A Conceptual Review of Gamification and Game-Based Learning: Enhancing Student Motivation and Engagement in Online Learning

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ABSTRACT

The implementation of gamification and game-based learning (GBL) in online learning has garnered heightened interest as universities seek innovative methods to enhance student motivation and engagement. By exploring the use of gamification and game-based learning (GBL) in online learning, this research uses Self-Determination Theory (SDT) to demonstrate how gamification and Game-Based Learning (GBL) enhance motivation, active engagement, and improved learning outcomes among university students. Both approaches incorporate gaming elements such as points, badges, leaderboards, narratives, and challenges to create a more immersive learning environment. Gamification incorporates game mechanics into non-game settings, while GBL uses games as a primary mode of instruction. The study uses online snakes and ladders as a tool to examine how these approaches enhance motivation and engagement by highlighting the psychological requirements for competence, autonomy, and relatedness. The primary purpose of this conceptual review is to synthesise existing empirical evidence and propose a conceptual model grounded in SDT that explains the motivational mechanisms linking gamification, game-based learning, and online learning outcomes. In conclusion, the paper proposes that gamification and game-based learning (GBL) can improve the overall quality and efficacy of online learning and act as effectivecatalysts for cultivating engagement.

Keywords: (gamification, game-based learning, student motivation, engagement, online learning)

INTRODUCTION

The rapid expansion of online learning has presented challenges in sustaining student motivation and engagement within digital environments in higher education. Conventional online courses often rely heavily on asynchronous lectures, discussion forums, and assessments, which can lead to passive participation and feelings of disconnection (Luarn et al., 2023). A lack of motivation is a critical factor contributing to poor learning outcomes and higher dropout rates in online education. Despite the enormous potential of digital technologies, numerous online learning platforms struggle to sustain student engagement and motivation. The lack of interactive and engaging strategies for learning leads to diminished persistence and decreased achievement levels. To address these challenges, Gamification and Game-Based Learning (GBL) have emerged as effective pedagogical approaches that integrate game elements and interactive experiences into education. Their success, however, is largely contingent upon the alignment of learners' psychological needs and the design of the learning environment.

Gamification involves the integration of game elements, such as points, badges, leaderboards, challenges, narratives, and levels, into existing educational activities in online courses or classrooms to augment motivation and engagement. This enhances learning by incorporating incentive elements from gaming (Yan & Zhao, 2023; Marinensi, Botte & Carbonell, 2022). Gamification is readily applicable to existing educational resources, enhances both extrinsic and intrinsic motivation, and facilitates ongoing feedback.

Meanwhile, Game-Based Learning (GBL) uses games as a pedagogical tool, wherein the game is structured around educational goals, allowing learners to gain knowledge or skills through gameplay. The exercise constitutes a comprehensive game featuring rules, narratives, and challenges that necessitate problem-solving, decision-making, and the application of knowledge. Learning occurs through the game experience itself, rather than solely through

supplementary mechanics. GBL is immersive and highly participatory, fostering problem-solving, critical thinking, and experiential learning.

The incorporation of gamification and game-based learning in online education presents possible solutions for enduring issues related to student motivation and engagement. Gamification improves learning settings by using external incentives, like points, badges, and leaderboards, whereas game-based learning engages students in genuine experiences that promote significant knowledge. Both methodologies correspond closely with Self-Determination Theory (SDT), which discusses the importance of competence, autonomy, and relatedness in maintaining learner engagement (Gupta & Goyal, 2022).

Accordingly, the purpose of this conceptual review is to synthesise existing empirical evidence and propose a conceptual model grounded in SDT that explains how gamification and game-based learning enhance motivation, engagement, and learning outcomes in online higher education. In this context, the subsequent section analyses pertinent existing literature to elucidate the impacts of gamification and game-based learning in online education.

LITERATURE REVIEW

Self-Determination Theory (SDT)

Self-Determination Theory (SDT) serves as a foundational framework for explaining how gamification and game-based learning (GBL) can enhance motivation and engagement in higher education. SDT posits that fulfilling the needs for autonomy, competence, and relatedness fosters intrinsic motivation, persistence, and deeper learning. Empirical research demonstrates that gamification elements such as badges, levels, and feedback strengthen perceptions of competence when tied to explicit goals, while tasks offering meaningful choice support autonomy, and collaborative features enhance relatedness (Mekler et al., 2017; Seaborn & Fels, 2015). Conversely, reward-driven or overly competitive designs risk undermining intrinsic motivation by overemphasizing extrinsic incentives (Hamari et al., 2014).

