Emotions, Engagement and Motivation: A Delicate Dance in a Virtual Learning Environment

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Authors' Contributions (Angelina Sundström Kärneus - AS, Noushan Memar - NM, and Toon Larsson - TL.) AS led the study. The research idea was jointly developed by all. All collaboratively discussed the virtual adaptation of the simulation. AS introduced depth into the theoretical section. The survey design and data collection were carried out by all. NM performed the quantitative statistical analysis and authored the corresponding sections; AS, and TL performed the qualitative codified content analysis and wrote the qualitative results. All contributed to data coding and collaborated on transforming qualitative data into quantitative form. AS and NM co-authored the discussion and conclusion sections. All reviewed and approved the final manuscript.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process: During the preparation of this work, the authors, in addition to using human proofreader, used tools such as OpenAI, Grammarly, to enhance readability and refine language. Following the use of these tools, the authors carefully reviewed and edited the content as needed to ensure its scientific accuracy and coherence and take full responsibility for the content of the published article.

Abstract. Emotions play a pivotal role in shaping learners' engagement and motivation. Yet, little is known about how emotional fluctuations unfold within virtual gamified learning environments, despite their growing importance in higher education. This study investigates how a bundle of game design elements in a virtual learning exercise evoke learners' emotional responses, and how these emotions, in turn, affect learners' engagement and motivation throughout gameplay. Using a mixed-method research design, we examined the emotional experiences of 71 university students participating in the virtual version of the Strategic Business Game (VSBG). Qualitative analysis revealed that game elements such as time pressure, information asymmetry, and social interaction evoked both positive and negative emotions, often simultaneously. Quantitative results showed that negative emotions significantly decreased both engagement and motivation, while positive emotions enhanced motivation. Interestingly, engagement appeared more sensitive to negative emotional experiences, whereas motivation was shaped by both positive and negative emotions. These findings highlight the importance of emotional calibration in the design of gamified virtual learning environments. Understanding how emotions shape learning can inform more effective pedagogical strategies that sustain engagement and motivation over time.

Keywords: virtual learning environment, gamification, emotions, Strategic Business Game (SBG), engagement and motivation..

1. Introduction

During the COVID-19 pandemic, when many higher education institutions entered emergency lockdown, remote and virtual learning replaced much of the campus-based classroom learning (e.g., Chandani et al., 2024; Colombero & Dal Zotto, 2022; Greenberg & Hibbert, 2020; Hari Rajan et al., 2025). Even after the lockdown was lifted, debates about the benefits, limitations, and pedagogical potential of *virtual learning environments* continued (e.g.,Govindarajan & Srivastava, 2020; Hari Rajan et al., 2025; Mathur et al., 2025; Whalley et al., 2021). In some respects, these post-pandemic discussions echoed earlier pre-pandemic analyses of virtual learning by competing institutions (Arbaugh, 2000; Arbaugh & Duray, 2002; Chandani et al., 2024).

Amid these longstanding debates, proponents of virtual learning environments argue that such settings offer several advantages over traditional classrooms. This claim rests on the premise that virtual environments support learners by allowing them to independently and remotely choose their physical location when engaging with instructors and peers (e.g., Hari Rajan et al., 2025; Hrastinski, 2008; Mathur et al., 2025). In these settings, learners can interact and collaborate with others in various activities (Piccoli et al., 2001) and receive support from their instructors and peers (Gurtner, 2014) more flexibly across time and place (Piccoli et al., 2001).

However, critics maintain that learners in virtual environments tend to demonstrate weaker academic performance. This line of research attributes such outcomes to the learners' limited face-to-face interaction with instructors and peers, which is considered a primary reason for their lack of engagement, low motivation, and sense of isolation (Keller & Suzuki, 2004; Zizka & Probst, 2024).

To better understand these concerns, it is important to clarify how engagement and motivation are defined and interrelated in educational research. *Engagement* is typically conceptualised from a student-centred perspective, emphasising the active role learners take in their educational process through meaningful involvement and participation in learning activities (Ferrer et al., 2022; Hu et al., 2025; Martin & Borup, 2022). Furthermore, *motivation* and engagement are conceptually interlinked, as learners typically manifest their motivation through active engagement in learning activities (Akram & Li, 2024; Ferrer et al., 2022; Hu et al., 2025). Motivation itself is commonly understood as the internal drive that prompts learners to begin, persist in, and strive toward success in their learning and educational pursuits (Akram & Li, 2024; Hu et al., 2025). Together, engagement and motivation are essential for learning, as they provide the foundational conditions for academic achievement (Akram & Li, 2024).

