Chapter #22

DESIGN THINKING APPLIED IN HIGHER EDUCATION
D-Think, a European Project for Innovating Educational Systems

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ABSTRACT

As a response to continual social and technological transformations, many academic, governmental and private organisations call attention to the need for urgent changes to educational systems. Because of its collaborative and creative approach, its cross-disciplinary and human-centeredness, Design Thinking is seen as a useful mindset and method to face the challenge of a new learning paradigm. Between 2014 and 2017, seven institutional partners from six different European countries developed the Research Project *D-Think*, supported by the Erasmus+ Programme of the European Commission. The goal of the *D-Think* project is the promotion of the application of Design Thinking as an innovation method to rethink not only learning/teaching methods but also pedagogical approaches, learning spaces or the role of educators. In this wider context an open access training course for Higher Education Institutions (HEI) educators and Vocational Education Training (VET) professionals was developed, through which they can learn how to apply Design Thinking tools and how to get into the designer's mindset.

Keywords: design thinking, research, higher education, innovation, toolkit.

1. INTRODUCTION

The world is facing unprecedented social, economic, political and environmental challenges, driven by accelerating globalisation and a faster rate of technological developments. Based on this continuous transformation, many academic, governmental and private organisations are emphasising the urgency of changing the educational system. Students have to be prepared for jobs that have not yet been created, for technologies, that have not yet been invented, and to solve social problems that have not yet been anticipated. In this context, *The Future of Education and Skills 2030* project (OECD, 2018) points out that students "will need a broad range of skills: cognitive and meta-cognitive skills (e.g. critical thinking, creative thinking, learning to learn and self-regulation); social and emotional skills (e.g. empathy, self-efficacy and collaboration); and practical and physical skills (e.g. using new information and communication technology devices)" (p.5). Already in 2009, under the EU *Forum University Business Dialogue* (COM, 2009), there was a consensus on the need for comprehensive change to curricula and learning methods and for the inclusion of transversal and transferable skills, so that students can be prepared to be the agents of change. HEI (Higher Education Institution) and VET (Vocational Education Training) institutions need to maintain their efforts to reposition themselves in the emerging learning landscape. They must experiment with new formats and strategies for learning and teaching to be able to offer relevant, effective and high-quality learning experiences in the future (Redecker et al., 2011). Because of its collaborative and creative approach, its cross-disciplinary and human-centeredness, Design Thinking is seen as a useful mindset and method to face the challenge of a new learning paradigm. In this international context, the

European project *D-Think – Design Thinking Applied to Education and Training* emerged, having the goal of promoting the application of Design Thinking as an innovative method for rethinking pedagogical approaches, learning spaces, learning/teaching methods and/or the role of educators.

1.1. The design thinking concept

Design has always been a catalyst for change and for innovation. In the last decade, it has rid itself of its function merely in product creation, to widen its activities into the innovation process in general, whether in service, social or educational innovation (see Brown, 2009; Martin, 2009; Noweski et al., 2012; Tschimmel, 2012;). It is now accepted that any kind of business or organisation can benefit from the methods used by designers. In earlier work (Tschimmel, 2012), we affirmed, and still maintain, that Design Thinking (DT) relies on the designer's capacity to consider at the same time: 1. Human needs and new visions of living well; 2. Available material and technical resources; and, 3. The constraints and opportunities of a project. DT is based on the ability to combine empathy for the context of a problem, creativity in generating ideas and solutions, and rationality in matching solutions to the context. Design Thinking is a holistic and user-centred method, based on design cognition and design learning, that enables teams to enact positive change in the world. Today, it is understood as a way of thinking in multi- and interdisciplinary teams, driving transformation and innovation by looking for new perspectives and solutions. Design Thinking not only offers a systemised way to innovate products, services and processes, but also helps to foster a culture of creativity. And the belief in our own creative thinking capacity lies at the heart of innovation and of education and learning.

