A Teaching and Learning Blueprint for Increasing Engagement in Challenge-Based Learning

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Abstract. Challenge-Based Learning is an active learning approach that involves students in identifying and addressing real-world problems. It follows a three-phase framework that includes the Engage, Investigate and Act stages. However, despite its name, and due to its naturally initial fuzziness, during the Engage phase engagement is low compared to the other two phases, namely when the challenge is perceived to be far beyond the students' competences. This is why it is important that students become more comfortable with the challenge and develop a sense of ownership over it. This paper aims at presenting a teaching and learning blueprint for increasing engagement in CBL's phase Engage, by guiding students on the identification of a purpose, helping them anticipate the impact of their potential solutions on the community and the world, which can motivate them to engage more deeply with the challenge. It also suggests that progress can be assessed during this phase through rubrics aligned with its three defining moments. Finally, it discusses the teaching and learning context in which the proposed blueprint will be implemented: a Portuguese masters course on Web Communication and Technologies, where the Big Idea is defined in collaboration with external entities, and where design thinking is the main method.

Keywords: Challenge-Based Learning · Student Engagement · Design Thinking · Double Diamond · Anticipation of Impact · Purpose

1 Introduction

Challenge-based learning (CBL) is an experiential inquiry-based framework to teaching and learning (T&L) that encourages groups of students to solve real-world problems by identifying, analysing, and designing a solution to a local or global challenge, while acquiring content knowledge in various subjects (Rådberg *et al.*, 2020; Nichols *et al.*, 2016). Students are supposed to work with multiple stakeholders, asking relevant questions, developing deeper subject and context-related knowledge, accepting, and solving challenges, and finally sharing their experience. It was initially proposed by Apple Inc. in 2008 as a T&L strategy for the American high school system to meet the needs of the 21st century workplace, but it has since moved into the higher education sector across the world (Leijon *et al.*, 2022; Chanin *et al.*, 2018; Johnson *et al.*, 2009).

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According to Nichols *et al.* (2016), in a CBL approach students work through a three-phase framework that involves 1) identifying a compelling challenge within a certain community and from a given Big Idea (Engage stage), 2) developing a plan to address the challenge (Investigate stage), and 3) implementing the plan to make a difference in the community (Act stage). The authors argue that successful CBL is grounded on providing students with structure, support, checkpoints, and the right tools, while allowing space for self-directed, creative, and inspired learning. In fact, CBL can be highly motivating for students who, whilst engaged, are more likely to think deeply about the content, and to construct an understanding that entails integration and application of the key ideas. However, engagement may initially drop if the activity brief is unclear, or if the challenge is perceived to be far beyond the students' competences. This is why it is important that students become more comfortable with the challenge, so the learning process, the probable outcomes, and the impact that a possible solution may entail can serve as polestars.

One way of promoting engagement and motivation is through foreseeing the impact of a project, since it can help students develop a sense of purpose and meaning (Rådberg *et al.*, 2020). However, the literature on CBL tends to suggest this is ought to be done by planning, setting goals and doing research (Johnson *et al.*, 2009), which typically takes place during the Investigate phase, or through reflection tools (Khambari, 2019; Shuptrine, 2013), which tend to be implemented throughout or even after the Act stage. The literature on how CBL engages students by making them anticipate the impact of a project (since the Engage phase) is very scarce, not to say inexistent. It is important that students are given the structure and guidance so they can quickly empathise with the Big Idea, define a problem associated to it, and identify a purpose that will sustain the creation of a stronger bond toward the activity.

2 Engagement in CBL

Several authors state that engagement refers to the level of involvement and enthusiasm that students have towards learning tasks and learning success (Richards, 2023; Leijon *et al.*, 2022; Saroyan, 2022; Shuptrine, 2013; Johnson *et al.*, 2009). When students are engaged in their learning by pursuing activities that are personally relevant (Shuptrine, 2013), they are more likely to be motivated, focused, and committed to their education which, in turn, leads to increased effort and better academic outcomes (i.e., higher marks, increased retention, and improved performance) (Nichols *et al.*, 2016; Apple, 2008). For Johnson *et al.* (2009) the learning process will be more actively engaging when students ask questions, draw connections, and use what they have learned in novel contexts. Sartania *et al.* (2022) observed that engaged learners display positive emotions, cognitive effort, and attitudes of enthusiasm, confidence, participation, and active involvement. When individuals are engaged in an activity, they are more likely to feel a sense of confidence in their ability to make decisions related to that activity. The way decision-making happens becomes also more rapid and systematic (Nichols *et al.*, 2016), which is particularly important in situations where individuals are faced with uncertainty or ambiguity. Moreover, according to Escobar-Tello (2016), engagement is closely related to happiness: when individuals are engaged in activities that they find meaningful, rewarding, and

enjoyable they are more likely to experience positive emotions such as joy, excitement, and contentment which, in turn, lead to greater happiness.

