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Motivation at Play: A Bibliometric Analysis of the Emerging Gamification and Game-Based Learning in Education

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Abstract: The growing use of gamification and game-based learning (GBL) is transforming education by promoting interactivity, engagement, and a learner-centered approach. This paper examines research trends in gamification and GBL, focusing on student motivation and the effectiveness of integrating these methods into curricula. We conducted a bibliometric analysis of research articles from the Scopus database published between 2012 and 2026. VOSviewer software was used to visualize research trends, keyword co-occurrences, research areas, and emerging themes. A qualitative analysis identified common themes. Results show a significant increase in research on gamification and GBL since 2018, with a notable rise after 2020. Network and density visualizations highlight motivation, teaching, and e-learning as primary themes. Time-slicing analysis indicates a shift from technology-centered research to a focus on learner engagement, motivation, e-learning, health education, and remote learning. Emerging topics include augmented reality, serious games, simulation, and escape rooms. The findings emphasize the importance of considering learner motivation and engagement, appropriate technology, instructional level, and educator readiness when implementing gamification and GBL. This study enhances understanding of key areas of focus in educational research on gamification and GBL. The results can inform practitioners, researchers, and policy-makers in the development and implementation of digital learning experiences.

Keywords: *gamification; game-based learning; student motivation; education; bibliometric analysis; VOSviewer; learner-centred learning*

1. Introduction and Background

The rapid advancement of digital technologies has fundamentally transformed teaching and learning practices across educational institutions, offering new opportunities to engage students in interactive learning and to utilize a wide range of technological tools. However, as the educational environment becomes increasingly digitized, it is necessary for educators to implement learning models that enable them to effectively engage students in ways that sustain their learning interest and keep them motivated.

Game-based learning (GBL) is an innovative educational concept that incorporates game elements and principles into interactive learning experiences (Ding & Yu, 2024). In recent years, the need and importance of GBL have significantly increased due to the growing trend away from traditional teacher-centered contexts and the increasing need for innovative learning methods and engagement strategies. Game-based learning is a joyful cognitive activity that adheres to academic guidelines to achieve several educational results. Compared to conventional or traditional directive learning strategies, GBL uses game dynamics and elements such as rules, interaction, goals, competition, and problem-solving to ensure students engage in educational activities and learn concepts and skills more effectively (Al-Jamili et al., 2024). According to Chang et al. (2024), game-based learning, through interactive games, simulations, or virtual environments that replicate real-life circumstances, enables students to practice and apply theoretical knowledge in a secure setting. Meanwhile, Ding & Yu (2024) also mentioned that GBL has been shown to improve students' motivation to learn and performance, with a focus on in-game design and conducted in an experimental setting without educators' involvement.

For students who lack motivation and tend to struggle academically, game-based learning (GBL) has become an effective tool for engaging them in immersive, dynamic learning experiences (Hsu & Cheng, 2021). Students can actively investigate complex academic ideas and phenomena through interactive, dynamic environments

created by game elements such as challenges, rewards, and competition, thereby enhancing their motivation to learn (Ding & Yu, 2024). Chang et al (2024) further agree that gamifying learning materials may boost students' enthusiasm and motivation for their education. In the meantime, the increase in engagement and participation also leads to better comprehension of complicated subjects.

Locally, in the context of Malaysia, a study by Che Mansor and Rosly (2024) found that students taught using mathematical games outperformed those who received only traditional instruction, showing that game-based learning is not just a game but also helps students achieve academic success. Another study by Chang et al (2024) found that incorporating game-based learning in education has effectively enhanced students' self-efficacy and motivation to learn. Meanwhile, Ghapar (2024) believes it is essential to develop digital skills among students in higher education institutions through digital gamification, which aligns with the Malaysian government's and related ministries' efforts to create a digitally literate generation and to foster innovation using digital technology in the Twelfth Malaysia Plan. Previous studies have shown that using GBL as a new approach to learning improves students' achievement and may foster a pleasant, engaging learning environment while also developing their ability to think strategically and logically.