To address the challenges surrounding low engagement and motivation among learners (Kapp, 2012), research on learning in higher education increasingly advocates for experiential learning approach (e.g., Kolb & Kolb,

2005; Kolb, 2014; Kolb, 1984), including interactive experiential learning exercises such as gamification (e.g., Faiella & Ricciardi, 2015; Memar et al., 2021; Silva et al., 2020). In this pedagogical model, learning occurs through doing (Munge et al., 2018) and lived experiences (Morris, 2020).

Building on this foundation, we adopt the assumption that gamification offers a promising solution to the persistent challenges of low learner engagement and motivation in virtual learning environments. Indeed, a growing body of research supports the effectiveness and positive impact of virtual gamification environments on learners' engagement, motivation, and learning outcomes (e.g., Acosta-Medina et al., 2021; Muntean, 2011; Pacheco-Velazquez et al., 2024).

These benefits arise from gamification's capacity to evoke emotional responses through game design elements, which in turn support learning (Mullins & Sabherwal, 2020, p. 305). However, prior studies often treat learners' emotions as static and predominantly positive (Dao & Sato, 2021; Henritius et al., 2019; Hu et al., 2025; Mullins & Sabherwal, 2020). This static framing potentially may oversimplify the learners' emotional experiences.

In reality, learners experience a range of *emotional fluctuations*. Emotional fluctuations refer to the variability or changes in learners' emotional states experienced throughout the learning process. These fluctuations are particularly relevant in virtual gamified learning environments, where learners encounter challenges and stimuli across different phases of gameplay that evoke a range of emotional responses. These emotional responses include both positive emotions such as excitement, curiosity, and joy, and negative emotions such as anger, boredom, and frustration, as defined in foundational theories of emotion (e.g., Plutchik, 1980; Solomon, 1993, 2008).

While prior studies have shown that positive emotions play a significant role in fostering engagement, motivation, and academic achievement (e.g., An et al., 2023; Mega et al., 2014; Valiente et al., 2012), fewer studies have explored how emotional states fluctuate in response to game design elements (Dao & Sato, 2021; Henritius et al., 2019; Memar et al., 2021).

We believe that recognising the shifting nature of experienced emotions is essential for designing emotionally responsive and pedagogically effective virtual gamified learning environments that enhance learners' engagement, motivation and academic achievement. This study, therefore, investigates how emotional fluctuations are experienced among learners in a virtual gamified learning environment and examines how these emotions influence the learners' engagement and motivation. To that end, we ask:

How do fluctuations of emotions influence the engagement and motivation of higher education learners in a virtual, gamified learning environment?

2. Literature Review

Gamification and Emotions

The flexibility and freedom that characterise the virtual gamified learning environment place high demands on learners to commit to their studies and to take responsibility for their learning (Pilcher & Miller, 2000). These characteristics may call for the *gamification* approach, which helps learners meet such expectations. Gamification refers to the use of game elements (e.g., aesthetics, frameworks, dynamics, mechanics, metaphors and thinking) and activity patterns traditionally found in non-game settings (e.g., Deterding et al., 2011; Simões et al., 2013). Research suggests that gamification can prompt learners to solve problems, enhance their creative and critical thinking, and acquaint them with situations, processes and behaviours in learning environments (Pasin & Giroux, 2011).

Gamification is widely studied among researchers (Alahmari et al., 2023; Faiella & Ricciardi, 2015), and while some challenges associated with the virtual gamified learning environment have been noted, most researchers highlight its pedagogical benefits. For instance, in business education, learners often describe the business game-based learning as fun and enjoyable, as it provides them with an opportunity to experiment with practices associated with different business situations within low-risk simulated environments. Such an approach enables them to learn from their mistakes in a safe setting without the consequences of real-life stress (Kim, 2012; Lee & Hammer, 2011; Veltsos, 2017). Furthermore, the gamification experience promotes greater curiosity, engagement and motivation among learners (Buckley & Doyle, 2016; Jaskari & Syrjälä, 2023; Kim, 2012) and enhances student-centric learning that facilitates more active and cooperative learning compared to traditional lecture-style settings (Kapp, 2007; Oblinger, 2004).

In addition to fostering engagement and motivation, we argue that gamification elicits a broad spectrum of emotional responses as learners interact with diverse game design elements (i.e., stimuli) during gameplay, making emotional fluctuations an inherent part of the experience. Emotions are the subject of different theories, including discrete emotion theories, basic emotion theory, the circumplex model, and Plutchik's wheel of emotions (c.f., Ekman et al., 1999; Izard, 2007, 2010; Plutchik, 1980; Solomon, 1993, 2008). These theories differ in how they define and organise emotions, from viewing emotions as positive or negative, biologically distinct categories, to representing them along continuous dimensions or as combinations of core affective states. Despite these differences, all aim to explain the complexity of emotions and their significance to human behaviour and cognition.

Consequently, the term *emotion* is discussed in various ways across the literature, and there is no clear consensus exists among scholars regarding the terminology or the full range of emotions humans may experience. Due to this