# From the Lack of Engagement to Motivation: Gamification Strategies to Enhance Users Learning Experiences

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*Abstract*—One of the main challenges we face in the educational domain nowadays is the lack of student engagement in traditional teaching methods. One way to address this challenge is through the use of gamification strategies, especially in educational systems. In this paper we address some difficulties and possible solutions to this challenge, discussing high-impact national studies in the area which obtained international recognition, whose strategies together comprise frameworks and guidelines that assist in the development, implementation and evaluation of gamified strategies both from the point of view of the developers, the teachers and the students themselves.

*Index Terms*—gamification, gamified educational systems, computers and education, students' experience

## I. Introduction

Gamification, defined as "the use of game elements in non-game contexts" [1], is an approach being widely used to engage and motivate users, to perfect or to create a desired behaviour in the learning process, and to improve users' experience in digital systems [2]. In the educational domain, one of the biggest problems educators face nowadays is the students' lack of engagement [3]. This occurs due to the rapid advances in Information Technologies (IT) services that are not assembled or tied to the traditional teaching approaches [4]. Consequently, traditional models are not effective enough to maintain the interest and attention of these students [5]. This situation became even more prominent since the beginning of the COVID-19 pandemic in early 2020, where the traditional educational system had to be quickly migrated to the remote system, bringing a series of new challenges for both teachers, students, and school administrations [6]. In the specific case of Brazil, the problems were emphasized due to the pandemic,

since part of the population lack access to internet or technological resources and the teachers also have no training in the use of digital technologies.

Gamification is an approach used mainly through digital environments, however, it is also possible to apply it in non-technological environments, through the use of unplugged strategies [7]. The application of gamification in education have overall positive results [8], [9]; however some studies show uncertain and negative findings (*e.g.*, demotivation and disengagement) [10], with gamification designs often blamed for these undesired outcomes [11], [12]. Henceforth, the main challenge we pose in this paper is how to increase students' engagement in the learning process through the use of cutting-edge research on gamification design.

Based on recent reviews in the field of gamification in education [13], [14], we summarized some topics that must be addressed in order to implement the best gamified strategies to enhance students' motivation and engagement:

(i) Provide tools to support teachers to design and implement gamification properly (within virtual or unplugged environments);

(ii) Identify and measure the motivation in real time (*i.e.* through the identification of flow states [15], without intrusive methods (*e.g.*, as surveys which can affect the students' experience);

(iii) Understand, design and implement ways to keep the student immerse within the content with the help of the game elements, where their user experience is of utmost importance.

To address these challenges, we propose a connection of multiple research directions that scholars have been exploring recently, which we summarize as follows:

*i)* Automatically identifying psychological states related to engagement in real time, as well as features that lead to those [16]; with that, *ii)* create personalized contents, through automatic generation, that drive learners towards motivation and engagement [17], [18]; with the goal of *iii)* delivering a clear and effective framework that can be used by any educator, even by those without knowledge in gamification, to create instructional designs [19]; *iv)* featuring gamified contents to be experienced in a subtle way, guiding the students to an enhanced learning process by means of immersive experiences [20].

## II. RESEARCH CHALLENGES AND DIRECTION

There are numerous frameworks and guidelines for gamification design strategies [13]. Some of them, derived directly from the gaming domain, such as the Bartle model, which was created upon observations of behaviour characteristics of Multi-User Dungeon (RPG) players [21]; the MDA framework, which was created in games studies and have not been empirically tested or validated to gamification purposes [22]; the Hexad, which was specifically proposed for use in gamification research and which relates the concepts of Bartle's model with Self-Determination Theory (SDT) [23] and game experience design [24], [25]; and BrainHex, that was based on neurobiological discoveries that relate the behavioural characteristics of players to elements of the nervous system [26] and was recently superseded by the five player traits model [27] after re-analysis of the original data. However, none of these generic approaches encompass educational properties. In this sense, the field of education encompass the concepts of teaching and learning, both adopting different perspectives that involves different characteristics from educators and students. This alone makes gamifying education a challenge, since there are many variables that need to be considered that might affect the students' learning and educators' teaching practices. Recent research in the field of gamified education have presented mixed results on its application [28], [29], which motivated us even more to pursue the best gamified learning experience for students and the best practices to implement it by teachers and educators.

