Game-Based Learning: A Scoping Review of Research in Higher Education

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Abstract: In higher education, game-based learning (GBL) has been implemented across disciplines to enhance learning and to foster peer-to-peer connections (Jääskä & Aaltonen 2022). In the Canadian context, GBL has been embedded into curricular, co-curricular, and research initiatives, but challenges exist in GBL promotion, department affiliation, and staffing (Garbati & Skrepnek 2024). To advocate for GBL, we turn to the literature in learner motivation where scholars have noted GBL as a pillar of differentiated pedagogy (Tsami 2022) as well as a mechanism of learner motivation (Eltahir et al. 2021). While literature intersecting GBL and learner motivation exists, a systematic review of this literature does not. As such, we conducted a scoping review of the literature intersecting GBL and learner motivation in higher education. In educational research, scoping reviews synthesize existing evidence (Gómez Suárez, M. & Jesús Yagüe 2021) and are useful in determining the "scope" and volume of literature on a topic (Munn et al. 2018). To conduct this scoping review, we first searched our university library database (the largest in Canada) and other major databases (e.g., Web of Science, ERIC) using "game-based learning," "motivation," and "higher education" as key words. Inclusion criteria included: English peer reviewed journal articles published between January 1, 2020, and January 1, 2025. Our search yielded 166 results. Second, we systematically reviewed each article to identify number of authors, university affiliation, study type (e.g., qualitative, quantitative), context (curricular, co-curricular or research), research fields, program level(s), game genre (e.g., digital, analog), theoretical foundations, and learner motivation categories. Findings point to a positive connection between GBL and motivation as well as enhanced motivation and academic performance through digital GBL. Authorship composition trends toward multiple authors. This scoping review provides a comprehensive understanding of the landscape of GBL as a motivating factor in higher education, particularly in relation to student-centered initiatives, differentiated assessment strategies, and study tools. Given the current and increasing interest in GBL as both a differentiated pedagogical tool and a mechanism for fostering student motivation, this review provides a foundation for future research and offers insights for educators, scholars, and institutional leaders seeking to implement or expand GBL initiatives within higher education.

Keywords: Game-Based learning, Motivation, Higher education, Scoping review

1. Introduction

Games, both digital and analog, have been used to support classroom teaching and learning objectives and to address complex challenges related to student engagement and learner motivation (e.g., Prensky 2006; Hung & Yeh 2022). Game-based learning (GBL) is the area of study that focuses on how games can be used in the classroom to enhance student learning (Gee 2003). GBL has emerged as a dynamic and increasingly prominent pedagogical approach in higher education, aimed at enhancing student engagement, motivation, and learning outcomes. Broadly, GBL integrates elements of gameplay into educational contexts to promote active learning and foster deeper cognitive engagement with course material (Deterding et al 2011). Much of the research in this field highlights that games, whether digital or analog, offer rich opportunities for students to develop critical thinking skills, enhance collaboration, and experience content in interactive, meaningful ways. For example, research has found that the integration of games – and GBL – offers alternative or new modes of instruction and assessment (e.g., Wang & Huang 2021) and can promote active learning (e.g., Maynor et al 2022; Tejada-Simon 2024; Ting et al. 2019). In addition, GBL can foster student involvement and motivation with learning material (e.g., DeLisi & Wolford 2002; Furlong et al 2018). This engagement with learning material and academic achievement relates to students' motivation to learn. As a means of fostering this motivation, games can be used as they can provide interactive experiences that can enhance students' understanding, sustain their attention, and promote their active participation. Depending on the game design and learning context, games may support a range of educational goals, including helping students build and deepen foundational content knowledge, engage in analytical or creative thinking, communicate and collaborate with peers, or apply their learning to practical or simulated scenarios (e.g., Bernal & Lempiälä 2025).

Early studies in GBL primarily emphasized the novelty of digital technologies in education, particularly examining how digital games could outperform traditional lecture-based instruction in promoting student motivation and participation. Over time, however, the field has expanded to consider a broader range of educational purposes and learner outcomes, recognizing that games can serve both cognitive and affective functions in the classroom (Vita-Barrull et al 2025). Motivation is a central theme in GBL research, with scholars frequently exploring how