1.2. Design thinking applied in higher education

The need for educational reform has led to much research, which has documented the value of experiential learning, creative problem solving and design thinking, and increased relevance and motivation in learning. Projects such as *Design Thinking for Educators* (Riverdale & Ideo, 2012) or *Thinking & Acting Like a Designer* (Diefenthaler, Moorhead, Speicher, Bear, & Cerminaro, 2017) with their case studies, mindset and toolkit, have already proved that Design Thinking is able to offer research, creativity and learning tools, capable of boosting collective intelligence, novel & adaptive thinking, transdisciplinarity, empathy with an audience, and many other skills employers and organisations seek today. Research studies on behalf of Education and Culture of the European Commission, such as "Future Learning Spaces" (Punie & Ala-Mutka, 2007), "The Future of Learning: New Ways to Learn New Skills for Future Jobs" (Redecker et al., 2011) or "The Future of Education and Skills 2030" (OECD, 2018) show that the Design Thinking methodology can be an important contribution in a new vision-building process for educational systems. The OECD (2018) Learning Framework 2030 presents a complex concept, when it calls for "the mobilisation of knowledge, skills, attitudes and values through a process of reflection, anticipation and action, in order to develop the inter-related competencies needed to engage with the world" (p.6). This challenge requires the construction of a knowledge base for redesigning curricula. A change of curricula is based on an analysis of the ecosystem of many stakeholders: "Students, teachers, school leaders, parents, national and local policy makers, academic experts, unions, and social and business partners have worked as one to develop this project" (OECD, 2018, p.7).

Working deployed within this challenge, Design Thinking can help with the exploration and organisation of diverse information; through visualisation, mapping and prototyping tools, and by helping to make sense of and tackle ill-defined problems. Thus, DT can be of great help in re-designing learning environments, structures, processes and contents. Planning and implementing different learning strategies to address diverse generational learning needs, is complex and needs time. Moreover, different generations of students have different learning styles. People learn more when the teaching method is consistent with their learning style. This changes the perspective of education: a diverse learning ecosystem in which learning adapts to each learner instead of learners trying to adapt to training environments is the new model for education. Design Thinking is an effective method for finding answers to this challenge, by recreating new learning proposals in a collaborative process. In addition, the designer's empathic mindset and collaborative working approach can enrich the reflection on the educators' new role as 'learning facilitators'.

2. THE BACKGROUND OF THE *D-THINK* PROJECT

The *D-Think - Design Thinking Applied to Education and Training* project was conceived to answer the above identified specific challenges that the EU and the world are facing nowadays. According to Redecker et al. (2011), many of the changes depicted have been foreseen for some time but they have come together now in such a way, that it has become urgent and pressing for policymakers to consider them. The *D-Think* project is a kind of proposition of a fundamental shift in the learning paradigm for the 21st century world. It is also a response to the European Commission's search for personalised, collaborative and informal learning, by offering a Toolkit, the application of which could lead to a holistic changes in HEI or VET institutions, by redesigning curricula, pedagogies, assessment, teacher training, etc. The project also aims to orient educators, through the use of Design Thinking, to find out what kind of knowledge, skills, attitudes and values are needed for today's students, as well as how educational systems can effectively develop them.

This is the background against which, between 2014 and 2017, seven institutional partners from six different European countries developed the Research Project *D-Think*, supported by the Erasmus+ Programme of the European Commission. The seven partners are the Portuguese Design College ESAD/CIFAD (project leader and the general coordinator), Advancis Business Services (Portugal), Vaasan Ammattikorkeakoulu VAMK (Finland), ISTUD Business School (Italy), Akademia Humanistyczno-Ekonomiczna Łodzi (Poland), Venture Hub (Spain) and the European Foundation for Management Development (Belgium). The target group for the project includes HEI professors and staff, VET providers, educators and staff, adult educators, professional trainers and key-stakeholders in DT and Education. The *D-Think* project was designed with the aim of promoting a wider use of Design Thinking as a transversal learning method, by developing and making available an innovative open access digital course. The main achievements of the project include the *Research Report D-Think* (Tschimmel, et al., 2015), the *D-Think Toolkit* (Tschimmel et al., 2017) and the m-learning Course on DT applied to Education and Training (available at http://www.d-think.eu/ & https://dthink.worldclass.io).

2.1. Objectives

The goal of the *D-Think* project is to promote the application of Design Thinking as an innovation method to rethink not only learning/teaching methods but also pedagogical approaches, learning spaces or the role of educators. Focusing on the redesign of education and on the change of educators' mindset, the objective of the project was not to teach

educators how to teach Design Thinking to their students, but to apply it themselves to improve the educational system. In this context, a training course was developed, through which HEI educators and VET trainers can learn how to apply Design Thinking tools and how to get into its mindset. The main achievements of the project include the above mentioned Research Report, the Toolkit and the m-learning Course.

