Innovation in education by design thinking

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Abstract

The dynamic changes currently caused by various megatrends challenge the educational sector. Prospective strategies are required to cope with these issues. This is where the innovation methodology of Design Thinking comes in: it can be described as creative thinking in heterogeneous teams to develop creative solution ideas for complex challenges. This approach helps to initiate new or adjusted strategies for special target groups in the context of education. In this article, essential aspects of Design Thinking are introduced, and references to innovations in the field of education are presented. Two examples from the higher education sector are then used to illustrate the practical implementation.

Keywords: Design thinking; innovation; megatrends; higher education.

1. Introduction

Megatrends "describe extremely complex dynamics of change and are a model for the transformation of the world" (Zukunftsinstitut, 2021). According to the Zukunftsinstitut, 12 megatrends can be identified, e.g., the megatrends neo ecology, new work and connectivity (ibid.).

Megatrends ensure that a variety of innovations will also be necessary in the field of higher education, such as the derivation of future skills according to Ehlers (2020), the examination of new topics in terms of content, the optimisation of digital teaching-learning scenarios, the development of new target groups and new types of programme designs.

2. Design Thinking

While solutions to manageable questions can be explored and solved with known problem-solving strategies, the complex challenges described above cannot be mastered in this way (Rittel & Webber, 2013). Buchanan sees the opportunity to develop new solutions through Design Thinking (Buchanan, 1992).

Today's understanding of Design Thinking as a methodology for initiating target group-oriented innovations can be traced back significantly to the d.school founded in 2005 at Stanford University (Meinel et al., 2015). Since 2007, Design Thinking has also been taught at the d.school of the Hasso Plattner Institute in Potsdam. Both institutions cooperate closely and conduct joint research programmes in the field of Design Thinking (Meinel & Leifer, 2011). In the meantime, Design Thinking has established itself internationally at other universities and colleges in teaching and research.

According to Meinel and Leifer, Design Thinking can be characterised as follows: "Its human-centric methodology integrates expertise from design, social sciences, engineering, and business. It blends an end-user focus with multidisciplinary collaboration and iterative improvement to produce innovative products, systems, and services" (Meinel&Leifer, 2011, p. 8). These essential characteristics of Design Thinking can be similarly found in other definitions (Uebernickel et al., 2015, p. 16; Lockwood, 2009, p. xii; Plattner et al., 2009, p. 59; Brown, 2008, p. 86).

Design Thinking has already proven its value in the development of product and service innovations in well-known business enterprises. Also in Education Design Thinking is applied in various contexts and several universities, such as the Massachusetts Institute of Technology (MIT), Stanford University, the University of Potsdam and the University of St. Gallen, have made Design Thinking an integral part of their management training and research (Eppler & Hoffmann, 2012). Furthermore, Ehlers (2020) underlines the importance of Design Thinking by including it among the 17 Future Skills.

2.1 Key Elements

The essential key elements of Design Thinking are collaboration in a multidisciplinary team, a variable workspace and an iterative process flow (Plattner et al., 2009).

Multidisciplinary teams can draw on different professional qualifications. Through this broad range of expertise on the one hand and the profession-related different approaches on the other, a greater diversity of perspectives can be achieved, which expands the solution horizon (Page, 2017). "The evolution from design to Design Thinking is the story of the evolution from the creation of products to the relationship between people and products, and from there to the relationship between people and people" (Brown, 2019, p. 47).

A **workspace** that can be flexibly designed opens atypical uses and stimulates creativity. Variable furnishings such as high tables, stools and furniture on wheels are suitable for this purpose. In addition, pinboards and flip charts should be available for knowledge communication and documentation and prototyping materials are also needed (Plattner et al., 2009). With the help of sticky notes, the writable surfaces can additionally be extended to windows and cupboard doors (Lewrick et al., 2018).