In the context of higher education, CBL easily keeps students engaged with the learning process, since they deal with real-world issues. According to Johnson *et al.* (2009), this type of active learning can be particularly motivating for students, since it is designed to be interdisciplinary and project-based, allowing students to understand the context, see the relevance of their education, and foresee the impact they can have on the world. For Rådberg *et al.* (2020), CBL allows students to anticipate the impact of their projects by engaging in a process of foresight, which involves exploring and anticipating the potential consequences of their actions. It also prepares students for the workforce by developing skills such as critical thinking, problem-solving, collaboration, and communication (Shuptrine, 2013; Johnson *et al.*, 2009). Hence, engagement is a key goal of CBL, due to its significant effect on a student's wellbeing and achievement of predefined learning outcomes, but also on the potentially increased success toward finding a plausible and impactful solution.

2.1 CBL's Engage Phase

This is particularly true within the Engage phase, the first in the Challenge-Based Learning framework. Students move from an abstract Big Idea (which is a call to action) to a concrete, actionable and relatable Challenge, using the Essential Questioning process (Nichols *et al.*, 2016). This phase's goal is to personally connect students to the subject matter through the identification, commitment, and ownership of a challenge, helping them in developing a clear understanding of the problem they will be trying to solve.

According to Apple's guide (2008) and Nichols *et al.* (2016), the Engage phase consists of three steps: 1) the definition of a Big Idea, which is a central topic that is important on a global scale; 2) the formulation of Essential Question(s), which can be more than one and which are expected to reveal that students can identify what needs to be known about the Big Idea; and 3) the identification of one challenge that the students can relate to and foresee the meaningfulness of resolving the problems associated with it. Each of these steps can be assessed through the following rubrics, respectively: 1) develop a deeper understanding of the matter and a sense of what is globally important, 2) use existing knowledge and own's opinion in a new context to identify areas of interest in critical and creative ways, and 3) make decisions based on personal aspirations and perception of impact.

3 The Teaching and Learning Context Under Scrutiny

For the last two years, and since the validation of MA in Web Communications & Technologies at the University of Aveiro, Portugal, the taught and first year of studies runs under CBL. The Big Idea is defined in collaboration with external entities that have been playing the role of *partners*. The Engage phase is aligned with the first weeks of semester 1 modules, being "Communication Design for the Web" (CDW) one of them. Despite the generic CBL approach implemented across the MA course, each module is expected to define its own specific T&L methodology and assessment strategy.

When preparing students for the UI/UX industry, conducting them through opportunity recognition (Grau and Rockett, 2022) and the design of positive user experiences is pivotal. This is why Design Thinking (DT), a process model that is widely used within the UX/UI sector, has been the structuring T&L method of CDW. Although there are about 15 DT different models (Kueh and Thom, 2018), two of them are most popular in this area of specialism: the Stanford d.school's, which promotes the iterative stages *Empathise, Define, Ideate, Prototype*, and *Test* (d.school, n.d.), and the Design Council's Double Diamond framework, which explains the process of working in design, after steps *Discover* and *Define*—dedicated to the Problem—and steps *Develop* and *Deliver*—dedicated to the Solution (Design Council, 2019). Roughly, Empathise coincides with *Discover*, Define corresponds to *Define,* Ideate and Prototype align with *Develop*, and Test aligns with *Deliver* (Fig. 1).

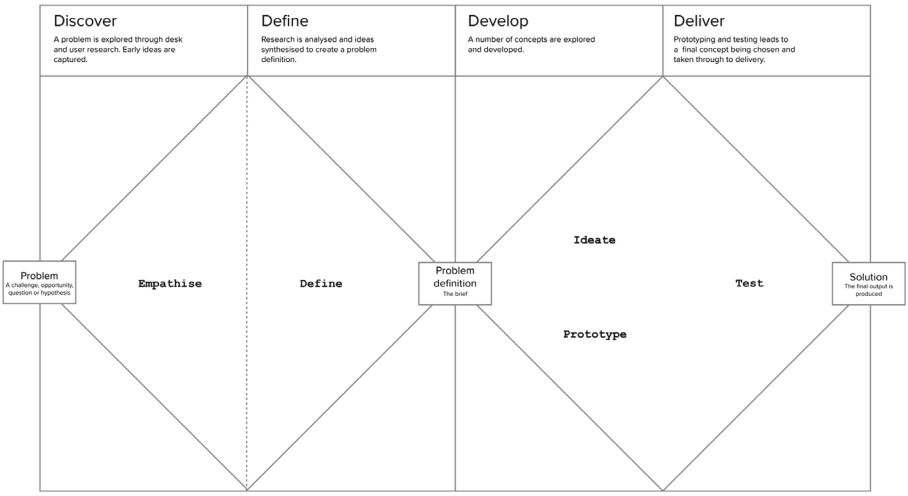

Fig. 1. The Double Diamond aligned with Stanford d.school's DT five stages (adapted from The Design Council, 2023)