However, despite the growing body of research on GBL and its extensive application in education, a comprehensive synthesis of research trends and the evolution of GBL in education has remained limited. Existing studies primarily focus on specific technologies or individual aspects. A key challenge in this research is to identify how emerging technologies in gamification can contribute to students' education, particularly regarding motivation. Furthermore, there is limited research on how GBL enhances students' motivation in the learning process, given the evolving landscape of gamification in education. Therefore, to bridge the gap, this study conducts a bibliometric analysis to map and synthesize existing research on the emerging fields of gamification and GBL in education. This study seeks to answer the following key questions.

Accordingly, this study employs a bibliometric approach to map and synthesize the development of research on gamification and GBL in education. Specifically, the study addresses two interrelated questions: how have gamification and game-based learning evolved in relation to student motivation, and how can game- based learning be effectively incorporated into education? By addressing these questions, the study seeks to provide a clearer understanding of the field's development and the emerging role of motivation in gamified learning research.

The remainder of this paper is organized as follows. Section 2 reviews the literature on gamification and game-based learning in education, student motivation, and barriers to adoption. Section 3 describes the bibliometric method, data collection and screening procedures, and VOSviewer analysis. Section 4 presents publication trends and the network, overlay, and density visualizations. Section 5 discusses the major themes and their implications for incorporating GBL into education. Section 6 concludes the paper by outlining its contributions, limitations, and directions for future research.

2. Literature Review

Gamification and Game-based Learning in Education

According to Krath et al. (2021), gamification, which refers to structured play with rules, goals, and challenges for entertainment, was first developed in 2008 and has grown in popularity since 2010. Unlike games, gamification is distinguished by its serious objective. Although there are many definitions of gamification, most focus on either the practice of gaming and gameful experiences in serious settings or on game features and mechanisms. Another study, Zainuddin et al. (2020), identified various commonly used gamification elements, including points, badges, leaderboards, levels, and avatars.

Serious games and GBL are two other concepts closely associated with gamification. GBL is the process of achieving predetermined learning objectives through gameplay and game materials, and of improving learning by incorporating challenges and problem-solving that give players and learners a sense of achievement. The researcher further agrees that the goals of GBL are to educate the students. The goal of GBL is to educate. The approach is based on a full-fledged game, sometimes known as a serious game. Serious games can be used for other objectives beyond education, such as industry, training, or simulation with real-world applications for

students in the future. Positive gaming experiences can be used for important purposes, such as education or behavior change, rather than solely for entertainment (Krath et al, 2021).

Students' Motivation in Education

Carpio de los Pinos et al. (2026) define motivation as the need to channel energy towards specific goals, encompassing social achievement and internal factors like self-concept and self-esteem. The researcher highlights the connection between positive motivation and self-concept, stating that optimal motivational stimulation occurs at middle levels for effective behavior development and maintaining behaviors. In order to be effective, motivational activities must foster creativity and individuality, enable students to express their unique personalities, and significantly expand on their past knowledge. Integrating current technologies improves students' motivation to learn and their academic performance (Shalgimbekova et al., 2024). Chang et al (2024) stated that games play an important role in human culture and society by increasing motivation and involvement, leading most educational institutions, which typically do not involve games, to adopt GBL.

According to Krath et al (2021), gaming's reputation as a motivator is one of the factors contributing to the rise in popularity of gamification, serious games, and GBL. Motivation is a theoretical concept that manifests as behavior and can lead to positive cognitive outcomes, such as improved learning and achievement. In educational settings, high-quality motivation, such as intrinsic motivation, is associated with better outcomes than low-quality motivation, such as motivation through extrinsic rewards. Chen (2023) further agrees that combining games with learning can boost students' motivation, learning effectiveness, and experience by providing interesting and challenging activities. GBL is a proven way to provide enjoyable learning experiences and improve motivation and outcomes.

