Game-Based Learning in Improving Student Engagement

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ABSTRACT

With increasing concerns regarding student disengagement in educational environments, game-based learning (GBL) has surfaced as a viable pedagogical strategy to improve learner motivation, engagement, and performance. This study examines the impact of game-based learning (GBL) on student involvement through a combination of quantitative survey data and qualitative responses from open-ended questions. A total of 96 undergraduates engaged in GBL-integrated sessions across various learning environments. The findings demonstrated elevated engagement in emotional, behavioral, and cognitive dimensions, along with enhanced enjoyment, collaborative learning, conceptual comprehension, and learner confidence. Students indicated a secure educational atmosphere that promoted a growth mindset. The results indicate that effectively structured game-based learning activities markedly enhance student engagement and provide tangible advantages for cognitive development and classroom interactions.

Keywords - game-based learning, student engagement, mixed-method research, level of engagement, cognitive development

INTRODUCTION

In recent years, educators and policymakers have increasingly highlighted the significance of student involvement as a crucial determinant of learning outcomes, academic success, and retention rates. Engagement is acknowledged as a multifaceted concept that includes behavioral, emotional, and cognitive elements, all of which enhance a student's active participation in the learning process (Fredricks, Blumenfeld, & Paris, 2004). Nonetheless, despite this cognizance, sustaining elevated levels of student involvement continues to be a formidable issue in educational environments, especially in conventional, lecture-centric classrooms where passive learning frequently prevails.

A primary factor leading to this disengagement is the disparity between traditional teaching methods and the changing expectations of 21st-century learners. Contemporary pupils are digital natives, familiar with interactive tools, multimedia settings, and immediate response. Consequently, static learning situations devoid of stimulation or real-world relevance frequently fail to engage their attention or foster sustained participation. This widening disparity necessitates novel instructional approaches that are dynamic, participative, and congruent with students' cognitive and emotional requirements.

In addressing these issues, game-based learning (GBL) has arisen as a viable educational approach that incorporates game mechanics—such as rules, feedback, incentives, and narratives into the learning context. GBL is based on constructivist and experiential learning theories, which promote active knowledge production via problem-solving, collaboration, and reflection. Research indicates that GBL can increase engagement, facilitate deeper learning, and improve abilities including critical thinking, communication, and resilience (Plass, Homer, & Kinzer, 2015; Adipat et al., 2021).

Although GBL has garnered attention in educational discussions, additional empirical research is required to elucidate its particular impacts on student involvement, particularly in varied academic settings. This study seeks to fill that gap by examining the impact of game-based learning on students' behavioral, emotional, and cognitive involvement. This research employs a mixed-methods approach, integrating quantitative surveys and qualitative replies to provide both measurable outcomes and detailed insights into students' experiences with

GBL. The study ultimately enhances the discourse on student-centered learning and offers practical applications for incorporating game-based tactics into conventional education.

LITERATURE REVIEW

This section presents an overview of game-based learning (GBL), the concept of student engagement, and the application of GBL in educational settings. Drawing from recent empirical studies and theoretical models, the review highlights the convergence of GBL and engagement in promoting effective and meaningful learning.

Overview of Game-Based Learning

Game-Based Learning (GBL) refers to the intentional application of game mechanics - such as rules, objectives, feedback systems, challenges, and narrative components - in educational environments to enhance student engagement and optimize educational results. According to Plass, Homer, and Kinzer (2015), game-based learning (GBL) "merges the engagement of gameplay with specific learning objectives" (p. 262), embedding educational information inside the game's structure and dynamics. GBL is differentiated from gamification, which generally incorporates extrinsic incentive elements (e.g., points or leaderboards) into conventional learning activities without thoroughly integrating the content.

Digital games - e.g., instructional software, quiz platforms, simulation environments - to analog forms - e.g., board games, role-playing, card-based games - GBL activities can take many different forms. Within the framework of the present research, both forms were applied to guarantee accessibility and offer variation. For formative assessments and fast-paced quizzes, for instance, digital tools including Kahoot! and Quizizz were employed; analog activities included cooperative board games, role-playing scenarios, and card-matching exercises meant to reinforce course content.