The **Design Thinking** process comprises several phases that build on each other. The six-steps according to the HPI School of Design Thinking (2023) are presented in figure 1:
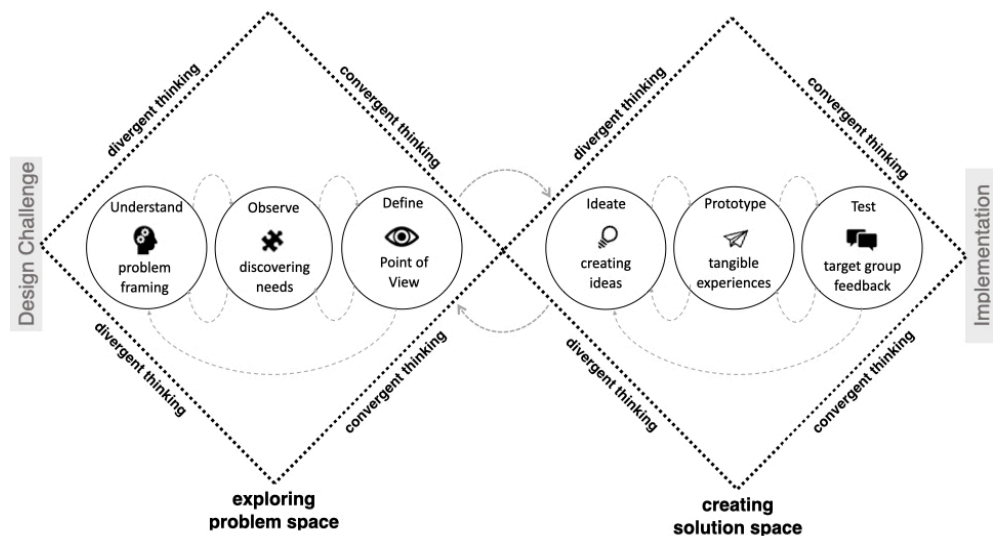

Figure 1: Problem space and solution space in the iterative Design Thinking process (Schmidberger & Wippermann, 2022, p. 40).

The Design Thinking process aims at finding a solution for a so-called Design Challenge. The Design Challenge presents a target group-oriented question for a complex problem and

is the starting point of the Design Thinking process. A unique feature of the process is the iterative, nonlinear approach, which is a result of its exploratory nature. In this way, the results obtained can be reflected upon, and questions that arise can lead to the further development of the solution idea (Lewrick et al., 2018).

The Design Thinking process moves between two fictional spaces. First, the focus is on exploring the problem space. Only then is the focus on developing new solution ideas for the design challenge. This separation between problem space and solution space is called the double diamond and represents an important aspect of Design Thinking (Design Council, 2007).

In this way, a detailed consideration of the problem is made possible without hastily trying to find solutions. This detailed clarification of the actual problem creates the basis for the development of target group-oriented solutions to complex challenges. At the beginning of the process, the focus is on divergent thinking. This means that the problem is approached as openly and unbiasedly as possible. To find out for which concrete challenge the target group needs a solution, different perspectives of the target group are included, and the Design Thinking team's own view is critically reflected on.

When evaluating and classifying the target group observation, the focus is then increasingly on convergent thinking. The results of this exploration phase enable the definition of a common point of view. This is crucial for a transition into the solution space. Here, divergent thinking is called for again, creating new solution impulses and enabling initial prototypes to be developed. When it comes to concretising the solution ideas, making decisions, and putting them into practice, convergent thinking is increasingly required. Throughout the process, the connection to the problem space is always maintained. This iterative procedure is intended to ensure that the solution finding corresponds to the actual needs of the target group (Design Council, 2007).

But tools, methods and processes alone do not fully unlock the potential of Design Thinking. The team's mindset is also important. It determines whether a team can successfully collaborate across disciplines, move through complexity, or inspire others to learn experimentally in order to think out of the box to create extraordinary solutions. Individuals with a human-centered mindset are open and non-judgmental towards people with different backgrounds. They are able to empathize with the emotions and needs of others and they feel comfortable taking on other perspectives, even if they don't correspond with their own experiences. These team members discover the problem space with curiosity and take every opportunity to improve, adapt or refine their own understanding, even if that means deviating from the original plan or redefining the problem to solve (Graves & Fuchs, 2022).

3. Innovation in Education by Design Thinking

To illustrate how innovation in education can be fostered by Design Thinking, two examples of the Ludwigsburg University of Education in Germany are described.

