

## Designing for learning and empowerment: how design-based research can impact education and practice

L. Jönsson<sup>1,\*</sup>

<sup>1</sup>VIA Culture & Pedagogy, Research and Development, VIA University College, Ceresbyen 24, 8000 Aarhus C., Denmark

### Abstract

This paper proposes design-based research as a teaching approach to enhance the learning environment of university college students and as a potential tool for empowerment in practice. The paper depicts how students, professors, professional educationalists, and people with learning disabilities worked together to develop five new visual and digital methods for interviewing in special education. Thereby enhancing students' competences, knowledge and proficiency in innovation and research as well as designing a solution aiding people with learning disabilities to communicate with peers and professionals.

**Keywords:** Design-based research, designing for learning, higher education, special education, learning disabilities, empowerment, visual and digital interview methods.

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### 1. Introduction

Danish university colleges provide higher professional education leading to bachelor's degrees in areas such as social education, teacher education, social work and nursing. All programs include internships/placements, thus, putting great emphasis on the combination of theory and practice.

In order to boost education to a higher level of academia, to innovate new practice-oriented products and services, and to make education flexible, the programs were recently regulated by executive order from the Ministry of Higher Education and Science [1]. Replacing myriad parallel modules, programs now consist of short singular modules integrating innovation, research and cooperation with practice in every subject area.

Such structural and curricula changes call for a new learning environment. An environment that raises the following research question: *What characterizes a teaching approach that has the potential to enhance students' research and innovative competences,*

*knowledge, and proficiency whilst being embedded in practice?*

Extending previous work [2], this paper starts with section 2 by taking point of departure in design-based research (DBR) [cf. 3]. The section introduces DBR and proposes a comprehensive teaching approach in four phases. As way of example, the paper uses a module in a social education program and gives valuable insights into how students, professors, professional educationalists, and people with learning disabilities worked together in a design process. Thus, bridging the gap in literature and meeting a current need for clear guidelines in how to incorporate innovative approaches in teaching and learning [4]. Following this, section 3 presents the findings. The paper shows that not only did this collaborating design process enhance students' research and innovation competences, knowledge and proficiency, and gave way for a new teaching approach, it also empowered people with learning disabilities as they took part in the process and were the end users of five new visual and digital interview methods designed through the

\*Contact email: lhjo@via.dk

research. Finally, section 4 provides concluding remarks concerning the research and depicts future research plans.

## 2. Design-based Research

Design-based research (DBR) is a comprehensive approach, which retrieves data by designing, refining, and testing a design focusing on either education, learning, and/or didactics [5] and which can '...account for and potentially impact learning and teaching in naturalistic settings' [6]. DBR is characterized by the close collaboration with practice throughout the design process and, thus, offers an approach, which combines theory and practice.

DBR emerged in the 1990s [7, 8] as an educational technology in an attempt to enhance teaching and learning within the social constructivist learning paradigm [3]. In DBR students become active learners and are 'learning by designing' [9] through hands-on experience with e.g. creativity [4] and mathematics [5, 10]. Building on this, the proposition will show how DBR is adaptable to a university college setting with emphasis on students' competences, knowledge, and proficiency within innovation and research, whilst at the same time addressing a current need in practice by creating an adaptable solution.

### 2.1. DBR as a University College Teaching Approach

The model presented below (table 1) is adapted from Thomas Reeves (2006). Reeves' original design model depicts four phases. In phase 1, researchers and practitioners analyse practical problems in order to put forward the research objective. Phase 2 focuses on the development of solutions using existing design principles and innovations, whereas phase 3 is an iterative cycle of testing and refinement of the solution in practice. Phase 4 produces design principles and focuses on the implementation of the solution [3].

Taking point of departure in a social education module, the research proposition follows Reeves design model, yet elaborates the model by providing details about the particular roles of students, professors, professional educationalists, and people with learning disabilities (table 1), and by presenting the cycle of testing and reflection/refinement (fig. 1). The adapted model is explained below.