The games also changed in structure, including cooperative and competitive components. Often through time-bound challenges or point-based rankings, competitive forms were utilized to increase enthusiasm and individual accountability. Collaborative games, on the other hand, stressed teamwork, communication, and group problem-solving, therefore complementing the social-constructivist ideas of shared knowledge building. Many times, hybrid models were used, in which students participated in teams to strike a mix between peer support and drive.

The theoretical foundation of GBL is primarily rooted in constructivist learning theory, as advanced by Jean Piaget (1952) and Lev Vygotsky (1978). Constructivism emphasizes that learners actively build knowledge through experience, exploration, and social interaction - principles that are naturally aligned with the interactive and immersive nature of well-designed games. GBL also draws on experiential learning theory (Kolb, 1984), which highlights the importance of concrete experiences, reflective observation, abstract conceptualization, and active experimentation. Games provide simulated environments where learners can engage in these cycles of learning through active participation and iterative feedback.

Building upon these fundamental principles, Adipat et al. (2021) delineate three further theoretical viewpoints essential to GBL design: Narrative-centered learning theory highlights storytelling's significance in enhancing emotional and cognitive engagement; Problem-solving theory advocates for complex, open-ended challenges to cultivate higher-order thinking skills; and Engagement theory links meaningful learning with collaborative, interactive activities.

These theoretical points of view taken together support the hypothesis that well-designed games - digital or analog, competitive or cooperative - may produce immersive, motivating, and cognitively enhancing learning environments. GBL is a potent teaching tool to improve both student involvement and academic performance by matching gameplay mechanics with educational objectives.

Student engagement and Game-based learning

Student engagement is acknowledged as a complex, multidimensional phenomenon that includes behavioral, emotional, and cognitive aspects (Fredricks, Blumenfeld, & Paris, 2004). Behavioral involvement include

observable acts including attendance, active participation, and task fulfillment. Emotional involvement denotes students' affective responses, encompassing curiosity, enjoyment, and a sense of belonging. Cognitive engagement pertains to the allocation of mental effort, the application of deep learning mechanisms, and self-regulation in academic endeavors.

To enhance comprehension of the factors influencing these dimensions, researchers have employed various theoretical frameworks. Self-Determination Theory (SDT) (Deci & Ryan, 1985) is highly influential, asserting that learners exhibit greater engagement when their psychological demands for autonomy, competence, and relatedness are satisfied. Game-Based Learning (GBL) intrinsically fulfills these requirements: games offer significant options (autonomy), tailored tasks and feedback (competence), and avenues for social engagement via collaboration or competition (relatedness). Under these situations, students are more inclined to cultivate intrinsic motivation, which Ryan and Deci (2000) contend is essential for prolonged engagement and profound learning.

In addition to Self-Determination Theory, many theoretical frameworks also emphasize the significance of participation for academic achievement. Flow theory (Csikszentmihalyi, 1990) posits that optimal learning transpires when learners are completely engrossed in tasks that equilibrate challenge and skill. Well-crafted games induce "flow states," promoting concentrated attention and inherent pleasure. Expectancy-Value Theory (Eccles & Wigfield, 2002) posits that students exhibit more engagement when they appreciate a task and possess confidence in their capacity to succeed - elements frequently bolstered by the prompt feedback and goal-driven framework of educational games.

Hartt et al. (2020) emphasize the significance of intrinsic motivation in fostering sustained academic performance, a conclusion supported by Kuh (2009), who recognized student engagement as a critical determinant of accomplishment and retention in higher education. Consequently, there is increasing interest among educators in implementing interactive, student-centered methodologies such as Game-Based Learning (GBL) to foster significant and multifaceted involvement. By aligning with fundamental motivational and engagement theories, Game-Based Learning (GBL) presents a viable approach for fostering profound learning and sustained academic growth.

Applications of Game-Based Learning in the Classroom

Empirical research endorses the incorporation of Game-Based Learning (GBL) throughout several educational settings, ranging from basic to tertiary levels and encompassing disciplines such as mathematics, languages, science, and planning.