2.2. Methodological approach

The method we applied in the research process for the development of the *D-Think* course material was Design Thinking itself. By applying the DT model *Evolution 6^2* (Mindshake, 2016), the research team went through different DT phases, applying several tools of Design Thinking, such as Trend Analysis, Collaborative Mind Maps, Field Observation, Interviews and Rapid Prototyping. The whole research process is described in the *Research Report D-Think* (Tschimmel et al., 2015, pp. 24-53).

Figure 1.
The Evolution 6^2 Model, normally in 6 colours, here in a black and white version
(Mindshake, 2016).
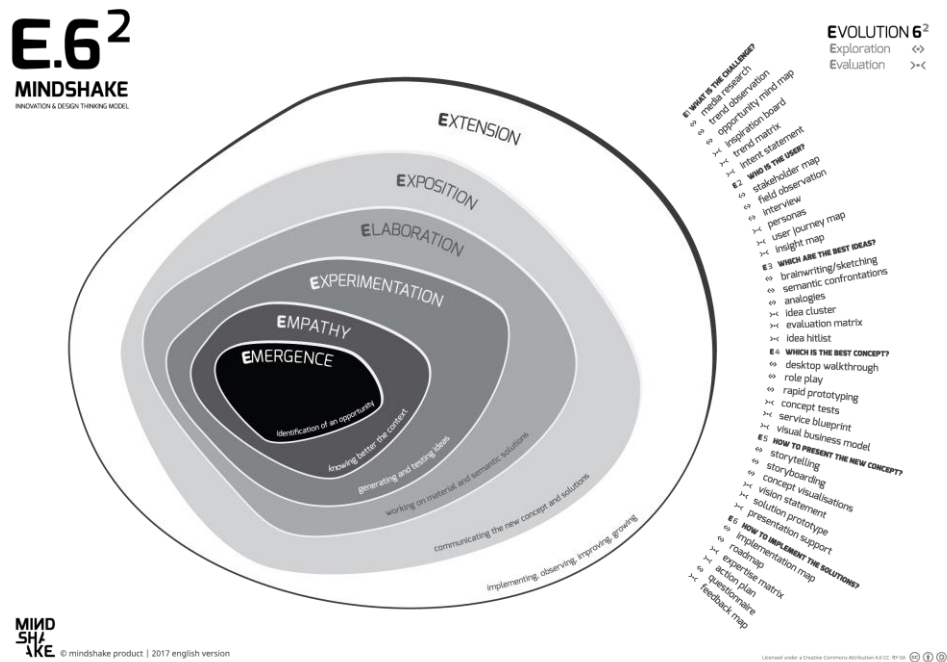
Mindshake's Design Thinking Model, *Evolution 6^2* (E.6^2) was developed between 2012-2015 by Katja Tschimmel, the research leader of the *D-Think* project, as the result of her research studies about the creative processes in design. The model has been applied in product and service development, workshops, coaching sessions, research projects, and methodology lessons. Since 2015 the E.6^2 model has been registered under *Creative Commons Attribution 4.0 International License* in the version 'by-sa'.

The model is called *Evolution 6²* because the creative process is an evolutionary and iterative process in which a lot of individuals and situations are interacting. 'E6' implies that in English the name of every stage of this six phased model starts with an 'E': Emergence, Empathy, Experimentation, Elaboration, Exposition and Extension. Since there are also moments of Exploration (divergence) and Evaluation (convergence) in every phase of the model, the model is called E.6². The E.6² model mainly distinguishes itself from other DT models, by the visual inclusion of the DT tools: 6 tools for every of the 6 E-phases, thus in total 36 tools (see http://mindshake.pt/design_thinking). During the research process, other well-known Design Thinking models have also been analysed, such as IDEO's 3 I model and HCD model (Brown & Wyatt, 2010), the Double Diamond model from the British Council (Design Council, 2018), the Design Thinking model of the d.school (Hasso-Plattner Institute/Stanford University, available at https://hpi.de/en/school-of-design-thinking/design-thinking/mindset.html) and finally the DT Toolkit for Educators designed by Ideo in collaboration with the Riverdale School (Riverdale & Ideo, 2012). The analysis and comparison of these models permitted the optimisation of the different tools introduced to the *D-Think* Toolkit and the m-Learning course, contained in the six E-phases of the E.6² model.