Based on this perspective, the study by Toda *et al.* [30], using data mining techniques, designed a taxonomy of game elements for specific use in gamified educational environments.The differential of this taxonomy lies in the fact that its development was made based on two layers of evidence: *(i)* by the validation of domain experts, considering both aspects of engagement and motivation, as well as learning; and *(ii)* by confirming the importance of these elements, from students perspective, in the design of gamified classroom strategies. Since then, this taxonomy has been used successfully in the development of some Gamified Educational Systems (GES) [31], and is being used in the construction of a framework whose objective is to allow educators, even without specific knowledge in gamification, to create gamified strategies in a simple and practical way for their classes. In this sense, this framework seeks to bring the design of gamified strategies to be more accessible.

Another research pillar is based on the fact that the learning process is fluid and depends on the performance and particularities of each student [32]. Recent systematic reviews show that the gamification design must be adaptable [14], [33] and based on evidence [34]. Gamification works with the concepts of gamer types, where it is possible to personalize the gamified experience by identifying behavioural profiles (usually obtained through surveys). There are currently several classifications, from the previous mentioned Bartle Model [21], to the most recent Hexad [24], [25] and the five Player Traits models [27].

However, most tailoring approaches work with these models as absolute profiles (*i.e.*, if a person is identified with a greater score in the Socializer user type in the Hexad model, they will be presented to a personalized system based on this profile, throughout the whole gamified experience). Human nature, however, is fickle, and when it comes to learning processes, at a given moment a student may be more likely to compete and at another time to collaborate with their colleagues. To address this gap, Palomino *et. al.* [35] developed a new approach called Gamification Journey (GJ), specifically for educational contexts, based on Jung's 12 Archetypes, which is an approach used both in psychology and in several other areas, such as marketing and communication, being the basis for the creation of characters and stories for games, and thus being intrinsically linked to game design, providing several resources for use in gamified strategies.

In the GJ approach, the students begin their learning journey classified into one of these archetypes, that are defined based on an immersive experience at the first login into the gamified system. Through the users' experience on the system, the GES can identify the change in their behaviour and consequently into their initial archetypes, presenting the content in different ways as to adapt to the students pacing and preferences at that moment.

This approach takes into account the use of unconventional game elements, such as Narrative and Storytelling, seeking greater immersion within the learning context [31]. These elements, according to Palomino *et al.* [20] are concerned with both the content and immersive experiences in gamified systems and are defined as the sequence of events that guides the users towards a defined goal, which can be supported by storytelling. These come together with a purpose of meaning, and constant transformation, by establishing a dialogue with the user. In this sense, it is necessary to consider the user experience (UX)[1] and how it can influence the system's tailoring. Through the association of Jung's approach to classifying user types with UX concepts, it is possible to think of interactive systems that suit these desires and perceptions, working with the hedonic qualities of usability (novelty, stimulation, and attractiveness) [37].

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[1]That is, the study of practical, experiential, affective, meaningful and valuable aspects of Human-Computer Interaction (HCI) [36].

To seek evidence on the importance of these elements for the learning process, data mining techniques were used, which returned several association rules of great importance between the elements Narrative and Storytelling, and the other elements present in Toda's taxonomy [30]. Considering teaching as an act of communication from the teacher to the student [38], we can conclude why these two specific elements are so important to the education domain.