Pratama and Setyaningrum (2018) conducted a study on mathematics instruction utilizing an interactive problem-solving game, GeoGame Adventure, to teach geometry to Indonesian junior high school students. Their findings indicated substantial enhancements in both cognitive outcomes (concept identification, problem-solving) and affective outcomes (motivation and interest). Post-intervention statistics indicated that 87.88% of students achieved the minimum performance standards, while interest levels transitioned from "medium" or "low" to "high" and "very high."

Adipat et al. (2021) discovered that digital adventure games facilitated interdisciplinary learning, social engagement, and the development of a growth mindset in language acquisition. Students exhibited a greater propensity for risk-taking, shown a willingness to repeat activities without apprehension of failure, and persisted until achieving mastery - behaviors indicative of grit and resilience, which are increasingly acknowledged as essential learning attributes (Duckworth et al., 2007).

Hartt et al. (2020) investigated the application of game-based methodologies in urban planning education. Their research contrasted a conventional lecture with a gamified session incorporating role-play and real-world simulation. Students indicated increased enjoyment, enhanced peer interaction, and a more profound comprehension of demographic and migration patterns during the GBL session. Further investigation has corroborated these results. Papastergiou (2009) demonstrated that digital games enhanced science content knowledge and digital literacy in high school pupils. Barab et al. (2009) indicated that games centered on real-

world issues fostered systems thinking and ethical decision-making in higher education. GBL demonstrates potential in enhancing equity in education. Wouters et al. (2013) conducted a meta-analysis of 38 research and determined that game-based learning (GBL) yields superior educational outcomes compared to traditional instruction, particularly when the games are effectively incorporated into the curriculum and linked with educational objectives.

Nonetheless, effective GBL application necessitates meticulous design. Li and Tsai (2013) asserted that games should transcend mere entertainment and promote significant engagement with content. Inadequately executed games, particularly those misaligned with instructional goals, might lead to superficial involvement or frustration (Pho & Dinscore, 2015).

RESEARCH METHODS

This study adopted a mixed-methods research design, combining quantitative and qualitative approaches to explore how game-based learning (GBL) influences student engagement. A survey instrument served as the primary tool for data collection, allowing for triangulation of findings through both structured and open-ended responses.

Participants were undergraduate students enrolled in a course where GBL activities were implemented over a four-week period. A total of 96 students participated in the study. The participants came from diverse academic backgrounds and had varying degrees of familiarity with digital game tools used in educational settings.

Data were collected through a survey administered after the GBL intervention, which included a series of 25 Likert-scale questions designed to measure the three dimensions of student engagement (behavioral, emotional, and cognitive), and an open-ended questions were included at the end of the survey to collect students' reflective insights and subjective experiences.

RESULTS AND DISCUSSIONS

The data collected through the mixed-method survey yielded both quantitative and qualitative insights into the effectiveness of game-based learning in promoting student engagement. The combination of Likert-scale analysis and thematic coding from open-ended responses offers a well-rounded understanding of the intervention's impact.

Student engagement dimensions

The quantitative data were analyzed across three core dimensions of student engagement—behavioral, emotional, and cognitive—using mean Likert-scale scores derived from responses of 96 participants. Table 1 presents the descriptive statistics for each engagement domain.

Table 1. Mean Scores for Student Engagement Dimensions (n = 96)

Engagement Dimension	Mean	SD
Behavioral	4.22	0.54
Emotional	4.34	0.47
Cognitive	4.18	0.51

The mean score for emotional engagement was the highest among the three dimensions (M = 4.34, SD = 0.47), suggesting that students had a robust affective response to game-based learning (GBL). Items such as "I anticipated class when games were implemented" and "I found the learning activities to be more enjoyable than usual" were recorded with high levels of agreement. These results indicate that GBL strategies effectively

nurtured a sense of enthusiasm, interest, and enjoyment in the learning process, which are critical indicators of emotional engagement.

The average score for behavioral engagement was also strong (M = 4.22, SD = 0.54), which indicates that students were actively engaged during GBL sessions. It is important to note that over 85% of respondents reported that they were more likely to partake, complete assignments, and attend class when GBL elements were included. The conclusion that GBL encourages active behavioral involvement is further supported by the consistent positive responses to statements such as "I was more attentive during game-based lessons" and "I actively participated in discussions and activities when games were involved."