During the development of the *Research Report,* literature review and data analysis on new teaching methods and pedagogical activities were carried out, as well as on the application of DT in Education. This research allowed the definition of the theoretical framework of the study, and above all, the construction of the different scenarios to be presented in the Toolkit: "Setting the Pedagogical Framework", "Setting-up and Revising a Curriculum", "Developing Contents", "Setting the Assessment", "Designing the Learning Spaces" and "The Role of Facilitator". It emphasised the need to rethink all aspects of teaching performance, from the pedagogical project of the school to the classroom space and dynamic.

3. THE D-THINK TOOLKIT

The *D-Think Toolkit* (Tschimmel et al., 2017) is intended to be an active workbook to support the use of Design Thinking as a method of renewing educational approaches and methodologies, to update and learn how to redesign learning experiences, and to promote a mindset which encourages innovation.

The toolkit was conceived as a way of stimulating the application of the DT tools by educators and trainers in different and relevant educational contexts. As a result, the research group conceived three educational contexts with two scenarios in each context. In the first context, "Setting the Learning", one scenario is related to the Pedagogical Framework, and the other to Revision of Curricula. The first scenario, "Setting the Pedagogical Framework" should include the expectations and the core systemic principles of the institution. The outcome of the DT process could be, for example, a list of procedures and practices for the installation of new teaching habits, aligned with the institutional values, and with the support to students 'learning improvement'. In the "Setting-up and Revising a Curriculum" scenario, the DT process starts with the understanding of where and how a certain course fits within the educational system and its broader programmes. A possible outcome of the DT process might, for example, be a new description of the learning and teaching context, or an improved curriculum for an academic course.

The second context of the toolkit, "Conceiving the Learning", is dedicated to two scenarios: "Developing Contents" and "Setting the Assessment". Contents may be varied, including printed and digital materials, and live performances, such as classes, games or events. In the learning contents development, the focus should be on the construction of meaningful learning experiences that simultaneously engage and challenge students and their teachers. One of the main challenges in designing and creating learning experiences is to define what has to be accomplished, and to ensure not only a combination of the content and the instructional methods, but also the assessment. Assessments are a central element in education, which can affect decisions about results, assignments, improvements, instructional needs, curriculum, and, in some cases, even funding and certifications. But the way the assessment system works today is not inspiring students to improve their learning activities. Instead of being focused on quantitative evaluation, qualitative feedback would be better suited to the diversity of the learning ecosystem.

The last two scenarios of the toolkit are related to "Facilitating the Learning", by first "Designing new Learning Spaces", and second by rethinking "The Role of the Educator/Facilitator". When working to deliver innovative learning experiences, educators and organisations need to rethink the way learning spaces are organised. As a consequence of globalisation and new technologies, the requirements for a learning environment have changed considerably. In order to fit the 21st century learning framework, spaces should be sufficiently diverse to accommodate different learning styles. As for the role of the educator, he/she should be more a facilitator than a teacher in the traditional way. The last scenario and the proposed DT tools would help educators to define better the role and the tasks of the educator as a facilitator of learning experiences, providing the intellectual, physical and emotional growth of students.

Figure 2.
The different contexts and scenarios of the D-Think Toolkit (Tschimmel et al., 2017, p. 24).
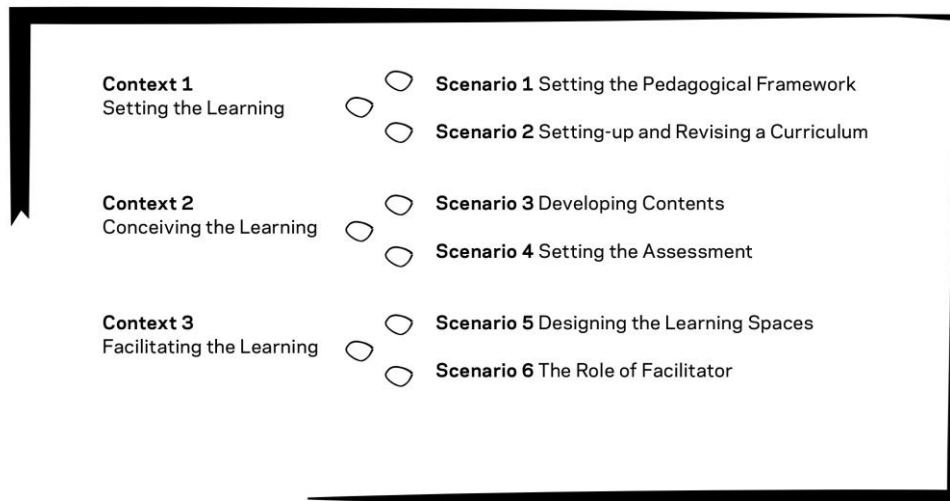
Each of these six scenarios follows the six E-phases, having used between eight and twelve DT tools for the whole process.