#### Phase 1: Identifying the Need for New Interview Methods in Special Education

The first indications of a need for new interview methods in special education were brought to light by the author's lectures on interview methods in a social education program. In social education, interviewing is a crucial part of gaining insight into the thoughts and feelings of the target group. From that, professionals adjust and

accommodate the appropriate pedagogical and educational measures to the individual. Yet, very few publications focus on interviewing in special education and even less address or describe the particularities regarding people with learning disabilities [11, 12].

The lack of literature mirror the lack of concrete methods in practice. This was recognized on a university college meeting with representatives from professional educationalists working in special education. Professional educationalists argued that people with learning disabilities have difficulties in communicating their ideas due to poor language, cognitive, and motor skills, which often leave professional educationalists as the decision makers for people with learning disabilities. Thus, although professionals already use different communication techniques, they identified a need for a more systematic approach, where people with learning disabilities are able to communicate their perception of life.

From the above, it is clear that the need for new interview methods in special education was identified in both academia and in practice. To address this gap, seven professional educationalists joined an expert group. All professional educationalists were highly experienced in the field and currently working with people with learning disabilities. They were to work with two university college professors (the author included) in order to identify which interview methods to design and refine for use in special education.

Table 1. Teaching Approach

	PHASE 1	PHASE 2	PHASE 3	PHASE 4
PEOPLE WITH LEARNING DISABILITIES			<i>Co-designing the prototype</i>	
STUDENTS		<i>Designing the first prototype</i>	<i>Designing + testing the prototype</i>	<i>Refining prototype Presentations Writing chapter</i>
PROFESSIONAL EDUCATIONALISTS	<i>Experiencing a need for new interview methods</i>		<i>Expert group Mentoring</i>	<i>Expert group Mentoring Feed-back on methods</i>
PROFESSORS	<i>Identifying a need for new interview methods</i>	<i>Teaching Supervision</i>	<i>Teaching Supervision</i>	<i>Teaching supervision</i>

### Visual and Digital Methods as a Way to Empowerment in Special Education

Visual and digital techniques are often used in special education settings for communication and documentation purposes. For example, drawings are used to illustrate the structure of the day for the autistic and pictures are taken to document a holiday as a reminder for people with a lack of memory. These techniques aid people with learning disabilities and allow them to a greater extent to take part in everyday life. Using the theoretical framework of Pierre Bourdieu [13], one may say, that people with learning disabilities through visual and digital

techniques often are able to assert themselves as stronger agents as the techniques enable them to convert resources/capital to symbolic capital and, thus, to retain a more powerful position or voice regarding their own lives. It follows, that the advantages of visual and digital techniques may be strengthened further by developing them into actual methods. Indeed, this paper argues that visual and digital methods hold the potential to empower people with learning disabilities. Empowerment is, cf. Andersen and Siim, "...the process of awareness and capacity-building, which increases the participation and decision-making power of citizens and may potentially lead to transformative action which will change opportunity structures in an inclusive and equalising direction" [14].

Experiences from practice, the potential for empowerment and the fact that visual and digital methods in research often prove beneficial when working with children and others who may have verbal limitations, led to the decision that all interview methods were to be either visual, digital or both. This, combined with the number of university college students taking part in the research, resulted in designing the following five visual and digital interview methods:

- (i) Photography.
- (ii) Film.
- (iii) Scrapbook.
- (iv) Digital storytelling.
- (v) Talking-mats.

### Phase 2: Developing New Interview Methods

Twenty university college students from the social education program joined the research in phase 2 as part of a five-week module focusing on research and developmental projects. The first part of phase 2 focused on academia and provided knowledge of DBR, the history of participation and decision making among people with learning disabilities, and ethnographic interviewing with particular emphasis on special education. Students were also introduced to visual and digital methods. In groups of four, students worked with a particular method and designed their first solution, i.e. prototype, by combining their knowledge of education and methods. University college professors supervised this latter part of the phase.

### Phase 3: Iterative Cycle of Testing and Refinements of Interview Methods

The third phase consisted of an iterative cycle of testing and refinements - starting with test 1 (see fig. 1). For testing, each group split into pairs allowing each group to carry out two tests in each test cycle, thus, doubling the amount of data<sup>†</sup>.

<sup>†</sup> Two interviewers instead of four also limited the amount of stress for the interviewee.