Systematic reviews consistently highlight that need-supportive gamification strategies those explicitly addressing autonomy, competence, and relatedness are most effective in sustaining student engagement and motivation in higher education contexts (Khaldi et al., 2023; Sailer & Homner, 2020).

In addition to gamification, GBL has shown more consistent effects on academic achievement when grounded in SDT principles. Serious games and simulations promote exploration, mastery-oriented behavior, and knowledge retention, with perceived competence and autonomy mediating these benefits (Clark et al., 2016; Vlachopoulos & Makri, 2017). Nevertheless, challenges such as novelty effects and methodological variability complicate long-term evaluations of these approaches (Subhash & Cudney, 2018). To address these limitations, scholars advocate for longitudinal designs and mediation analyses to examine whether satisfaction functions as the mechanism linking gamification and GBL to enhanced motivation and learning outcomes (Deci et al., 2017). Collectively, the literature underscores the importance of intentional, SDT-aligned design in maximizing the motivational and educational value of gamified and game-based methods in higher education.

Gamification in Online Learning

Online learning has increasingly embraced gamification, broadly defined as the incorporation of game design elements such as leaderboards, badges, points, and reward systems into non-game contexts. Its growing adoption is largely attributed to the need to sustain engagement and reduce attrition in digital environments. Beyond entertainment, gamification offers instant feedback and reinforcement mechanisms that influence learner behavior and motivation (Hamari et al., 2014). In educational contexts, it has been shown to enhance both intrinsic and extrinsic motivation, encourage goal setting, and provide meaningful rewards (Seaborn & Fels, 2015).

Systematic reviews confirm gamification's ability to improve motivation, engagement, and course completion. Subhash and Cudney (2021) identified six primary outcomes of gamified interventions, including performance, engagement, and collaboration. Similarly, Navío-Marco and Solórzano-García (2021) demonstrated that features

such as “karma points” in MOOCs significantly improved course completion rates, underscoring gamification’s potential to address high dropout levels.

Despite these promising findings, the literature highlights critical limitations. Simsek & Karakus Yilmaz (2025), which analyzed studies published between 2013 and 2021, found that while gamification increased participation, its impact on academic performance was inconsistent. further stressed the need for adaptive gamification in higher education, noting that uniform designs often fail to meet the diverse needs of learners. Additionally, theoretical foundations remain underdeveloped; as Seaborn and Fels (2015) observed, many implementations rely heavily on extrinsic motivators while underutilizing established frameworks such as self-determination theory. Methodological issues, including small sample sizes, short intervention durations, and heterogeneous designs, also hinder cross-study comparisons.

Overall, the literature suggests that gamification holds considerable promise for enriching online learning by enhancing engagement and reducing attrition. However, its long-term effects on learning outcomes remain inconclusive. The effectiveness of gamification appears to depend on design quality, learner characteristics, and contextual factors, highlighting the need for longitudinal, large-scale, and theory-driven research to generate more definitive evidence.

Game-Based Learning (GBL) in online learning

1. Enhancing Motivation and Engagement

Game-based learning (GBL) has been widely recognized for its ability to increase student motivation and engagement. By integrating elements such as challenges, narratives, and rewards, GBL transforms traditional instruction into an interactive experience that sustains learner interest (Plass et al., 2015). Studies demonstrate that games stimulate intrinsic motivation by fostering curiosity, autonomy, and a sense of achievement, aligning with self-determination theory (Deci & Ryan, 2000). As a result, learners show greater persistence and willingness to invest effort in academic tasks compared to conventional approaches (Huang et. Al.,2019).

2. Supporting Cognitive and Skill Development

Beyond engagement, GBL contributes to meaningful cognitive outcomes. Research shows that serious games and simulations enhance problem-solving, critical thinking, and conceptual understanding by situating knowledge in interactive, context-rich environments (Annetta, 2010). For instance, digital science games allow learners to apply theoretical concepts in virtual experiments, improving transferability of knowledge to real-world settings (Clark et al., 2016). Furthermore, collaborative game play fosters communication and teamwork skills, aligning with 21st-century learning objectives (Sung & Hwang, 2018).

