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A Review of the Impact of Gamification on Students' Motivation and Retention in Higher Education

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Abstract

This paper reviews the implications of gamification on student's motivation and learning retention in higher education. Gamification involves enhancing students' learning experiences through the integration of game design elements such as points, badges, leaderboards, and feedback systems. Based on the psychological and educational theories, such as the Self-Determination Theory, Flow Theory, and Behaviourist Theory, the study examines how gamification can contribute to intrinsic and extrinsic motivation in students. In addition, empirical studies were presented to illustrate how gamified learning can facilitate cognitive engagement, active participation, and long-term knowledge retention. Moreover, best practices for gamification were explored: alignment with learning objectives, personalization, and balance between competition and cooperation. At the same time, the study did not ignore some challenges, such as the overjustification effect, accessibility issues, and limited data privacy for digital learning platforms. Ethical issues of educational gamification were briefly presented. Overall, this study concludes that, if properly implemented, gamification could significantly improve the traditional educational settings making them more interactive, engaging, and motivating.

Keywords: gamification, student motivation, knowledge retention, higher education, intrinsic motivation, educational technology, learning engagement

1. Introduction

1.1 Background

In recent years, the integration of technology into educational settings has dramatically transformed how information is conveyed and absorbed. In the current learning process, students have great curiosity in searching for information, assignments, materials, etc., so they inevitably have to use technology in it (Kartini & Putra, 2020). Among the myriads of

innovations, gamification has emerged as a pivotal strategy aimed at enhancing student engagement and motivation. By leveraging game-like elements such as points, badges, and leaderboards, educational frameworks are increasingly adopting gamification techniques to create immersive learning experiences. Strong learning motivation in students will encourage them to participate actively in every learning activity, overcome challenges, and continue improving their understanding of the material being studied (Hanaris, 2023). The application of gamification in education continues to develop with various forms of strategies and presentations in the classroom (Al Fadillah & Rafli Akbar, 2024). The idea of gamification comes from the framework of games specifically designed to increase user retention and participation (Marisa, Maukar, Widodo, et al., 2022). Gamification, in the words of Luis et al. (2022), is the inclusion of game aspects in non-game environments to attract attention and change student behaviour during learning. Gamification's major goal is to improve students' academic performance and final grades. Some studies reveal that gamification of traditional learning settings provides multiple advantages and benefits (DoE, 2020). Shpakova et al. (2017) also reported that gamification entails changing non-game settings into activities that resemble games but are not truly games. Gamified learning has various advantages, including the promotion of ongoing engagement and involvement, as well as the facilitation of information retention and application through strengthening higher-order thinking abilities (DoE, 2020; Kahu & Nelson, 2018). Chapman and Rich (2018, p. 764) describe gamification in education as "a set of information and communication technology systems used in practical situations to identify and evaluate tasks, monitor progress, and engage with fellow participants." Gamification, in general, means incorporating game aspects and concepts into non-gaming activities. Gamification has recently been a hotly disputed topic, particularly in the field of higher education, as a result of the ongoing issue of students' disinterest in completing their studies (Barna & Fodor, 2018). This issue also arises in higher education, when some students fail to complete their undergraduate coursework in the time allotted (Iosup & Epema, 2014). While gamification can boost student engagement and overall course success, it cannot address issues like poor material quality and ineffective teaching methods (Barna & Fodor, 2018). As maintained by Tundjungsari (2018), students lacked the motivation to learn independently and complete the game's stages. To improve the programme, students requested adding more game components such as exabis and customized certificates. It could therefore be noted that Gamified learning still has a considerable way to go before being fully embraced as a teaching method in classrooms (Peñalva et al., 2019). In many universities, the authentic concept of gamification remains underutilized and is often misunderstood as traditional games. As a result, its application is frequently limited to short, isolated activities or the use of a single playful tool, without deeper exploration (Álvarez-Alonso & Echevarria Bonet, 2023; Vanduhe et al., 2020). Games are generally still being seen as entertainment rather as a proper educational approach (Tuparova et al., 2020). This misinterpretation is particularly common in teacher training programs, where the integration of gamification is often even more superficial and diluted (Cuevas Monzonís, 2021). Against this background, this article aims to offer a reflective analysis of the influence of gamification on student motivation and persistence in higher education. It will examine how the implementation of gamification impacts motivation in

students of higher education, measure if gamified teaching approaches have an added value for increasing knowledge retention, aim to gather a list of best practices and things to avoid when implementing gamification approaches in higher education and inform recommendations for practitioners and policy makers on how to use such approaches to establish a more engaging, inclusive and effective learning environment. Thus, this research will help increase the knowledge on how gamification can be leveraged to support the changing requirements in education for the 21st century and prepare our students for a future in which flexibility, creativity and lifelong learning will play a more and more important role.