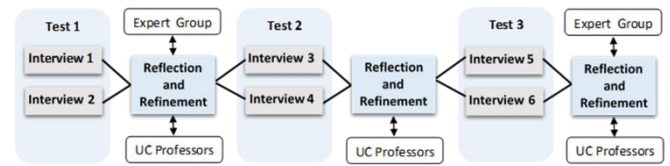


Fig. 1. Iterative test cycle for each interview method

Interviews were carried out in care facilities, either at the work place or in the homes of people with learning disabilities. All interviews focused on the lawful right to participation and decision making in one's life, yet the main focus of the interview was for students to pay attention to the target group's needs and the potential to use the method as a way of communication. This potential was monitored by the use of notes and by video filming.

After test 1, students returned to university college for reflection and refinement. The pairs rejoined their methods groups and a lecture on analysis served as a springboard for the next stage of the design process. Each group analysed their videos and discussed similarities and differences between the two interviews by paying careful attention to the flow of the interview, language, body language, and the influence of e.g. time and setting. Overall, the method's ability to work as a tool of communication was scrutinized and sequences of particular interest and concern were presented to the expert group of professional educationalists. Professional educationalists and students then discussed the findings - along with input from university college professors - and worked together in order to refine the methods. For example, the group of students using photography as a method of interviewing first disregarded people with learning disabilities as photographers, yet encouraged interviewees to take pictures in the refinement of the method as it became clear from watching the video and from the discussion with the expert group that this was certainly an option. In this way, people with learning disabilities also became co-designers of the prototypes, as they informed the design process during the interview.

In test 2, the refined prototype was tested again. Tests were carried out with new interviewees so that prior knowledge of the method did not influence the interview. This interview was analysed, reflected on and refined into a prototype for test 3. After test 3, the interview data from all six interviews were analysed and discussed in each group. Again, the expert group mentored the students along with the professors. The process ended with a refinement of the prototype into a new interview method. Here summed up briefly (for further information see [15]):

- (i) Photography. Informal conversations while people take pictures in their care facility or home environment, investigating the reasons behind their choices of framing. Thereafter semi-structured interviews by using the pictures taken and additional pictures brought by the interviewer.

- (ii) Film. Semi-structured interviews by the use of film clip. The interviewee watches small clips of film contextualising the topic of the interview and aiding the following conversations.
- (iii) Scrapbook. Semi-structured interviewing on a particular topic while interviewee picks and chooses pictures for his or her individual scrapbook. Pictures, captures, and stories are glued into the scrapbook for any additional interviewing or storytelling.
- (iv) Digital storytelling. Interviewing by the use of an app for cartoon storytelling. Interviewee's choices of characters and digital environments are discussed while the story is co-created between interviewer and interviewee.
- (v) Talking-mats. Interviews by the use of a mat and pictures. The interviewer places a topic picture on a mat in front of the interviewee. The interviewee answers questions by choosing a happy, neutral or an angry smiley and by placing the picture on the mat. From that follow-up questions. Talking-mats is a concept from Stirling University, Scotland, which was tested and further developed through our research.<sup>‡</sup>

#### Phase 4: Reflections on New Methods for Interviewing in Special Education

Throughout the design process students reflected upon the applicability of the interview method. In phase 4, these reflections were explored even further as each group of four presented their method on two occasions. First, the interview method was presented to the other four groups, the expert group and the university college professors. At the presentation, each group reflected on the design process, the interview method as well as its potentials and limitations. This allowed a discussion of the particular method and its applicability in special education, which also served as the first feedback to the expert group. The second presentation was carried out at a peer conference. The conference functioned as a "show and tell," in which students explained and demonstrated the method to their peers enrolled in parallel module projects - and to students and visitors at the university college on that particular day.

Presentations, along with the work and reflections carried out throughout the design process, laid the foundation for a forthcoming book [15] on the subject of interviewing in special education. In more detail, students were instructed in writing and supervised intensively during a two-week writing period. These efforts resulted in five methods chapters focusing on interviewing with the use of photography, film, scrapbook, digital storytelling, and talking-mats. The chapters will be published together with writings on DBR, the history of decision making among people with learning disabilities as well as an introduction to interviewing in special education.