Still in this research area, it is noted a great focus on the user and little to the learning content [34]. To tackle this gap, Rodrigues *et al.* [18] proposed the personalization of GES based on learning activities types, suggesting specific game elements for each type of learning activities to improve the system's impact on users and, by considering activities' context, contributing to their learning process. The proposal's key point is that almost all personalization approaches demonstrate how to tailor gamified interventions to user characteristics. That is, they provide guidance on which game elements are more suitable for users with characteristics X or Y (e.g., Socializer from Hexad). However, the user is not the only factor impacting gamification's success; the context also does and demands more research [10]. Accordingly, Rodrigues *et al.* [18] expanded the literature with a proposal that, rather than only focusing on users, tailoring gamification to learning activities should be performed with the goal of bringing the context into the personalization process. Hence, complementing user-based approaches and addressing gaps in personalized gamification literature [34].

Finally, another challenge considering all the previous research mentioned, is on the evaluation field (*e.g.*, dealing with the detection of student's level of engagement), so that all tailoring can occur in the best way. Flow is considered to be a state of deep engagement that is closely related to the learning process [15]. However, one of the biggest challenges in this field is the automatic detection of this state, since currently, to identify a person's flow state, it is necessary to answer a survey. The implicit detection of this state can improve not only in the student's immersive experience, but also in the instructional design of educational systems. The research by Oliveira *et al.* [39] proposes a conceptual model that associates student interactions, detected through data logs in educational environments with each flow experience dimensions. Through this model, it is possible to progress towards automatic flow detection in the future.

All of the research presented to tackle the challenges mentioned on this paper can be summarized dealing with the following aspects of gamification applied to education *(i)* Design; *(ii)* Tailoring and *(iii)* Evaluation, and they are intrinsically related to the effectiveness of good gamification strategies to keep students engaged and ensure that they effectively learn.

Based on the studies exposed in this paper, future works can be outlined according to the following principles:

(i) to use data collected in digital educational environments to understand the variables involved in the student's learn-

ing process and how they can help improve gamification and the learning process itself;

(ii) to work based on empirical evidence, testing conceptual models and frameworks developed in real educational environments, organizing and analyzing data in order to refine and improve the initial models;

(iii) to consider gamification for educational domain as an experience for the student, being concerned with aspects of user experience (UX) and intrinsic satisfaction, both extremely important for improving learning and;

(iv) to bring the involved stakeholders for an active role within research, testing and validating hypotheses through its expertise and seeking methods to present these frameworks and guidelines in a way that they are understood by all, so that their applicability in practice are accessible to all levels of education.

As for the research follow-up, we intend to monitor the emergence of new approaches to gamification applied to education, as they can help in increasing engagement, through literature reviews; the application of new approaches in order to assess their impact through experiments and; the effect of these approaches on engagement in education, carrying out reviews and meta-analyzes to summarize the results.Additionally, we call researchers to centralize studies in this area in an open repository aiming to facilitate the assessment of progressions.

## III. Final Remarks

Brazil is a country with several problems in the area of education [40], that were further accentuated with the current global pandemic of the COVID-19. [6]. Regarding the transition from traditional teaching methods to the digital environment, there is still much to be researched and developed, and gamification in this context is very relevant, as it is one of the forms of engagement most accepted by the younger generations, born after the internet and digital games [41]. This paper presented high impact research in the area of gamification developed by Brazilian researchers, and which have obtained international recognition. All the pillars presented on this paper are related between themselves and together aim to tackle a wider scope related to motivation and engagement problems in education. Each pillar works as a gear, which together seek to provide a complete framework that can be socially useful as it is concerned with everyone involved in the process of gamified classes. As future studies, we intend to connect all these gears through an application ontology, which can be used in the creation of intelligent gamified systems. In addition, it is necessary to validate the different approaches through empirical experiments, so that the processes are refined and adjusted to a stage where, once validated, they can be applied in practice.The results of these studies will possibly bring in the next decade new specific frameworks, systems and guidelines that can effectively be used in classrooms and gamified digital environments.

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