2. Understanding Gamification in Higher Education

2.1 Defining Gamification

Recently, gamification in learning has emerged as a popular topic in education (Zulkifli et al., 2024). Gamification is the introduction of game design elements in non-game contexts, thus it could enhance users' engagement and motivation. In schools, this would be a process of gamifying the education, adding points, badges, leader boards and challenges to learning. Gamification in higher education: This concept is defined as the application of game design elements, game mechanics and reward dynamics to, without being restricted to, non-game contexts, with the aim of improving user engagement, productivity, learning, and ease of use (Gironella, 2023) Education gamification is one approach that attempts to increase student's motivation in an educational setting by using game mechanics (Dichev & Dicheva, 2017). As we can notice, gamification has a long history, even it can be found hundreds years ago as a necessary mean to capture and motivate people. Game elements when combined to nongame contexts create engagement and motivation. Gamification uses game elements and design in nongame applications to increase the level of engagement and motivation (Christopoulos & Mystakidis, 2023; Rodrigues et al., 2019; Flores, 2015). It is widely used in sales, marketing, health, HCIs, and education (Sharma et al., 2024; Minh et al., 2023; Krath et al., 2021). Gamification can take many forms, such as incorporating point systems, leaderboards, badges, and other game-like elements into traditional coursework, or creating educational games that simulate real-world situations and challenges (Ghai & Tandon, 2023). One of the reasons why gamification is so popular in higher education is that it has been shown to be effective in increasing student engagement and motivation (Thurairasu, 2022). When students are immersed in a game-like environment, they are more likely to become invested in the learning experience, which can lead to improved academic performance and retention (Aguilos et al., 2022; Gironella, 2023; Ghai & Tandon, 2023; Thurairasu, 2022). The implementation of gamification techniques can enhance users' experience, increase user engagement and facilitate the establishment of clear goals

2.2 Theoretical Frameworks

Gamification in education has its root in a number of psychological and pedagogical theories explaining how and why gamified tactics are successful in improving students' learning. Theoretical frameworks such as Self-Determination Theory (SDT), Flow Theory and

Behaviorist Theory offer important perspectives in understanding the effects of gamification on the motivation and retention of students in higher education. These offer underlying understanding into motivational and behavioural mechanisms that gamification employs. Deci and Ryan developed SDT and it holds that human motivation is determined by the inherent desire to fulfill three basic psychological needs, i.e. autonomy, competence and relatedness (Deci & Ryan, 1985). In the context of gamification, these needs are fulfilled by typical game features offering students choices (autonomy), explicit feedback and levels (competence), as well as social interaction in form of cooperation or competition (relatedness). Research by Othman et al. (2020) support this approach, and show that their extensive model is supported, highlighting those gamified applications, which enable these psychological needs, lead to sustainable motivation and positive learning outcomes. It was Csikszentmihalyi who developed the Flow Theory, talking about the state of deep concentration when our activities begin to exist on their own, which we now just call flow (Csikszentmihalyi, 1990). In educational gamification, flow means that a challenge is aligned at the right proportion to the learner's skill level in order for it to be both rewarding and productive (Hamari et al., 2019). This state is facilitated by functions such as real-time feedback, adaptive difficulty, and compelling narratives that encourage cognitive absorption and sustained effort in learning tasks. Also talking about another theory to gamification is the Behaviorist Theory, which deals with observable behaviour and external reinforcement. External rewards, or reinforcements, are employed to motivate the learning activity as points, badges, leaderboards among others (Domínguez et al., 2019). Nevertheless, some experts contend that over-reliance on extrinsic motivation can undermine intrinsic motivation which is necessary for the practice of a desired behavior (Toda et al., 2021), while others seem to believe rewards are effective for encouraging motivation in the early stages of engagement or among students who are not initially interested (Toda et al., 2021). Together, these theories provide a multidimensional perspective on the influence of gamification in educational contexts. They clarify, in addition to how gamification can facilitate initial interest in rewards (Behaviorism), sustain deep, internally motivated involvement over time through need fulfillment (SDT) and optimize task immersion (Flow Theory). Knowledge of these gamified configurations such as point systems, badges, leaderboards and narrative-based challenges is critical for educators who wish to create well-designed gamified learning environments.