3.1 Acknowledging the Issue of Giving Engage the *Cold Shoulder*

CDW's first taught sessions are dedicated to the initial thinking around the project students are expected to commit to. Yet, many students overlook the importance of questioning the problem and the existing predefined conceptualisations. The observed tendency is to rapidly move on into prototyping possible solutions, most of them weakly underpinned by sustained or validated information (Loranger, 2014). This is because students' engagement tends to increase when they face practical activities that move them away from the abstract content that is common at the beginning of a project (Samah *et al.*, 2022; Rodriguez-Calero *et al.*, 2020). In fact, they seem to concentrate most of their attention on the WHAT of their chosen challenge, little on the HOW and nothing on the WHY, precisely the opposite of what Simon Sinek (2009) proposes: that any

project should start with the identification of its WHY, for inspiration and purpose. Only then one can decide HOW to do it, and from there, arrive at the WHAT. This is why we realised the CBL approach that has been implemented within our T&L practice for the past two years had been skewed: 1) students were hardly having any contact with the first CBL phase (Engage) which does not seem to align to any of the DT stages, and 2) they were skipping the initial DT stages in the hurry of starting their mid-fidelity prototypes. It has been observed that the thought process around answering WHY—e.g. *Why is this Big Idea important to me?, Why is it urgent to solve its attached problems?* and *Why do I want to be part of the solution?*—was completely insipient (Fig. 2). Before beginning a project, students should identify the challenge they will be addressing, and develop a clear understanding of the problem they will try to solve. Investigate (aligned to HOW) is a phase that involves ethnographic and exploratory work to both understand the people involved/affected. Many of our students tend to shorten it so they can move on to Act (aligned to WHAT) as they get to see the concreteness of their possible solutions.

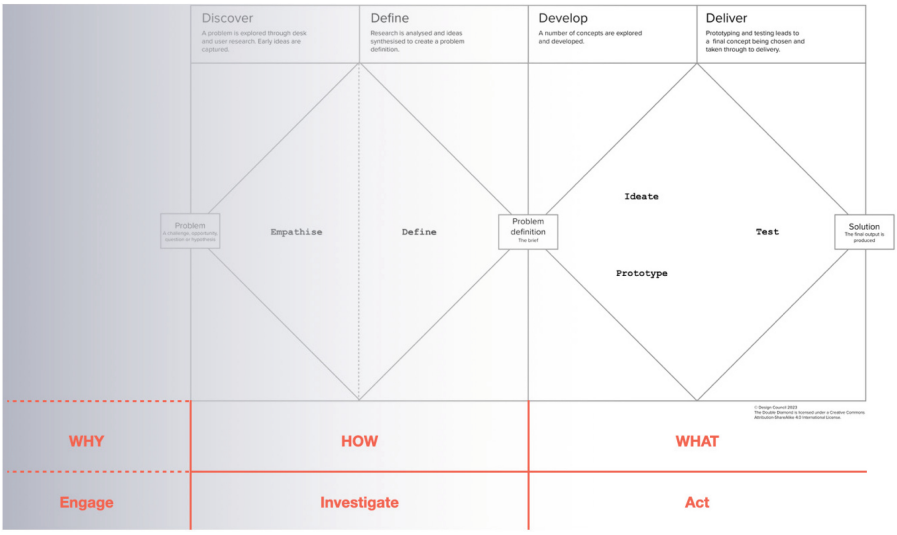

Fig. 2. The misalignment between DT and CBL frameworks

4 A Proposal for Increasing Engagement Since the Engage Phase

It was clear to the teaching team that guidance would be needed to support students in considering existing assumptions and acknowledging conscious and unconscious biases that may hinder (or otherwise) the way they foresee the future. By departing from a position in which students will be designing not just for the others (altruism) but for them as well (egoism), the aim is to explore and develop an increased sense of purpose, so to answer the question that is ideally expected to be resolved by the end of the Engage phase: *How can students identify a challenge that is both humanitarianly impactful and*

personally relevant? The idea is, on one hand, to make sure the Engage phase is fully experienced, namely by making students identify their WHYs in regard to the Big Idea; on the other hand, DT should remain as the main operative system, for which reason the void during the Engage phase would follow the framework proposed by Lelis (2022:54) which extends the Double Diamond by suggesting that most design processes (those leading to innovation) go through a stage called Determine, since individuals find their place in the world by 1) questioning the *status quo*, and 2) foreseeing the impact they can make, thus *determining* the one challenge with increased *determination* (Fig. 3).