The *D-Think Toolkit* is part of the open access m-Learning course (available in six languages), an innovative digital course that was designed with the same structure, but uploaded with videos and exercises that guide and allow the testing of different contexts and scenarios. The contents are available not only online for mobile use, but also for computer screens and tablets, increasing the range of possibilities of use.

4. VALIDATION OF THE PROJECT

Throughout the project, diverse activities of validation of the different results were developed. During the elaboration of the *Research Report D-Think* (Tschimmel et al., 2015), several interviews with HEI educators and VET trainers were carried out, which showed that most of them are neither familiar with the emerging educational trends nor with Design Thinking, but that they feel the urgent need of a change in education and training. The final outcome - the Toolkit and the Platform - were validated in three ways: 1. a "Train the Trainer" Course, a training activity for seven facilitators, to prepare them for the m-learning pilot sessions and future training course exploitation, 2. a Pilot Course with 104 participants, and 3. a Multiplier Event, which took place in five countries, and at which the project was presented and discussed with the local Educational communities.

The assessment was a key part of the methodology of the face to face "Train the Trainer" Course, and it was structured as a three step process: STEP 1 - a quick questionnaire was administered before the beginning of the course, to get some general information about participants' profile, familiarity with Design Thinking, and individual's expectations and engagement; STEP 2 - a discussion within the group of participants to get qualitative feedback at the end of the course; STEP 3 - a customer satisfaction questionnaire, completed by participants some weeks after the end of the course. Through the evaluation procedures and analysis, it was possible to conclude that the overall satisfaction with the course was good, as confirmed by 85% of the participants; the same percentage of participants also considered that the knowledge acquired is applicable for their professional life. Some final suggestions for improving the "Train the Trainers" course were also offered, resulting in a report for future editions.

Additional training activities also took place during the project, namely the M-learning Pilot Course. The pilot training was conducted online in order to test the m-learning course and gather feedback for improving the *D-Think Toolkit*. In addition to this online pilot session, partners also organised local face-to-face sessions that allowed the participants to observe, perceive, and identify the dynamics that arose from the face-to-face experience. The pilot session was organised for 104 (online) participants and it engaged HEI professors, professional trainers, and other educators from all the countries of the partnership and other European countries.

Finally, the multiplier event *D-Think Journeys,* which took place in five of the partnership countries with 272 participants involved. The *Journeys* were intended to: present the project's main results for stakeholders and potential end users; allow the discussion of other initiatives related to DT applied to education and training; collect support to ensure the continuity of the project. The satisfaction of the participants with the events was assessed through a questionnaire which revealed that the majority of the participants were satisfied or very satisfied with the events. They found Design Thinking, the toolkit and the course very interesting and useful. The general impression was good and most of the participants believed that Design Thinking may be a powerful tool in planning new curriculum and teaching methods.

5. CONCLUSIONS

The main conclusion of the *D-Think* research project was the consensus that Design Thinking can be applied in education and training in the same way as it is used in the field of product innovation or management. We also recognised that Design Thinking is more than a method for innovation or a model focusing on structuring an educational innovation process. The project reveals that Design Thinking is also a creative and critical attitude with a future oriented mindset focused on collaboration, empathy, playfulness and continual learning; a mindset every HEI educator should have internalised.

The positive feedback from the three validation activities showed that around 80 % of the participants evaluated the course material as an effective support to try out and to learn the method of Design Thinking applied in an educational context. Participants feedback also confirmed that the *D-Think* project provides access to an innovative pedagogical methodology in line with EU priorities (learner centred learning; innovative pedagogical concepts), which can be used in formal, informal and non-formal educational contexts.

A final conclusion emerged during the Toolkit and m-Learning Course development is that the Design Thinking method presented in the *D-Think* Toolkit and m-Learning Course facilitates effective education by: fostering a mindset that drives transformation; offering model educational scenarios to follow; allowing the creation of one's own pathways and toolkit; permitting selection and creating solutions for building on experience and pathways; being custom-made, adaptable and flexible; and being for all educators interested in redesigning their educational perspectives, strategies and methods.

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