3.1 Seminar on the topic "Education for Sustainable Development (ESD)"

In the summer semester of 2022, students from various master's degree programmes (Early Childhood Education, Adult Education and Cultural Education) took part in the seminar "Education for Sustainable Development" at the Ludwigsburg University of Education, Germany. The seminar aimed at developing solutions for challenges in the field of education for sustainable development through Design Thinking. It started with a kick-off event that allowed the students to get to know each other personally and introduced them to the basics of Design Thinking. Furthermore, the students were given access to various learning media such as videos, study texts and literature on the topics of Design Thinking and ESD via the online learning platform of the University. During this asynchronous self-learning phase, the students dealt with in-depth impulse questions and used the online learning platform as an exchange forum. Subsequently, the acquired learning content was discussed and critically reflected upon during synchronous classroom sessions. An essential aspect was the gathering of practical experience in the application of Design Thinking in the context of ESD. For this purpose, the students formed four multidisciplinary teams (each consisting of approx. 10 participants), each of whom worked on a design challenge, both synchronously in classroom sessions and asynchronously (e.g., in the interview phases) throughout the semester. Due to the importance of the Design Thinking mindset, several aspects of it could be experienced by the students, e.g., by Impro Theater exercises. Special attention was paid to adopting a positive attitude towards mistakes in the sense of failing forward to include them as a necessary part of explorative learning.

During the Design Thinking process, two teams were accompanied by a lecturer who took on the role of the Design Thinking coach. The Design Challenges were developed in cooperation with the Office for University Didactics and the Office for Sustainability and Mobility at the Ludwigsburg University of Education, Germany. The Design Challenges were as follows:

How could we make learning even more attractive for students in the future, considering the quality criteria of ESD?

How could we motivate students to support sustainability issues at our university?

Based on the six-step Design Thinking process presented in this paper, the students first explored the problem space. For this purpose, interviews were conducted with the target group, and the results were evaluated using an empathy map. Then, with the help of creative techniques, solution ideas were developed, and the first prototypes were created. The

reflection at the end of the semester showed that the students had dealt intensively with the learning content. Through the methodology of Design Thinking, a creative approach to the Design Challenges in the field of ESD was supported, and innovative prototypes were created that can be tested in practice in the next step.

3.2 Development of a new profile for a master's degree programme

Since 2003, the Ludwigsburg University of Education in Germany has offered a master's degree programme in Educational Leadership that prepares educational leaders for their complex tasks against the background mentioned above (Iberer & Müller, 2012). The participants from all fields of education learn with and from each other. Against the backdrop of massive changes in the educational landscape, Design Thinking was used to develop a blueprint for the future curriculum and to find concrete levers. There was a particular focus on the composition of the study content, the design of the methodology and didactics, and an even more effective approach to the target group. The design challenge was: "How can the curriculum (objectives, content, methodology) of the master's degree programme in Educational Management be even more closely aligned with the needs of the participants?" The interdisciplinary teams consisted of members of the institute, current students, alumni and cooperation partners. During a one-day workshop, various prototypes (e.g., as video) were designed and concrete impulses for further development in terms of content, methodology and processes were collected.

4. Conclusion and critical reflection

Design Thinking might be a powerful methodology to develop extraordinary solutions if the required resources are matched, e.g., time slots for coaching and for iteration phases. It is also necessary to explore the problem space, e.g., by conducting interviews with the target group as well as testing the prototypes with the user in the solution space.

To fully unlock the potential of the methodology, an additional crucial resource is the person's mindset. Therefore, the development and support of a Design Thinking mindset needs to be addressed because not all persons may feel comfortable creating solutions in the described way. Nevertheless, according to our experiences, the structured design process is helpful for most team members.

The Design Thinking concept itself is not new and it describes the typical design process. But as soon as all described resources are met, Design Thinking can be used to tackle wicked problems and complex challenges. However, the strength of this methodology is its user-centeredness which supports creating innovations that are tailored to the target group's needs.

According to our expertise, the initiation and implementation of innovative ideas can be supported by Design Thinking in Education (Schmidberger & Wippermann, 2022;

Schmidberger & Wippermann, 2018). In this article, two examples show how solutions to complex problems in higher education can be developed with Design Thinking. Furthermore, Design Thinking is applied in various international contexts in Education and is among the 17 Future Skills. However, there is a lack of evidence regarding the impacts of Design Thinking on Education on the one hand and of systematic approaches to evaluate it at a large scale across sectors on the other hand. Therefore, further research on Design Thinking could focus on these aspects.

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