3. Challenges and Limitations in Implementation

Despite its benefits, GBL faces limitations that affect its consistent integration into education. A key challenge lies in balancing entertainment with pedagogical objectives; poorly designed games risk distracting students rather than supporting learning (Huang et al., 2021; Ishak, Hasran, & Din, 2023). Technical barriers, such as access to digital infrastructure and teacher preparedness, also restrict scalability (Eseryel et al., 2014). Moreover, empirical findings on long-term academic achievement remain mixed, as many studies report improved engagement but inconsistent impacts on performance outcomes (Zainuddin et al., 2020). These gaps highlight the need for rigorous, longitudinal, and theory-driven research to establish clearer evidence of GBL’s effectiveness across disciplines.

METHODOLOGY

This study employs a conceptual review methodology, integrating theoretical viewpoints and actual evidence from previous studies. This review systematically analysed studies published between 2017 and 2025 across major academic databases, including Scopus, Web of Science, and Google Scholar, concentrating on research regarding gamification, game-based learning, motivation, and engagement in online education. Unlike empirical research

that involves primary data collection, a conceptual review emphasises the critical evaluation, integration, and theoretical advancement of previous studies. No main data collectors occurred; rather, the objective was to illustrate how gamification and Game-Based Learning (GBL) augment motivation, engagement, and enhanced learning outcomes among university students.

Conceptual Framework

Self-Determination Theory (SDT) by Deci & Ryan (2000), is developed to understand human motivation. It posits that the quality of motivation is reliant upon the fulfilment of three fundamental psychological needs: competence, autonomy, and relatedness. SDT offers a robust framework for comprehending the reasons for gamification and game-based learning to improve online learning. By addressing learners' requirements for competence, autonomy, and relatedness, both approaches enhance intrinsic motivation and promote more self-determined varieties of extrinsic motivation. Gamification employs motivating triggers by incorporating game aspects, whereas Game-Based Learning (GBL) encompasses the entire learning process within a gaming experience, rendering it intrinsically engaging. Collectively, they provide synergistic opportunities for augmenting student motivation, engagement, and achievement in online education.

Based on figure 1, game elements such as points, badges, leaderboards, feedback, and challenges are frequently integrated into learning platforms to enhance the learning experience. These features create a sense of identity and presence for learners, making the process more interactive and engaging (Deterding et al., 2011). Effective game design should also satisfy three fundamental psychological needs: competence (the feeling of being effective), autonomy (the sense of choice and control), and relatedness (the sense of connection with others). When these needs are unmet, students often experience reduced motivation and engagement (Deci & Ryan, 2000). Although students may initially be driven by extrinsic motivation, such as the pursuit of rewards or recognition, well-designed game-based learning can gradually foster intrinsic motivation, where students engage in learning for enjoyment and personal interest. This transition enhances both engagement and learning outcomes, as motivation influences emotional, behavioral, and cognitive dimensions of student participation (Ryan & Deci, 2017; Fredricks et al., 2004).

