the online aspects of the course, led us to conclude that it would be insufficient to simply refine the online learning activities, including the discussion forum, and find alternative reading materials. Instead, we went back to the drawing board and sketched out several new adaptations of the key design principle. As illustrated in Figure 2 below, the design process led to a new branch of adaptation where the interaction and dialogue between the participants take place onsite, including mandatory inter-institutional observation visits, rather than online through an asynchronous discussion forum.

Adaptation of the key design principle in the second intervention

We now briefly outline how the adaptation of each characteristic of the key design principle 'Fostering a double learning community' was redesigned by the research and development team in the autumn of 2021 by using the revision strategy of branching out.

The overall recruitment strategy (characteristic no. 1) remains unchanged. However, participants are now enrolled as pairs comprising two colleagues from the same institution to strengthen local anchoring.

The second characteristic of stimulating inter-institutional and local collaboration is redesigned. The online platform is restructured to function only as a repository of shared resources. All interaction and dialogue between participants take place onsite at different campuses. Participants are required to carry out inter-institutional visits to observe and discuss experimentation with each other's learning designs.

In order to anchor the learning activities in both the inter-institutional and local learning communities (characteristic no. 3), the participants focus on designing and testing new solutions onsite in collaboration with a feedback partner from another HEI. This reduces the number of learning activities and minor cycles of the course to a few key meetings between the participants.

Lastly, the onsite visits between peers from different HEIs serve the purpose of linking inter-institutional and local learning activities (characteristic no. 4). During the onsite kick-off seminar, the participants decide which of the three content themes they would like to focus on. Subsequently, feedback partners are paired across institutions for the remainder of the course period. The intervention period ends with a final onsite seminar.

The second intervention can be visualised as follows:

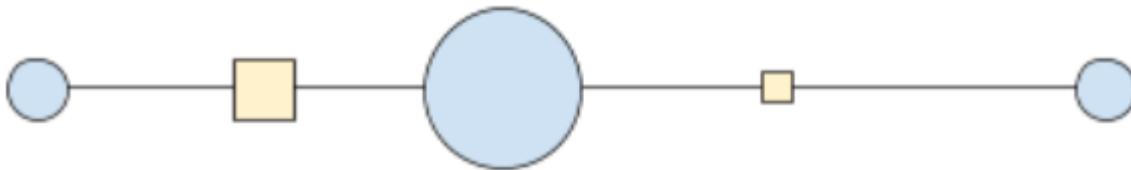


Figure 2. Legend: Square = online, circle = on-site, yellow = local, blue = inter-institutional, size = number of hours allocated to each activity.

The two small circles represent the onsite kick-off seminar and the final seminar of the course. The two yellow squares indicate the workload related to studying the course materials in the online repository. The large blue circle represents the onsite campus visits at the three HEIs.

Conclusion

The findings from the interviews with the course participants show that they hold a positive attitude towards the key design principle 'Fostering a double learning community', but the adaptation of the principle is unsuccessful as they have not experienced the intended hybridity of the course in the form of institutional collaboration. This is largely due to the fact that the participants do not have the time for or are not interested in contributing to the online learning community, which served as the primary setting for inter-institutional interaction in the first intervention. For the second intervention, the adaptation of the key design principle was redesigned through the strategy of branching out, resulting in an intended design with a greater focus on inter-institutional collaboration through onsite observation visits and cross-institutional feedback on tested learning designs.

Hence, the DDL exemplifies an intervention project in which a guiding principle remains intact, but the first and the second adaptations of said principle differ substantially. We propose that design researchers consider three aspects and two opposing strategies when revising on the back of an intervention. While our suggested list of aspects and design strategies is most likely inexhaustive, we believe that many intervention studies would benefit from unboxing their revision processes to a greater extent. Such considerations are pivotal if other interested parties are to follow the logic behind the iterative progression that characterises design-based intervention studies. Furthermore, the opposing revision strategies of branching out and narrowing down can help increase the awareness among researchers as to when to abandon suboptimal solutions and when to further increase the effectiveness of promising ones.

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