

## DESIGN THINKING TO ENHANCE INTERDISCIPLINARITY IN HIGHER EDUCATION

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### 1. INTRODUCTION

Design Thinking (DT), an approach to solving complex problems, can be applied to a wide range of areas and, in the case of this paper, can be used to improve the processes of both teaching and learning (Gallagher and Thordarson, 2018; Kelly, 2016; Spencer and Juliani, 2016), especially given the motivational characteristics that appeal to students as well as teachers. The six iterative steps involved in DT emphasize a user-based approach to complex (or even wicked) problems: understand (learn about the problem), empathize (find a deep understanding of the context), define (analyze data and identify users' needs), ideate (diverge on an unlimited number of ideas), prototype (develop some of the ideas generated), and test (evaluate artefacts that have been developed). Within the framework of the Erasmus+ Project Design Thinking Approach for an Interdisciplinary University, we are exploring the use of DT and other tools for teaching in higher education to promote creative, critical, and divergent thinking – all of which are crucial skills for the job market. Analysis of the project name posits the attraction of the area of design, borrowing notions to apply specifically to teaching, and attributes a fundamental motivation to thinking itself as an activity and a source of motivation. When these facets are then applied to education, a number of questions arise, beginning with the notion that design thinking is not an exclusive or better approach to thinking than others but rather a place to start. The initial answers to these questions involve a better understanding of the need to create empathy, to value the exploration of other ideas, and to respect and promote a culture of error. Data collected from researchers and academics in international and national teacher training courses sustains this confrontation of realities and strengthens an understanding of the possibilities offered by interdisciplinary teaching.

### 2. METHODOLOGY

Given that thinking is an activity and a source of motivation for learning that can be taught even in higher education (Nielsen and Thurber, 2016; Rustler, 2018), this paper follows up on the first international training initiative in April 2018, where 32 academics and researchers in HE met at the Technische Universitaet Dresden. The week-long workshop was an intensive 35+ hours dedicated to learning about and implementing design thinking tools in an interdisciplinary setting, interacting with local students and staff as well.

The pilot version for a workshop adapted to the Portuguese reality took place three months later in June 2018, at the Polytechnic of Guarda (IPG). Authorization was granted by the Board of the School of Technology and Management (ESTG) and the Deputy Director was the first to volunteer. A total of 14 participants volunteered from the School of Health (n=2), School of Education, Communication, and Sport (n=1), and the School of Technology and Management (n=8) – representing the teaching staff at three of the four IPG Schools. The additional participants kindly accepted the invitation to participate in this innovative project; these first-year students (n=3) from

the ESTG Professional Specialization for Technicians course (CTeSP) in Software Development had demonstrated valuable development in their intercultural communicative (ICC) competences throughout the two semesters with one of the authors (their Applied English teacher). Their instructions were to challenge the traditional hierarchy that tends to separate teachers and students in Portuguese higher education.

The participants were divided into three interdisciplinary groups of one student and three to four professors. The results of the pilot version are reported in this paper and have provided the basis for the national workshop for Portugal which is scheduled for 11-12 October 2018.

The vision, preparation, and production of the DT.Uni project publications include the creation of data collection instruments and collaboratively designed templates that are piloted as a strategy involving HE students and professors from a diverse range of study areas, from Chemistry and Engineering to Sociology and Applied Linguistics. Their responses to 28 questions in a post-test have informed the discussion of the findings.

### 3. FINDINGS AND DISCUSSION

One of the primary concerns was building new active learning spaces for teachers and students. The student volunteers, for example, accepted the challenge as an opportunity not only to learn something new (DT) but also to build experiences with the teaching staff. We find that the creation of active learning spaces must include the consistent promotion of a respectable culture of error along with a clear notion of the centrality of empathy in understanding others and, subsequently, explore ideas so that problems can be solved in the best way possible.

Nevertheless, post-tests show that among the concepts that proved most difficult to acquire are *error culture, hierarchies, and less thinking more doing*.

Overall the three highest and lowest scores attributed on a scale of 1 to 5 (maximum) revealed a lack of discomfort with *learning by doing* despite a sense of difficulty with making *an informed judgement from an analysis* (both < 2.5) but a high level (> 4.5) of enjoyment associated with *exchanging and incorporating ideas and concepts from other team members* as well as satisfaction with having increased their *specific lexicon (terminology) in design thinking* and practiced *formulating questions in English*. The average response, with a median of 4, ranged from 3.3 to 4.4, indicating a level of 66 to 88 percent appreciation.

Despite having rated this interdisciplinarity experience highly, the responses indicate a tendency toward a clustering of teacher responses from the areas of mathematics + computer and health (M+Eng&Sci) and those from language and culture (L&C) associated with another teacher from health (Sci). We also have identified the questions whose responses may be at the root of this distinction so that, considered qualitatively, anticipation of thoughts and feelings, discomfort with learning by doing, appreciation of other perspectives may contrast with reaching a position based on analysis, the use of haptic materials and the terminology of a specific discipline, and the acceptance of reworking procedure in searching for a solution. A better understanding of the perceptions of teachers in the different study areas could contribute to further analysis. Further implementations of the workshops will provide further data so that the reduced number of participants will no longer be a limitation to the study.

These post-tests also revealed qualitative data, focused on the identification of appealing characteristic of interdisciplinary work and design thinking tools. Responses highlighted, among other aspects, the systematization of creativity and the promotion of the idea that anyone can learn to be creative; the reinforce of OPEN SPACES and collaboration with other study areas; the practicing of English communicative competences (speaking + listening + reading + writing + terminology) as well as asking questions and not complicating their communication but, rather than worrying about the form of their own English, with a focus on empathy for analyzing the user problem; the description of these problems in detail and from many perspectives, only considering solutions after clustering and organizing ideas and dealing alternately with divergent and

convergent thinking. The impact on students and faculty has potential since all participating teachers claim to have learned and implemented new tools and have presented further ideas for implementation and assessment in their own classrooms. The coming academic year will be ripe for further study of the options these teachers take in designing the learning experiences in the learning space they can influence.

Throughout the life of the DT.Uni project, we will also be looking for some responses to the following questions:

1. What are the current manifestations of interdisciplinarity in Portuguese education?
2. How can we improve interdisciplinary teaching in ways that contribute to active learning?
3. Can thinking itself be reconsidered as an activity to integrate different areas of learning?
4. Can thinking activities help learners better adapt in higher education?
5. What distinguishes design thinking as an approach to active learning?
6. What is the role of empathy in different types of thinking activities that can be applied in higher education?

For now, in the initial stages, we believe that we can partially respond to some of the questions and data collected from researchers and academics in international and national teacher training courses sustains this confrontation of realities and strengthens an understanding of the possibilities offered by interdisciplinary teaching.

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