3. Gamification and Motivation in Students

3.1 Enhancing Intrinsic Motivation

In basic terms, intrinsic motivation allows a person to engage into a task or activity purely for the senses of satisfaction which the activity itself provides and intrinsic motivations also tend to be avoided rather than initiated automatically due to the behaviour of the individuals. Being intrinsically motivated involves doing something because it is inherently interesting. Research evidences have reported that gamification increases intrinsic motivation as it offers immediate feedback, clear objectives, and a perception of advancement (Deterding et al.,

2011; Domínguez et al., 2013; Subhash & Cudney, 2018). These features align with core motivational principles and have been shown to enhance student engagement and learning outcomes in higher education setting. Gamification in education is the process of using game-based elements in an educational environment to increase student engagement. Gamification has been suggested as ideally appropriate for learning needs of today's generation of learners (Li et al., 2023; Nguyen-Viet & Nguyen-Viet, 2023; Smiderle et al., 2020; Jain & Dutta, 2018). Due to the potential effects game elements can have, many researchers to have explored the effects of gamification in education resulting in positive effects on student engagement by transferring gameful elements as levers in shaping cognitive, emotional, and social aspects of learning (Khoshnoodifar et al., 2023; Nguyen-Viet & Nguyen-Viet, 2023; Huang et al., 2020; Sanchez et al., 2020). Based on the documented benefits of gamification in enhancing student motivation and engagement, incorporating gamified elements into future instructional design and pedagogical research may offer promising avenues for improving teaching and learning outcomes in higher education.

3.2 Extrinsic Motivation and Potential Pitfalls

The use of external feeding back and rewards (e.g. points, badges, certificates, and leaderboards) as a basic component of gamified learning settings (Ryan & Deci, 2020) can be referred to as extrinsic motivation. Such incentive systems can drastically increase short-term involvement and contributions, especially for students who start with relatively low level of intrinsic interest in the topic (Toda et al., 2021). Extrinsic rewards are a common feature of gamification approaches which are used to motivate users to complete tasks, increase competition and supply instant feedback implying that rewards may be facilitating positive learning behaviours. But there is ample evidence to suggest that extrinsic motivation may not necessarily lead to the types of outcomes it constitutes, such as the overjustification bias (Deci et al., 1999; Cerasoli et al., 2014). This is what happens when people, originally fuelled by internal sources of motivation such as curiosity or pleasure, increasingly come to regard their behavior as stemming from external rewards, with the result that general intrinsic motivation tends to decrease (Deci et al., 2017). In educational settings, this can lead to diminished long-term engagement, creativity and deep learning, particularly after rewards are removed (Hanus & Fox, 2019). Thus, a balance should be achieved between 'carrot' factors (e.g., rewards, praise, positive reinforcement) and 'stick' factors (e.g., penalties, subtracting points) in order to design effective gamified learning settings. This balance helps in maintaining student engagement without undermining intrinsic motivation. Educators should create gamified experiences that, in addition to extrinsic rewards, also these gamified approaches are built around supporting elements of intrinsic motivation: autonomy (the power to make meaningful choices), mastery (the capacity to become competent), and relevance (the connect of learning tasks to personal goals or interests) as outlined in Self-Determination Theory (Othman et al., 2020). In doing so, gamification has greater potential to move beyond mere amusement to a pedagogical tool that supports learning through and beyond reward.

3.3 Empirical Evidence

Earlier empirical studies have shown the effectiveness of gamification on enhancing student motivation, engagement, and retention by applying particular well-placed game elements that were aligned with pedagogical objectives. Hence, in their systematic review on educational studies, Koivisto and Hamari (2019) found that gamification has a strong potential to support motivation and learning, making gamified elements pedagogically aligned with the course objectives and academically related, therefore contributing not only to instructional coherence but also to contextual significance. The report outlined that the key features in engaging in-game learning rested on goal-setting, feedback, and an appropriate level of challenge to motivate the player and drive academic outcome. In another research on language acquisition education, Zainuddin et al. (2020) reported that gamified mobile apps also improved both motivation and knowledge retention among higher-education students. Features like quizzes, points and leaderboards accounted for regular usage and enriched vocabulary learning. The authors also highlighted the role of feedback and monitoring in long-term retention. Moreover, Toda et al. (2021) posited that the effectiveness of gamification will not only rely on new game elements used, but more importantly, whether they are structured to along with the learning outcomes. In their work, they confirmed that gamification could be used to address dropouts and academic nous completion by means of cognitive, emotional and social learning. These findings collectively reveals that gamification as methodically implemented is not just a motivational tool, but, evidentially, a pedagogical strategy that can enhance instructional terms in diverse educational settings.