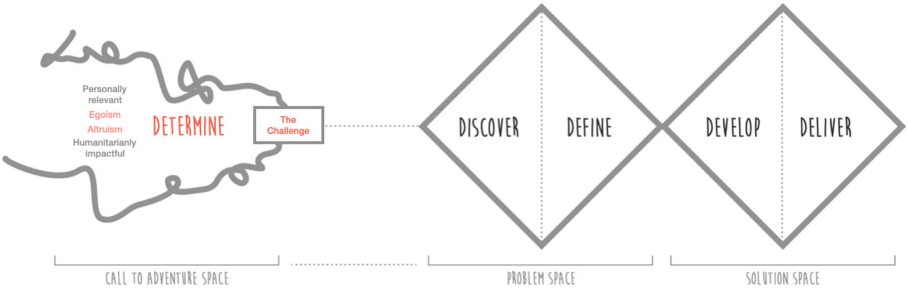

Fig. 3. The Determine stage (adapted from Lelis, 2022).

Hence, a T&L blueprint has been devised so to guarantee engagement since very early stages and to ensure the Engage phase is no longer ignored (Table 1). The Impact Plan (Lelis, 2022; 2021) will be used throughout the Engage phase to aid on the identification of an actionable, meaningful and engaging challenge, by guiding students on the respective teaching and learning activities.

The Impact Plan includes a toolkit that is meant to help individuals anticipate the impact of any projects or activities they may need to commit to. It starts by guiding them on the definition of their purpose, moving on to a few speculative exercises, followed by the actual anticipation of possible impact of whatever projects/activities, grounded on a deck of cards containing stimuli and prompts that reinforce the questioning and tentative answering regarding different contexts of impact: 1) Continuous Learning and 2) Career (both self-centred), 3) and the three pillars of sustainability (Economic, Environment and Social, which are planet and humanity-led).

The expected engagement-related results are an increased sense of self-awareness and self-positioning (building up students' personal identity) towards the current and pressing matters and the global needs that are proposed as Big Ideas. Additionally, it is expected the development of a certain level of commitment with the Big Idea (and its nuances) through personal/mutual meaningful connections. Through inquiry-based exercises, students will be able to foresee how whatever arises from the Big Idea will impact their wellbeing, the achievement of the established learning outcomes, and the competences they need to develop to pursue their ambitioned careers. Finally, students are expected to be excited authorities in the decision-making toward the selection of a compelling challenge.

Table 1. A T&L blueprint for the Engage phase.

	1	2	3
Components	**The Big Idea**: A central concept or theme that is important on a global scale. An abstract call to action	**Essential Question(s):** Open-ended, thought-provoking question(s) that identify(ies) what is important to know about the big idea	**The Challenge**: Actionable, relatable, and relevant to students' lives and communities; should be something that they are passionate about
Learning Rubrics	Develop a deeper understanding of the matter and a sense of what is globally important	Use existing knowledge and own's opinion in a new context to identify areas of interest in critical and creative ways	Decision-making based on personal aspirations and perception of impact
Example	Energy	How aware are members of my community of their energy consumption? How is energy being sourced to in my community? …	Increase awareness toward energy sustainability in my local community
T&L Activities	Definition of Purpose	Forecasting / Backcasting	Sorting the Anticipated Impact
Tools	..... The Impact Plan		
***Engage* Expected Results**	Self-awareness and self-positioning towards pressing concerns and needs	Commitment with The Big Idea through personal and mutual meaningful connections	Ownership and excitement through the selection of a compelling challenge

The proposed T&L blueprint, which will be first implemented and assessed in the context of CDW at the University of Aveiro, is a way of ensuring the Engage phase can be thoroughly used to maximise the motivational benefits from the beginning, so that students are cognitively and emotionally engaged with the selected challenge. It maintains and augments all the advantages of CBL in its entirety and DT's leverage and convenience in T&L practice. As opposed to common practice—where students reflect on the impact of their actions by reviewing them—in this proposal they do so during the Engage phase, by previewing answers to prompts/stimuli that are guided by the underpinning questions "Why is this important to me and to the world?" and "Who is the challenge going to impact?". They complete these anticipation exercises juggling between individual reflection and collaboration with their team members. Hence, toward

the end of the Engage phase, students will have prepared a clear challenge brief which can have a significant impact on engagement (Rådberg, 2020), as it provides them with a sound understanding of what they are expected to accomplish and why it is important, creating a sense of purpose and direction, which can be a powerful motivator for students to embark in the subsequent research-led (Investigate) and hands-on (Act) phases.

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