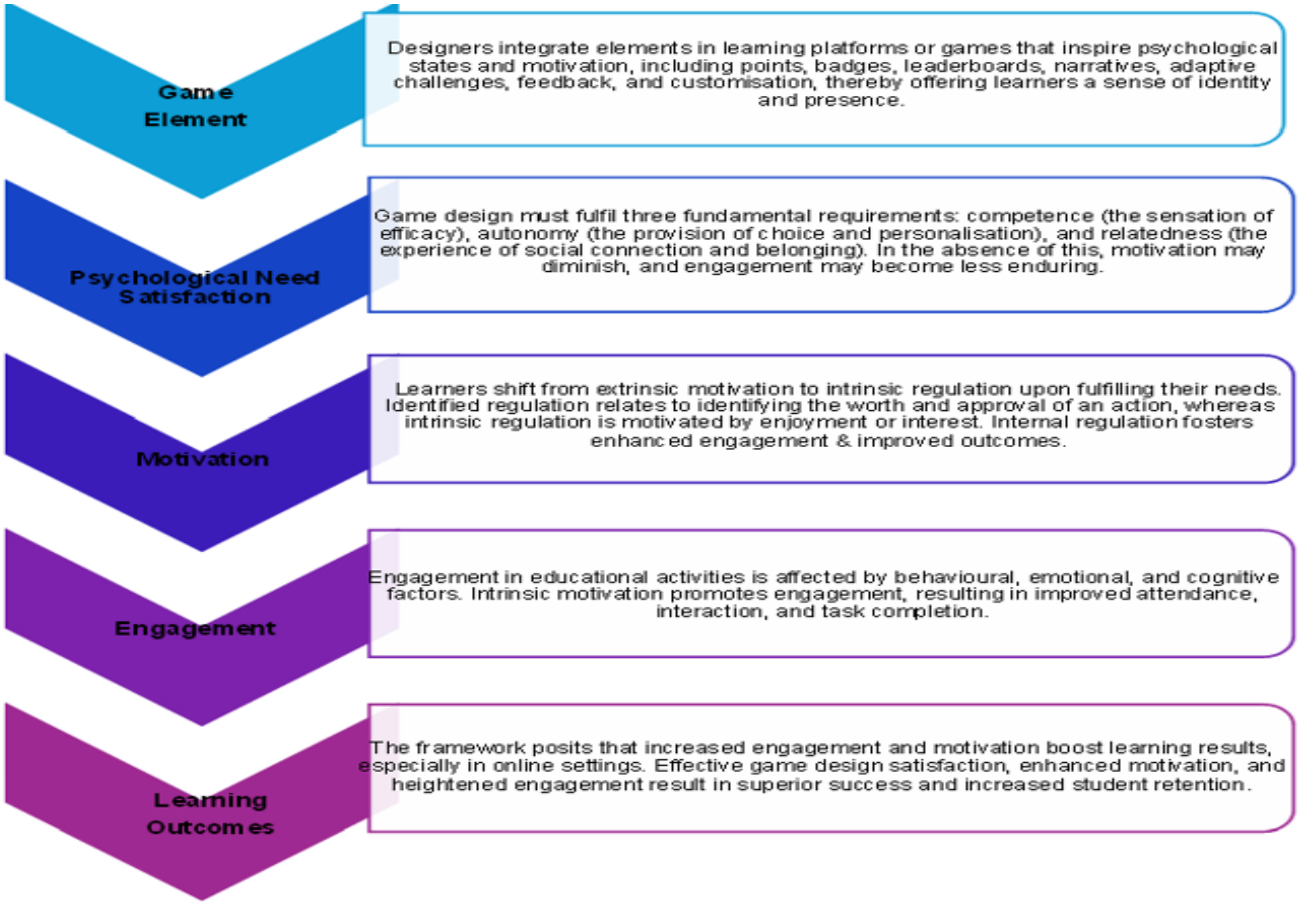

Figure 1: Framework Linking Gamification and Game-Based Learning to Motivation and Engagement

Greater motivation and engagement significantly improve academic results, particularly in the context of online learning where disengagement is a persistent challenge. By incorporating well-designed game elements, students experience increased satisfaction, motivation, and persistence, which not only improves performance but also supports long-term retention and reduces dropout rates. Consequently, gamification and game-based learning serve as valuable approaches to promoting meaningful learning experiences, enabling students to achieve academic success and sustain participation in their studies over time (Subhash & Cudney, 2018).

CONCLUSION

Gamification and game-based learning (GBL) are innovative and exciting digital tactics capable of transforming online education by enhancing student motivation, engagement, and learning outcomes. This conceptual review synthesises current evidence from 2017 to 2025 and integrates insights from Self-Determination Theory (SDT) to illustrate the correlation between game features and the psychological demands that foster intrinsic motivation. The integration of gamification and game-based learning with competence, autonomy, and relatedness establishes a robust theoretical foundation for their efficacy. However, their efficacy relies on careful design, ensuring that gaming elements are meaningful, inclusive, and aligned with educational objectives rather than merely superficial enhancements. It provides instructors with information on creating engaging digital environments that foster student engagement, motivation, persistence, and achievement. In conclusion, this conceptual review offers a theoretically supported model that connects SDT components, educational results, and game design aspects. In online learning environments, gamification and GBL can create meaningful, long-lasting engagement and encourage self-determined learners by focusing on the satisfaction of competence, autonomy, and relatedness.

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