<sup>‡</sup> See [www.talkingmats.com](http://www.talkingmats.com)

In addition, students visited the involved care facilities. The purpose of the visit was twofold. On one hand, the visits focused on sharing the knowledge and discussing the implementation of the method with the professional educationalists. On the other, the visits served as a way to give back and thank the people with learning disabilities. As will be demonstrated in the findings below, the visual and digital methods proved highly effective tools of communication and empowerment. This meant that students connected well with the interviewees, and thus, were asked to come back by professional educationalists and people with learning disabilities alike.

### 3. Findings

Drawing on the design process presented in this paper as well as observations, informal conversations, and semi-structured interviewing [16], findings show a dual outcome of the research: (1) DBR as a comprehensive teaching approach and (2) DBR as a potential tool for empowerment in practice.

#### 3.1. DBR as a Comprehensive Teaching Approach

The research shows DBR's genuine applicability as a comprehensive teaching approach, where students 'design for learning' and 'learn by designing'. By applying knowledge from lectures on DBR, the history of participation and decision making among people with learning disabilities, ethnographic interviewing, visual and digital methods as well as analysis and writing, the students were able to design, test and refine the interview methods. Thus, allowing them to both learn and develop the profession.

Students' competences, knowledge, and proficiency in innovation and research were demonstrated vividly and visibly in the presentations and by their ability to write a chapter for a book on visual and digital methods in special education [15]. Additionally, when asking students about their learning outcome, they spoke enthusiastically about the design process and highlighted the possibilities to do further testing and refinement in their upcoming internship/placement:

Sophie: *It's gonna be interesting if you can refine it even further. Maybe come up with new ideas.*

Mary: *Exactly, we can do some testing.*

Sophie: *There's great potential.*

Mary: *Definitely. And I really think the possibility to learn these kinds of things is so cool; to test these things because we can use this in the future.<sup>§</sup>*

<sup>§</sup> Names changed for anonymity purposes. Statements are translated from Danish to English.



As stated in the interview excerpt above, students expressed great interest in further advancing interviewing in special education. Although some students were more reluctant and unsure of themselves as interviewees due to lack of experience, it was apparent that all students agreed to have gained competences, knowledge, and proficiency in innovation and research, thus, enabling them to test and refine work related issues in future careers.

When asked for further details about their learning outcome, students praised the close relation with practice. The fact that they were designing new interview methods because of an actual need was highly motivating for them and linked their studies to the profession. Furthermore, the collaboration with practice played an important part in students' learning. The mentoring from the expert group and the openness and willingness from the interviewed people with learning disabilities were highly appreciated and both groups were seen as significant partners.

### 3.2. DBR as a Tool for Empowerment

Throughout the design process, practice highly influenced the adaptable solution presented as five new visual and digital interview methods for interviewing in special education. Although a bit embarrassed by being referred to as experts, the professional educationalists embraced their role as mentors and used their expertise in the design process. They spoke enthusiastically of a fruitful design process and saw themselves and the people with learning disabilities as co-designers of the five interview methods.

People with learning disabilities did indeed embrace the role as co-designers – and each individual contributed according to ability. Students and professional educationalists were surprised by the efforts and time put into the interviews by the people with learning disabilities – most participants went over and beyond what were expected from them. This suggests that DBR in itself can be seen as a tool for empowerment due to its close connection to practice. It was clear that the design process increased participation and the decision-making power of people with learning disabilities in a way that affected their ability to express themselves about their life. Thus, possibly paving the way for a more powerful and equal position in their care facility or home environment [cf. 13].