4. Gamification and Knowledge Retention

4.1 Cognitive Benefits

In the field of education, gamification brings a large number of cognitive benefits because active learning, long-term engagement, and embedded synthesis of information lead to a more effective retention of knowledge. When learning is most effectively combined with engagement, e.g., challenges, quizzes, simulators, and others, this encoding of information is semantically driven and, consequently is more likely to lead to deep memory retention (Koivisto & Hamari, 2019). These active elements in related games, i.e., instant feedback, flexible pacing and rewards, are fundamental in that they promote learning. According to Zainuddin et al. (2020), the roles of these features should facilitate attention, inference, and retrieval. Gamified systems enable learners to instantly correct mistakes resulting in stronger neural connections concerning the learned matter. This is in line with cognitive load theory, which suggests that feedback reduces irrelevant cognitive processes and redistributes resources to the relevant learning processes (Sweller et al., 2022). Moreover, the principles of overlearning and spaced retrieval are deeply embedded in gamified learning environments, which both facilitate memory consolidation (Plass et al., 2020). With this persistent process of interacting with content via game loops and iterative decision making, students effortlessly memorize, critically think and solve problem. Not only is it a fun way to learn, it's good for the cognitive development that supports effective learning. With active learning and

reinforcement, and the natural attraction of the brain to learning, gamification results in better learning results.

4.2 Long-Term Retention

Scholars reveal that gamified learning environment can lead to long-term retention of information as learners increase their engagement and become more active. Unlike purely passive forms of instruction (e.g., reading, lecture), Games for Learning situate learning activities within contexts that engage learners in immersive environments that allow information to be encoded while engaging with contextually relevant stimuli – contexts that can be information rich and provide scaffolding designed to support sustained information storage and retrieval over time. Research by Looyestyn et al. (2019) found that students who utilised gamified educational methods achieved significantly better retention rates than those who use non-gamified alternatives when compared on a week-by-week basis. According to Zainuddin et al. (2020), when learners are active through goal-setting, problem-solving and immediate feedback, their cognitive engagement is also higher which results in better memory consolidation. They coincide with well-documented learning principles such as spaced repetition and retrieval practice that are essential for long-term knowledge retention (Plass et al., 2020). In addition, gamification generates an emotional connection that reinforces the retention of memories. Emotional states which are positive experiences during engagement but mostly caused by success and advancing in gamified systems – have been found to boost memory recall (Hamari et al., 2020). This proves especially effective in topics where motivation and attention are traditionally low. Longitudinal research has also indicated that children will recall more content when taught via gamified means, and are also better able to transfer this information to real world applications (Capdeferro et al., 2021). Therefore, gamification is considered great aspiration and as a pedagogical support method that contributes to not only the immediate, but also to the long-term understanding and retention of knowledge in the educational contents.

4.3 Challenges

The concept of gamification involves incorporating game elements, mechanics, and design into non-game contexts, such as education (Zourmpakis et al., 2022). However, according to the study conducted by Sailer and Homner's (2020), the mere inclusion of game elements in an educational context may not be sufficient to create an effective learning experience. Here, the problem with gamification is that it can be superficial if the game elements are not supported by a strong and relevant underlying learning experience (Rapp et al., 2019). In other words, if your game components aren't in line with your learning goals, they aren't going to result in any real learning. A quiz, for instance, could be gamified by awarding students points for answering questions correctly. While this may add an element of competition and excitement to the quiz, it does not necessarily enhance the learning experience (Bicen & Kocakoyun, 2018). Moreover, if the quiz questions are not relevant or challenging, students may simply memorize the answers to earn points rather than engage in deep learning. This is supported by Kruse et al. (2022, p. 114) who state that "students mistakenly equate learning with memorization". In this case, the game elements are