games influence students' intrinsic and extrinsic motivations to learn (e.g., Camilleri & Camilleri 2019). Studies have demonstrated that well-designed game-based interventions can foster intrinsic motivation by supporting autonomy, competence, and relatedness-key principles derived from self-determination theory (e.g., Ryan & Deci 2017; Ryan et al 2006). In the context of GBL, motivation is often linked to how games encourage active participation, sustained attention, and perseverance through challenges (e.g., Seelow 2023). Specific aspects of motivation, such as knowledge acquisition, critical thinking, communication, and application of skills, are recurrent themes within the literature. Researchers have observed that games designed with clear pedagogical goals not only enhance content understanding but also promote higher order thinking skills, collaborative problem-solving, and real-world application of knowledge (e.g., Jung et al 2020; Stokes 2020). However, findings are not uniformly positive; the effectiveness of GBL in promoting motivation can vary significantly depending on factors such as game design quality, alignment with learning objectives, and the degree of student familiarity with gaming environments. Within the broader landscape of GBL research, several notable trends have emerged. First, there has been a predominant focus on digital games, particularly those that leverage emerging technologies such as virtual simulations, mobile applications, and augmented reality. While digital GBL interventions have been extensively studied for their potential to enhance student motivation and learning, comparatively fewer studies have explored the role of analog games, such as board games or card-based activities, in higher education contexts. This digital-centric emphasis has created gaps in the literature regarding the relative affordances of non-digital games, particularly in fostering peer interaction, reflection, and community-building. Furthermore, much of the existing research tends to concentrate on curricular applications of GBL within STEM fields, with relatively limited attention given to co-curricular or interdisciplinary contexts. Finally, while motivation remains a common endpoint in GBL studies, there is variability in how motivation is conceptualized and measured. Some studies focus narrowly on immediate engagement or enjoyment, while others adopt broader frameworks that link motivation to deeper learning outcomes, such as critical thinking, collaboration, and transfer of knowledge to real-world settings. The diversity in motivational constructs reflects the complexity of operationalizing and assessing student engagement in GBL environments. As such, continued exploration of how different types of games, digital and analog, cultivate distinct motivational pathways remains a crucial area for further research.

Research to this point has been valuable in understanding the use of GBL across contexts and disciplines. That said, a clear overview of GBL and learner motivation does not exist. As such, this study presents a scoping review of the literature at the intersection of GBL and learner motivation in higher education.

2. Research Question

We are guided by the following research question: What is the current landscape of literature in the area of GBL and motivation in higher education?

3. Purpose

The purpose of this study is to investigate how games are used to motivate student learning within higher education settings. Through a scoping review of scholarly literature, this study explores the various educational purposes games serve when integrated into curricular, co-curricular, and research-based contexts. Specifically, it examines how games are designed and implemented to support learner motivation across multiple dimensions of learning, including the development of knowledge and understanding, thinking, communication, and application of skills. This study focuses on identifying the intended learning goals associated with game use, placing particular emphasis as to how games are positioned to enhance students' engagement with course content, peer collaboration, and real-world problem-solving. For instance, some games aim to reinforce foundational knowledge by encouraging students to recall, organize, and apply key concepts. Others are used to cultivate thinking by prompting analysis, inference, or innovation. Games may also support communication through dialogue, role-play, or negotiation, and promote application by situating learners in simulated environments that require practical decision-making and skill integration. By assessing how game-based strategies are used to target these distinct areas of learner motivation, the study aims to provide a comprehensive overview of the pedagogical functions games serve in higher education. This includes identifying whether particular game types –digital versus analog- are more frequently used to support certain motivational outcomes, and whether those outcomes vary across disciplines, institutional contexts, or geographic regions. The findings of this study are intended to support educators, researchers, and curriculum designers in making informed decisions about the integration of games in higher education, with a focus on enhancing student motivation, learning, and engagement.

4. Methods

To conduct this scoping review, we first searched our university library database (the largest in Canada) and other major databases (e.g., Web of Science, ERIC) using “game-based learning,” “motivation,” and “higher education” as key words. Inclusion criteria included: English peer reviewed journal articles published between January 1, 2020, and January 1, 2025. We developed a spreadsheet with twelve categories to collect and code our data. These categories captured educational, geographic, methodological, and motivational variables relevant to GBL. The 12 categories were:

1. Article Title
2. DOI
3. Year of Publication
4. Name of Journal
5. Number of Authors
6. Context: Curricular, Co-Curricular, Research
7. Main Research Field
8. University Affiliation (by continent)
9. Program Level
10. Game Genre Category
11. Learner Motivation
12. Additional Notes