Although no research was carried out in order to determine the effect of the new interview methods, indications of improved communication throughout the research demonstrate how DBR may boost empowerment. DBR focuses on creating an adaptable solution to a practical problem. In this case, the lack of communication between professional educationalists and people with learning disabilities was identified as the need. This need was re-addressed after the research, when professional educationalists highlighted the diversity of the five visual and digital methods. By referring to individuals in their care facilities, they were able to identify and match which method would aid communication with whom and

emphasised how people with learning disabilities were able to voice their thoughts and feelings:

Nina: *The citizen is talking: "This is where I am and this is what I would like to develop." We are no longer the interpreters.*

The professional educationalists, as seen above, saw the methods as tools of communication that would support people with learning disabilities to keep focus and enable professional educationalists to listen. The methods, they argued, would provide professional educationalists with insights and understandings, instead of leaving them to rely on their own interpretations of people with learning disabilities' needs. They supported this argument by referring to interviewees who used the methods to become decision makers in their own life. In regards to talking-mats, for example, a man was able to communicate his lack of privacy in his own home by the use of smileys and another man was able to communicate how he wanted his flat decorated for Christmas by the use of digital storytelling. The latter also taught his peers how to co-produce small films expressing thoughts and feelings about everyday life.

These findings suggest that in this research, one may speak of both a horizontal and vertical empowerment of people with learning disabilities [cf. 17]. Horizontally as the new interview methods seem to strengthen networks between peers and enable them to use the method as tools of communication not only relying on words. Thus, potentially, boosting camaraderie, community building, and understanding between people with learning disabilities themselves.

Most significantly, however, are the possibilities for vertical empowerment. When people with learning disabilities use visual and digital methods to assert themselves, they potentially become stronger agents with a more powerful voice regarding their own lives [cf. 13] and, thus, strengthen the position upwards in relation to professionals and the system. Indeed, addressing the need, which the research set out to investigate.

By the same token, it is essential to keep in mind, that empowerment is interdependent on a myriad of factors. Some people with learning disabilities may not wish to become full decision makers in their own lives as their diagnosis may make them more comfortable with a life highly structured by professionals or family, for example. In such cases, imposing decision-making will not be beneficial.

Furthermore, visual and digital methods may not always render people with learning disabilities more powerful. If professional educationalists do not listen to people with learning disabilities' voices and take them into account, people with learning disabilities' awareness and capacity to act will not increase, leaving society and institution unchanged.

## 4. Conclusions

This paper proposes a new teaching approach to enhance the learning environment of university college students and to empower practice. By adapting DBR to a university college setting, it depicts how students gained competences, knowledge, and proficiency in innovation and research throughout a design process focusing on developing new visual and digital interview methods in special education. This was illustrated in students' presentations and methods chapters as well as in their statements about further testing and refinement of interview methods in special education.

The proposition also demonstrates how a teaching approach embedded in practice supports the development of the particular profession and ensures an adaptable solution. Acting as an expert group, the professional educationalists took part in the design process and mentored the students throughout the research, thus, allowing practice-oriented solutions promoting people with learning disabilities to become decision makers in their own life.

Testing the prototypes in care facilities and home environments of people with learning disabilities enabled students to explore the interview methods in real life situations while people with learning disabilities were able to inform the refinement of the method during the test cycle (seen in fig.1). This provided the springboard for applicable methods, which were able to empower people with learning disabilities, both horizontally and vertically. Methods were, subsequently, used as tools of communication between people with learning disabilities and between people with learning disabilities and professionals.

Being characterized as experimental, collaborative as well as theoretically and practically sound, the teaching approach presented in this paper is capable to serve as a model for university college teaching in innovation and research. The short singular modules provide intensive periods for prototype testing where students focus on developing a practice-oriented product boosting their own learning and where DBR is a potential tool for empowerment in practice. All features recognized by the Danish Ministry of Higher Education and Science and the focal point of university college education.

The teaching approach has the potential as a new teaching paradigm for university colleges. However, despite the model's flexibility and adjustability to time scales and students' levels in academia and practice (e.g. project management skills, experience with target group etc.) further testing of the model is needed in order to grasp the full potential as a new teaching paradigm. Consequently, the future research plan involves, in conjunction with dissemination in various academic outlets, initiating dialogue between academia, practitioners and students in order to validate the proposition and support theory building. In particular, further attention will be paid to the establishment of the appropriate DBR mindset for designing, refining and

testing the solution and to the actual potential for empowerment in practice. Extensive studies of the visual and digital methods in practice would provide insights into the experienced participation and decision-making power of people with learning disabilities and determine any change of opportunity structures in an inclusive and equalising manner.

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