superficial and may not lead to meaningful learning outcomes (Magana et al., 2022). Another issue that can also be attributed to gamification in students' learning is the novelty effect, by which decrease in motivational activities and engagement appears at the beginning of a gamified e-learning and evolves into a routine (Koivisto & Hamari, 2019). This can be a major risk to long- term learning effects, especially in long training programs. Once people get tired of the "game" of acquiring points, trophies and top rankings on leaderboards, there's a good chance that the novelty will fade and people will disengage. As noted by Toda et al. (2021), students may start to find the gamified environment repetitious and shallow if it does not develop along with their increasing expertise and motivation. Therefore, long-term retention with gamification is likely to hit a saturation period and may even decrease if the gamification doesn't keep evolving. In response to this issue, there is need to incorporate adaptive challenges and new content. These entail personalised learning paths, dynamic difficulty adjustment, and user-adaptive storylines, which track user's behaviour and progress (Capdeferro et al., 2021). Citing Landers (2019), sustained learner engagement is possible by the right mixture of novelty, relevance, and perceived value. Without doing so, it could undermine motivation and even decrease a learner's cognitive investment in learning activities. Gamification, consequently, has tremendous potential in education, but will require constant refinement paired with a sophisticated understanding of learner psychology to prevent user burnout and keep the learning process stimulating and relevant.

5. Best Practices in Implementing Gamification

5.1 Aligning with Learning Objectives

In order for gamification in an educational context to be successful, it has to be operationalised in relation to well specified learning goals. When game elements, like points, levels, quests, and feedback systems, are related to academic objectives, they serve to amplify the desired knowledge and skills, rather than divert attention from them. Misaligned gamification may ultimately reduce learning to shallow engagement with few meaningful results (Landers, 2019). The literature seems to find that alignment has something to do with how motivated and cognitively engaging in tasks students are. According to Zainuddin et al. (2020) gamified strategies with a clear connection to curriculum objectives contribute to increased retention and performance. For instance, using a quiz-based leaderboard in a science course is more effective if it is aligned with objectives for such competencies as coming up with hypotheses or interpreting data. In addition, gamification is most effective when it aligns with constructive alignment, in which the learning activities, assessments, and objectives are all linked (Capdeferro et al., 2021). In this framework, gameplay provides a linkage between abstract learning outcomes and student interaction, rendering educational goals more concrete and exciting. Thus, effective use of AMPLE (a framework that integrates key elements of game-based learning to enhance student engagement and learning outcomes) calls for thoughtful course design. Educators also have to decide what students need to learn or be able to do and then design and develop gamified experiences that incentivize students toward these learning goals. Without that underpinning, gamification could be little more than

a new fad, rather than a shift in education.

5.2 Personalization

Personalization in gamified learning refers to the setting and paths of game features, contents, and pathways based on unique students' interests, abilities, and learning styles. Studies reveal that customized gamification designs enhance learner motivation, engagement and satisfaction effectively, even higher than those with general strategies (Xu et al., 2022). With features like customizable avatars, adjustable difficulty levels, and adaptive feedback, learners are put in the position of active control of their learning experience and they take a more autonomous course of learning which keeps them more engaged for long. According to Toda et al. (2021), personalization allows gamification to cater to the different paces and needs of learners. For instance, a student who excels in analytic reasoning would benefit from challenging logical puzzles, whereas a visual learner may be inclined toward narrative-driven quests or diagrammatic puzzles. This personalized approach is in line with the SDT that autonomy and competence are key for motivation (Ryan & Deci, 2020). Furthermore, contemporary pedagogical technologies enabled by artificial intelligence (AI) and learning analytics enable content personalization in the moment. As noted by Ghallab et al. (2020), intelligent tutoring systems used within gamified systems can track student behaviour and modify the learning environment to guarantee that the student stay on their optimal challenge zone. Although personalization is more complex to design and model, it is powerfully effective in increasing cognitive engagement and emotional attachment to content. It turns gamification from a generic motivation model into a learner-centric motivation experience that will lower the chances of game-based learning adoption failing and low retention over time.