Article titles and DOIs were extracted directly from the original published sources to ensure accuracy, traceability, and to avoid duplication. The year of publication and journal name were also recorded to support longitudinal and disciplinary trend analysis. The number of authors was noted by counting all individuals listed in the author byline, including co-authors and corresponding contributors. Each article was categorized by its educational context: curricular, co-curricular, or research. The "curricular" label was applied to studies embedded within formal, credit-bearing academic courses. "Co-curricular" was assigned to articles describing structured learning interventions that occurred outside of formal coursework, such as workshops or extracurricular learning communities. Articles were classified as "research" when they presented theoretical contributions and underpinnings, such as systematic reviews, meta-analyses, or conceptual research frameworks without direct implementation in a specific course setting. Keywords were transcribed exactly as presented in each article. If no keywords were provided, thematic language from the abstract or introduction was used to infer the article’s main research fields. Geographic affiliation was determined by examining the authors’ institutional locations and recorded according to continental region. Program level was identified based on clear reference to either undergraduate or graduate students. When both levels were included, or if the level was unspecified, the classification “Undergraduate and Graduate” or “N/A” was assigned accordingly. Game genre was categorized as “digital,” “analog,” “analog and digital,” or “N/A,” based strictly on explicit descriptions in the text. Digital games encompassed simulations, mobile applications, and gamified platforms such as Kahoot. Analog games included physical, non-digital formats such as board games, card games, and in-person roleplays. Only when both types of games were simultaneously used in a study was the “analog and digital” category applied. Learner motivation was one of the most carefully assessed dimensions. Each article was classified under a motivation category: Knowledge and Understanding, Thinking, Communication, or Application. This coding was based exclusively on the article’s stated pedagogical goals or measured learning outcomes, with no assumptions made beyond what was explicitly described. “Knowledge and Understanding” referred to games intended to support factual recall, conceptual clarity, or content comprehension. Articles emphasizing cognitive strategies such as analysis, logical reasoning, or problem-solving were categorized as “Thinking.” Studies that highlighted collaboration, discussion, peer feedback, or opportunities for language development, as central to the learning process were classified under “Communication.” Lastly, the “Application” category was used for articles in which learners demonstrated the practical use of disciplinary knowledge in real-world or simulated contexts. In ambiguous cases, classification was guided by the clearest instructional aim articulated by the authors. An additional notes section was included to capture contextual details not otherwise represented in the primary chart fields.

5. Findings

5.1 Overview

We collected and analyzed a total number of 166 peer reviewed journal articles. The highest number of articles was published in 2021 (n = 43), likely reflecting a peak in post-pandemic educational innovation and experimentation with digital and hybrid modalities. This was followed by consistent scholarly output in both 2022 (n = 36) and 2023 (n = 35), suggesting that GBL remained a relevant and widely studied pedagogical approach beyond the immediate shift to remote learning. While a modest decline was observed in 2024 (n = 29), early data from 2025 include three additional articles, indicating that academic engagement with this topic continues and remains current.

5.2 Publication Trends and Authorship

The 166 peer reviewed journal articles appeared across 99 different academic journals, reflecting the multidisciplinary reach of GBL research. Despite this breadth, publication activity was not concentrated in a small set of specialized journals. Only five journals published more than four relevant articles each: *Education Sciences* contributed the largest share (n = 19), followed by *Education and Information Technologies* (n = 9), *International Journal of Educational Technology in Higher Education* (n = 5), *Journal of Computing in Higher Education* (n = 5), and *International Journal of Environmental Research and Public Health* (n = 4). Notably, the majority of journals (n = 71) featured only one article matching the review criteria, indicating that GBL and motivation are being explored across a wide range of academic disciplines, rather than being confined to a single field such as educational technology. Patterns in authorship further reflect the collaborative and interdisciplinary nature of GBL research. Most articles were co-authored by groups of three or more scholars (n = 101), followed by two-author collaborations (n = 46). Sole-authored articles were comparatively rare (n = 19), suggesting a strong preference for research teams, likely due to the cross-cutting expertise required to design, implement, and evaluate game-based interventions in higher education. This trend also highlights the collective investment in advancing GBL scholarship through shared methodological and disciplinary insights.