Although the mean score of cognitive engagement is marginally lower (M = 4.18, SD = 0.51), it still suggests a positive academic impact. Students indicated that GBL facilitated higher-order cognitive processes, including problem-solving, analysis, and application. Items such as "The games helped me apply concepts more effectively" and "I thought more critically during game-based tasks" were met with high levels of agreement, which implies that GBL strategies facilitated deeper processing of course content and enhanced metacognitive engagement.

Internal consistency was evaluated using Cronbach's alpha to guarantee the engagement scale's reliability. The instrument is supported in measuring the intended engagement constructs, as evidenced by the high reliability of the result ($\alpha = 0.87$).

In general, the data indicate that GBL was successful in enhancing all three dimensions of student engagement, with notably significant effects on emotional and behavioral involvement. These results emphasize the potential of game-based methodologies to establish cognitively stimulating, immersive, and motivating learning environments.

Student perception

Five distinct themes were identified through a thematic analysis of open-ended survey responses, which offer a more profound understanding of students' viewpoints and experiences with Game-Based Learning (GBL). These themes enhance the quantitative results by emphasizing the mechanisms by which GBL promoted cognitive, affective, and behavioral engagement.

Enhanced motivation and enjoyment (Emotional engagement)

The function of GBL in fostering emotional engagement was emphasized by the frequent use of the terms "fun," "energizing," and "exciting" by students. The novelty of game-based formats disrupted the monotony of conventional lectures and elicited positive affective responses. One participant contemplated: "Previously, I experienced boredom during lectures; however, I was genuinely enthusiastic about participating in games." It piqued my interest in acquiring additional knowledge.

This theme is consistent with the findings of Self-Determination Theory (Ryan & Deci, 2000), as the immersive and pleasurable nature of GBL seems to satisfy students' intrinsic motivation and autonomy needs, thereby fostering a greater emotional investment in their learning pursuits.

Enhanced collaboration (Social and Behavioral Engagement)

In cooperative or team-based activities, GBL was perceived as a catalyst for peer interaction. Students expressed their gratitude for the social aspects of game play, citing a decrease in anxiety and an increase in connectedness in group settings.

"My comprehension of the material was enhanced and my anxiety was alleviated as a result of my collaboration with teammates during the games."

This theme is consistent with Engagement Theory (Kearsley & Shneiderman, 1998), which underscores the social mediation of learning. The collaborative structure of GBL not only fostered a sense of relatedness but also increased behavioral engagement (e.g., participation, collaboration), as delineated in SDT.

Increased understanding through practice (Cognitive Engagement)

By necessitating the active application of knowledge in real-time scenarios, numerous students reported that GBL enhanced their conceptual comprehension. Games that necessitated strategic reasoning, immediate feedback, and problem-solving were particularly effective:

"I retained the concepts for a longer period of time because I was required to apply them in real-time in order to prevail in the game."

The principles of Experiential Learning Theory (Kolb, 1984) are strongly reflected in this theme, which posits that learners construct meaning through active experimentation and reflection. It is also in alignment with Flow Theory (Csikszentmihalyi, 1990), as cognitive engagement was frequently associated with students' sense of immersion and the balance between challenge and talent.

Enhanced confidence and willingness to take risks (Affective-Cognitive Crossover)

GBL fostered a psychologically secure learning environment in which students were more at ease with taking risks and learning from their errors. The absence of high-stakes grading within games reduced performance anxiety and cultivated a growth mindset: "I did not experience any form of criticism, even if I made errors during the game; rather, it served as an incentive for me to attempt again."

This understanding underscores the significance of GBL in fostering self-efficacy and resilience, which are essential elements of sustained cognitive and emotional engagement. It implies that the playful nature of GBL can reduce the dread of failure and encourage perseverance.

Obstacles to implementation

Although the general sentiment was favorable, several students identified constraints that undermined their engagement. Technical difficulties, including software errors or lag, unequal participation within teams, and unclear instructions were among the reported issues.

"The instructions were occasionally perplexing, and a few of my peers failed to prioritize them, which had an impact on the group work."