5.3 Competition and Collaboration Balance

Gamification typically involves competition elements using leader boards, points and badges to motivated learners and improve performance. Although competitive features could increase engaging experience by enhancing goal and urgency (Harackiewicz et al., 1998), over-reliance on a competitive system is likely to cause stress and anxiety, inferiority complex, and helplessness among low-achieving students (Toda et al., 2021). Balancing competition with collaboration is essential to fostering an inclusive and supportive learning environment. Including sharing gamification through team challenges, group quests, and collaborative problem-solving promotes social collaboration, joint responsibility, and learning with and from peers. According to Mekler et al. (2020), the processes of cooperation facilitate a sense of belonging and support the learning of communication, negotiation and cooperation. This type of experience is very useful in online and blended learning settings, where students might feel disconnected. Research by O'Donovan et al. (2019) reveal that an optimum can be obtained using a hybrid model between competition and collaboration. For example, competition between groups of students, rather than individual students, promotes group cooperation but maintains the motivational gains associated with interteam competition. This framework mitigates adversarial competition and encourages consolidated success. Balancing competition and collaboration is also consistent with the socio-constructivist

learning theories that knowledge is co-constructed through interaction and dialogue. Incorporating these components, educators can try to make sure that the impact of game-based learning extends from individual performance to the community and students' endeavors as a whole.

5.4 Continuous Feedback

Regular and timely feedback is core to a good gamified learning. Unlike conventional education systems which take more of an examination-based approach to learning and assessment, gamification facilitates active and instantaneous feedback so that learners can take corrective action immediately which leads to increased student involvement and improved academic results. Real-time feedback features – which use progress bars, scoring systems, badges, and algorithmic feedback – enable the learners to keep track of their progress in order for learners to change their strategy for goal pursuit (Koivisto & Hamari, 2019). This immediate feedback encourages a growth mindset and persistence, especially with more difficult tasks. According to Plass et al. (2020), feedback in gamified environments fosters metacognition, enabling learners to reflect on actions and outcomes. This will provide the students with immediate feedback on what they did right and what was done incorrectly, thus allowing them to build on the correct response and avoid repeating an error in future assignments This is consistent with the tenets of formative assessment which focus on learning during the act, rather than simply assessing the end product. Also, positive criticism generates motivation and decreases doubt. One such report is a study by Sánchez-Escudero et al. (2021) who found that students provided with elaborate and personalized feedback in a gamified environment were more engaged and performed noticeably better than students given shallow or untimely feedback. This feedback is most effective when it is specific, goal-focused and promotes learner autonomy. Gamified environments with adaptive feedback—whether driven by AI or learning analytics—can also customise the responses to individual actions and make learning more personalised and effective. As a whole, continuous feedback not only helps in raising one's performance, but also increases learners' confidence and motivation for the content to be learned.

6. Potential Challenges and Ethical Considerations

6.1 Over justification Effect

One of the most frequently identified psychological risks of gamification is overjustification effect (Deci et al., 2017). This is a situation where providing extrinsic rewards for behaviour that is already experienced as interesting leads to suppression of intrinsic motivation. In education, this is a huge ethical and pedagogical issue. Although extrinsic rewards (e.g., points, badges, and leaderboards) can increase participation, over-reliance on extrinsic rewards can get learners to stop being curious or aiming for mastery and instead simply strive to be rewarded (Ryan & Deci, 2020).

There is empirical evidence which suggests that reward-learning may begin to co-occur with learning for concrete payoffs or tangible rewards, which may lead to a loss of inherent

motivation or the inherent value of learning when these rewards are taken away. Zainuddin et al. (2020) observed high levels of engagement at first from the students in the gamified learning group, but some students lost motivation when the excitement surrounding rewards disappeared. This can lead to the opposite of the desired effect, where learning becomes too superficial. In other words, a gamified system must be designed to satisfy the three basic psychological needs (i.e., autonomy, competence, and relatedness) found in Self-Determination Theory (Ryan & Deci, 2020). Rewards are not meant to be an end, but a means of strengthening the meaningful progress and the internal satisfaction. Educators must be aware of whether or not the external motivational components – points, badges, or rewards – complement well with the intrinsic motivational components – self-relevance, goal-setting autonomy, creative engagement, and self-expression. Otherwise, gamification may end up being only skin deep and not the transformative resource for deep learning that is prolonged and rich in student engagement.