5.3 Educational Context and Program Levels

The reviewed literature illustrates that GBL is most used within curricular settings (i.e., formal, course-based instructional environments) accounting for 110 of the 166 articles (66.3%). A further 55 articles (33.1%) were situated in research or theoretical contexts, including conceptual studies or literature reviews examining game design principles, learning outcomes, or motivational theories. Only two studies (1.2%) took place in explicitly co-curricular environments, highlighting a potential area for future exploration, especially given the rise of student-centred learning outside traditional classrooms. In terms of program levels, GBL was most frequently applied within undergraduate programs (n = 115). A small number of studies focused solely on graduate education (n = 4), while a combined focus on both undergraduate and graduate or postgraduate learners was noted in nine articles. Variants of these combined categories included “Undergraduate AND Graduate” (n = 7) and “Undergraduate AND Post-Graduate” (n = 2). The dominance of undergraduate-focused research may reflect a perception that these learners benefit most from interactive, engagement-driven instructional strategies, particularly in large or introductory courses.

5.4 Game Types and Genres

Digital games were overwhelmingly represented in the literature, with 120 out of 166 articles (72.3%) specifying digital game formats. These ranged from quiz-based platforms like Kahoot! Or Quizizz to more complex simulations and mobile-based learning applications. A smaller subset of studies focused on analog games (n=19, 11.4%), including board games, card games, or in-class role-playing activities. Hybrid approaches-combining analog and digital elements-were reported in seven studies. The dominance of digital games aligns with broader technological shifts in postsecondary instruction and the scalability of digital tools across learning management systems. However, the presence of analog and hybrid game formats suggests that some instructors intentionally choose non-digital games to promote tactile interaction, peer collaboration, or context-specific learning (e.g., games situated in physical lab or seminar spaces). The limited number of hybrid designs may indicate underutilization of integrated approaches, despite their potential to blend the accessibility of analog formats with the interactivity of digital tools.

5.5 Learner Motivation Categories

Each article in the scoping review was classified under one primary learner motivation category: Knowledge and Understanding, Thinking, Communication, or Application. This classification was based solely on the article’s

explicitly stated pedagogical goals or reported learning outcomes, without making inferenced beyond what was clearly described. 'Knowledge and Understanding' referred to gaming inclusions designed to support factual recall, conceptual clarity, or content comprehension and acquisition. Articles that emphasized cognitive strategies such as analysis, logical reasoning, or problem-solving were classified under 'Thinking.' Studies that highlighted collaboration, discussion, peer feedback or opportunities for language development were coded as 'Communication.' Finally, the 'Application' category was used for articles in which learners demonstrated the practical use of disciplinary knowledge in real-world or simulated contexts. In instances where articles appeared to touch upon multiple categories, classification was guided by the most predominant instructional aim as articulated by the authors.

Based upon this framework, the most frequently represented category was *Application* (n=63), suggesting that a substantial number of game-based learning interventions were designed to support the transfer of academic knowledge to practical, extension-based tasks. The second most frequent category was *Thinking* (n=54), highlighting the use of games to cultivate learners' critical thinking, decision-making, and analytical reasoning skills. Many of these games were situated in disciplines requiring complex problem-solving, such as health sciences, engineering, and business. The category *Knowledge and Understanding* (n=31) captured studies that used games to enhance students' grasp of course content, typically though formative assessments, concept review tools, or scaffolded learning activities. These interventions were often designed to reinforce previously taught material and improve content retention. Communication was the least frequently coded motivation category (n=14), suggesting that relatively few articles focused on games intended to foster interpersonal dialogue, collaborative work, or peer-to-peer learning. While several games incorporated team-based elements or group activities, these were not always described as central to the instructional intent, limiting their inclusion in this category.

6. Discussion

This study investigated recent trends in game-based learning (GBL) research within higher education, with a particular focus on the types of games employed (digital, analog, or unspecified) and the learner motivation categories emphasized (Knowledge and Understanding, Thinking, Communication, Application). By systematically reviewing 166 articles published between 2020 and 2025, the study offers insights into how GBL is currently framed in pedagogical research, and where gaps remain. One of the most notable findings is the overwhelming dominance of digital games in the reviewed literature. Despite the educational potential of analog games, very few studies (n=19; 11.4%) specifically explored or even mentioned them. In many cases, articles failed to specify the type of game used, highlighting a lack of precision in the field's methodological reporting. This digital preference aligns with broader technological trends in education but may also suggest a narrow conceptualization of what constitutes effective game-based learning. Future research could benefit from a more deliberate exploration of non-digital (analog) GBL strategies, particularly given their accessibility, affordability, and potential for fostering peer interaction.