This theme emphasizes the significance of deliberate instructional design and facilitation in the implementation of GBL. The potential advantages of GBL may be diminished in the absence of equitable participation and explicit guidelines. These concerns also indicate that external factors, such as technological access and classroom administration, moderate engagement.

The conclusion that GBL substantially improves student engagement across cognitive, emotional, and behavioral domains is further supported by the convergence of quantitative and qualitative data. Students' narratives offer complex contextual explanations for why and how GBL strategies resonated with them, while Likert-scale scores provide quantitative evidence of heightened participation and motivation. These results are in accordance with previous research that has emphasized the ability of GBL to promote intrinsic motivation, collaborative learning, and deeper cognitive processing (Hartt et al., 2020; Adipat et al., 2021; Pratama & Setyaningrum, 2018).

CONCLUSION, LIMITATIONS AND IMPLICATIONS

This paper investigated student engagement using a mixed-methods approach with reference to Game-Based Learning (GBL). High degrees of engagement in behavioral, emotional, and cognitive spheres were found by quantitative results; emotional engagement ranks highest. Complementary qualitative data provided insightful analysis of students' actual GBL experiences, stressing higher enjoyment, drive, cooperation, conceptual understanding, and confidence in risk-taking.

These findings confirm an increasing corpus of research pointing GBL not just as a fun addition to education but also as a strong pedagogical tool encouraging active learning, natural motivation, and more advanced cognitive processing. Carefully planned and executed, GBL generates dynamic learning environments addressing students' academic and affective needs.

However, this study is not without limitations. The relatively narrow scope of the sample limits external validity, and the study's focus on immediate engagement outcomes does not capture long-term knowledge retention. To evaluate the ongoing educational impact of GBL, future studies should include triangulated data sources (e.g., academic achievement, observational data), bigger and more varied samples, and longitudinal designs. Future research should also look at how learner traits and game type - digital rather than analog, competitive rather than cooperative - impact GBL results.

The results have strategic and pragmatic implications for many different educational actors:

Embed GBL into lesson planning - especially in low-motivation topics - to help turn difficult material into participatory, emotionally resonant learning opportunities.

Team-based games can help peer interaction, critical thinking, communication, and problem-solving in real, socially rich settings.

By letting kids fail safely, think back, and try again, GBL helps to foster resilience, tenacity, and a good attitude about learning.

Policy Recommendations for Scaling GBL

The results of this study highlight the transforming possibilities of game-based learning (GBL) in improving student involvement in cognitive, emotional, and behavioral spheres. But deliberate policy and institutional support are necessary if we are to get beyond isolated classroom approaches and toward systemic integration. The road map for scaling GBL in curriculum design is provided by the following suggestions.

First, national or institutional GBL integration framework creation is essential. Such a structure should create explicit quality assurance criteria for educational games, match game-based pedagogy with curricular standards and learning outcomes and solve fairness by guaranteeing access across technical and socioeconomic settings.

Second, GBL approaches must be ingrained in both pre-service and in-service stages of teacher development. Including GBL into teacher preparation courses and providing micro-credentials or certification paths will help teachers better develop, support, and evaluate game-based learning.Third, encouraging professional learning communities helps to maintain knowledge-sharing and innovation. These groups should advocate reflective practice to always improve GBL techniques, multidisciplinary interaction between teachers and game designers, and group experiments.

Schools and other organizations also have to offer continuous technical and instructional help. This entails giving teachers training in successful GBL integration and arming them with both digital and analog instruments, therefore guaranteeing infrastructure readiness - especially in underfunded areas.

At last, ongoing observation and assessment are vital. Formative and summative assessments should be used by institutions to gauge how GBL affects student welfare and learning results. Crucially, the iterative creation

and improvement of GBL experiences should center student voice to guarantee that games remain sensitive to learner requirements and preferences and so remain relevant.

Adopting these policy frameworks and development plans helps educational systems institutionalize GBL not only as a creative tool but also as a sustainable, inclusive, and successful part of contemporary teaching. By making learning more interesting, interactive, and meaningful, Game-Based Learning offers a convincing route for changing educational practice overall. Coordinated policy efforts, strong professional development, and long-term empirical research are necessary if we are to fulfill full potential at scale.

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