6.2 Accessibility and Inclusivity

Although gamification has great potential to improve learner participation, it is important to note that not all learners equally benefit effectively from gamified components. Learners exhibit different preferences, needs, capabilities and socio-cultural background that affect the ways they perceive and interact with gamified content. If not properly designed, gamification might oppress or discriminate certain student groups such as those with disabilities, special learning needs and limited digital resources (Huang et al., 2020). Research by Xu et al. (2022) further underscores the significance of developing inclusive gamified learning environments for a variety of learners. For example, this could involve offering alternatives to traditional participation methods, like text-to-speech functionality, keyboard navigation, or culturally appropriate content. For example, blind learners may not respond to visual compliments in the same way as sighted learners, and pupil from under-represented groups may not 'see themselves' in the issues or characters used in sensitive themes in gamified tasks. Moreover, Toda et al. (2021) observe that gamified contexts can promote competition which may exclude less confident students or those with slower learning pace. When good students are told that they are unsuccessful, insufficiently talented students, due to external factors such as bad genes (genetic learning disabilities, cognitive limitations), they can absorb the message and this might ultimately lead to reduced sense of efficacy and academic engagement/achievement. In such cases, gamification would perhaps reinforce the mindset of “not being good enough” instead of promoting growth. It is, therefore, essential to balance competition with collaboration, and to incorporate adaptive features, personalizing to the individual learner profile. When designing inclusive gamification elements, the level of language accessibility, digital literacy, and socioeconomic differences should also be taken into account. Educators who embed universal design principles and practice don’t leave anyone behind in their efforts to make games subconsciously motivating and approachable for every student.

6.3 Data Privacy

The large incorporation of gamified platforms in education comes with serious data privacy

and security issues. Such systems can capture significant amounts of user data — for instance performance data, engagement patterns, behavioural analytics, personally identifiable information, to tailor learning experiences and augment interactivity. While this information can be useful for educators and developers, it also creates a risk that can compromise students' privacy, unless it is well handled (Kay et al., 2020). According to Binns et al. (2020), a growing number of gamified learning platforms lack full disclosure of what data are being collected, where information is being stored and who has access to it. The murkiness here itself raises ethical concerns, especially when students —in many cases minors—don't know how their data is working for them. Some third-party vendors may also monetize or share data without consent, infringing on both privacy rights and institutional policies. In addition, the European GDPR (General Data Protection Regulation) and other global regulations mandate a healthy collection (not more than the limit set by the law), secure storage and lawful use of data for the stated educational reasons by the institutions. They also need to conduct data audits, so that they know what data they hold, have clear and unambiguous privacy policies and security measures in place to protect the data of the learner (Raza et al., 2021). A growing recommendation is to include privacy-by-design methodologies within the design of gamification systems, with privacy and ethical referents securer dedicated places in system architecture as they are not only a posteriori consideration (Chia et al., 2022). This ensures that the integrity of the student/learner data is not dependent solely on external policies, but is secured by the nature of the technology. After all, treating data privacy as optional is not optional if we want to continue to build public trust in gamified educational tools, encourage ethical practice, and maintain the long-term viability of the approach.

7. Conclusion

Gamification has become an evolving and potential game-changer for today's education, bringing innovative opportunities that would engage students and integrate their learning more effectively. When appropriately applied, gamification, which is based on strong intellectual pillars such as Self-Determination Theory, the Flow Theory and Behaviourism, can support 'intrinsic' and 'extrinsic' learning objectives. There is empirical evidence to suggest that when deployed in a relevant context to complement learning goals, gamification fosters and boosts cognitive engagement, it leads to deeper learning, and knowledge retention. But gamification is not without its flaws. Challenges such as overjustification, novelty fatigue, and opportunities for exclusion or data privacy infractions need to be carefully planned and ethically considered; as illustrated, an overreliance on rewards can be catastrophic for intrinsic motivation and poorly designed systems have the potential to lock students out or even infringe upon their data privacy rights. To address these concerns, a commitment to personalization, accessibility, and ongoing feedback needs to ensure that gamified contexts can, in practice, support a wide range of learning pathways and promote equity. Guidelines emphasize the need to match the game elements to the learning objectives, to balance competition with cooperation, and to embed adaptive and democratic features into design. Additionally, adopting privacy-by-design principles helps protect the trust of users and the integrity of institutions. In the final analysis, gamification is not, and should not be

regarded, as a substitute for traditional pedagogy but simply as an additional tool, and a very helpful one at that, in the teaching kit. If supported by pedagogical purpose, ethical principles, and evidence-based design, gamification has great potential to encourage deep, sustainable learning across a variety of educational settings. Its use for good or bad must be taken in hand by educators, developers and institutions. The use of gamification has a lot of potential to increase motivation and retention among students in higher education. Implemented thoughtfully, it can enhance engagement and learning. Nevertheless, teachers should be aware of common traps, human rights and how to make the gamified practices fit the curricular and ethical goals.

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