Regarding learner motivation, most studies were classified under the "Application" (n=63, 38.0%) or "Thinking" category (n=54, 32.5%), emphasizing the role of GBL in enhancing cognitive skills such as problem-solving, critical analysis, and strategic reasoning as well as the design focus on developing higher-order cognitive skills. Comparatively fewer studies targeted "Communication" (n=14, 8.4%) skills. These findings echo earlier critiques within the literature that GBL research may prioritize cognitive engagement at the expense of social or applied dimensions of learning. Another important observation concerns the geographical distribution of research efforts. Most studies were affiliated with institutions in North America, Europe, and Asia, suggesting a concentration of GBL research within relatively well-resourced educational systems. Limited representation from regions such as Africa and South America points to a need for broader, more globally inclusive research efforts. The field would benefit from attention to context-specific variables that shape GBL effectiveness, such as infrastructure availability, cultural perceptions of play, and different pedagogical traditions. While this study offers a comprehensive view of recent GBL scholarship, several limitations must be acknowledged. First, the exclusion of non-English articles may have inadvertently narrowed the cultural diversity of the sample. Second, although coding frameworks for learner motivation categories were consistently applied, interpretation was based solely on authors' stated aims and outcomes, which may not capture deeper nuances present in the studies themselves. Finally, given that some articles lacked sufficient methodological detail, such as specifying game types, certain categorizations relied on the clearest available information, which introduces some degree of interpretive constraint.

Future research should aim to address these gaps by clearly specifying game types in study designs and reporting, broadening learner motivation frameworks to explicitly account for social, emotional, and applied dimensions of learning, conducting cross-cultural comparative studies that recognize how local contexts mediate the impact of GBL, and investigating the long-term impacts of GBL beyond immediate engagement or academic performance. In particular, future studies could explore how GBL influences persistence in education, career readiness, and the development of lifelong learning attitudes. Overall, while game-based learning continues to demonstrate potential as a motivating and cognitively enriching pedagogical tool in higher education, a more diversified, context-sensitive, and socially attuned research agenda is needed to fully realize its benefits across varied educational landscapes.

7. Limitations

While this scoping review provides a broad overview of the intersection between GBL and learner motivation in higher education, several limitations should be acknowledged. First, the review was limited to peer reviewed journal articles published in English between January 1, 2020, and January 1, 2025. This exclusion of non-English publications, conference proceedings, book chapters, and grey literature may have omitted valuable insights from diverse geographic regions and interdisciplinary sources. As such, the findings may reflect a publication bias toward English-speaking academic contexts and disciplines with greater representation in indexed journals. Additionally, while the classification of learner motivation categories was based on explicit statements within each article, this approach depends heavily on how authors articulated their pedagogical goals or learning outcomes. In cases where descriptions were vague or inconsistent, articles may have been excluded from more nuanced classification, and important instructional features may have been overlooked. Furthermore, only the primary motivation category was recorded, which may not fully capture the multi-dimensional nature of some GBL interventions. This review also did not assess the quality or methodological rigor of the included studies. As is typical in scoping reviews, the emphasis was on mapping the scope and characteristics of the literature rather than evaluating the strength of the evidence (Munn et al 2018; Pham et al 2014). As a result, findings related to the effectiveness of GBL for enhancing learner motivation should be interpreted without the assumption that such evidence is conclusive of total GBL impact within the landscape of higher education. Finally, due to the evolving nature of the field, the review captures a snapshot of GBL research during a time of significant pedagogical experimentation, particularly during the COVID-19 pandemic. This context may have influenced the types of games implemented, the emphasis on digital modalities, and the urgency to adopt student engagement strategies, potentially shaping the trends observed in the literature. These limitations highlight opportunities for future research, including studies that incorporate a broader range of sources, more robust theoretical integration, and empirical evaluations of GBL's effectiveness in supporting different dimensions of learner motivation.

8. Conclusion

In conclusion, this scoping review highlights both the strengths and current limitations of GBL research within higher education. While GBL continues to show considerable promise in enhancing student motivation, promoting cognitive engagement, and fostering deeper learning, the field remains heavily skewed toward digital applications and primarily emphasizes cognitive outcomes such as problem-solving and critical thinking. There remains untapped potential in exploring the role of analog games, expanding the focus to include social and applied learning outcomes, and examining GBL practices across more diverse global contexts. Future research should adopt more inclusive, detailed, and context-sensitive approaches to capture the full pedagogical possibilities of GBL. By broadening methodological practices and diversifying the understanding of learner motivation, the field can move toward more equitable, innovative, and sustainable uses of game-based learning in higher education. Doing so will not only strengthen the academic foundations of GBL research but also ensure its relevance and accessibility to a wider range of learners and educational environments.

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