Barriers to Adoption of Gamification

Although many educators are now embracing various technological tools to improve students' learning outcomes, there has been a reported list of challenges and barriers to gamification and GBL. These include student perceptions, inadequate technology, lack of training, limited funds, absence of relevant educational games, and a lack of administrative support (Kaimara et al., 2021; Sabornido et al., 2022). It is worth noting that these challenges are more likely to be experienced in smaller institutions due to insufficient funds, the cost of purchasing the necessary games, and a lack of sufficient technological infrastructure.

3. Research Methodology

This study employs bibliometric analysis in which the research problem and questions guided the search strategy. A bibliographic database, Scopus, was chosen to gather research evidence using keywords: "gamification" AND "education" AND "game-based learning" AND "students." The documents were screened based on their titles, abstracts, and keywords. The source manuscript shows that 665 articles were found, and 504 were included. Table 1 below demonstrates that the database includes 504 articles and 201 conference proceedings.

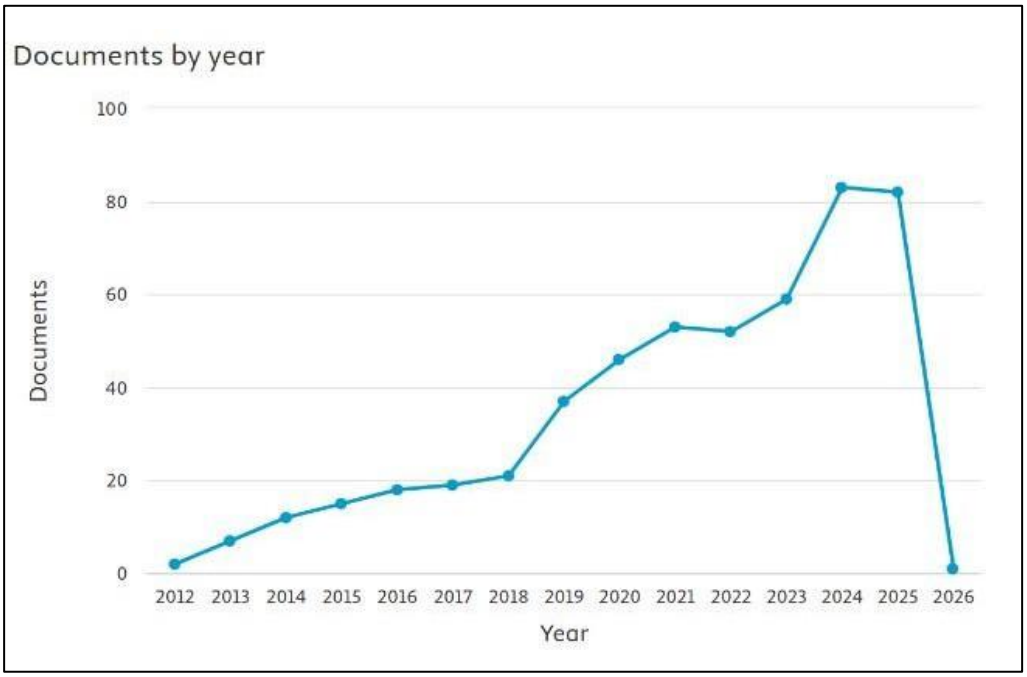
The inclusion criteria included English-language journals and conference proceedings published between 2012 and 2026. Excluded items were lecture notes, symposiums, trade magazines, book reviews, letters, books, book chapters, literature syntheses, bibliometric studies, and reviews.

Table 1: Dataset information

Description	Results
Initial search	
Timespan	2012 - 2026
Number of documents	665
Applying exclusion criteria	
Timespan	Only include 2012 – 2026 Exclude Before 2012

Document type	Journal articles and conference proceedings Exclude: Lecturer notes, symposiums, trade magazines, book reviews, letters, books, and chapters in books. Also, papers on literature synthesis, bibliometrics, and reviews. The main reason is to focus on empirical findings.
Language	English
Article	504
Proceeding	201
Total number of citations	9,513
Average citations per document	18.88

Figure 1: Number of publications based on year

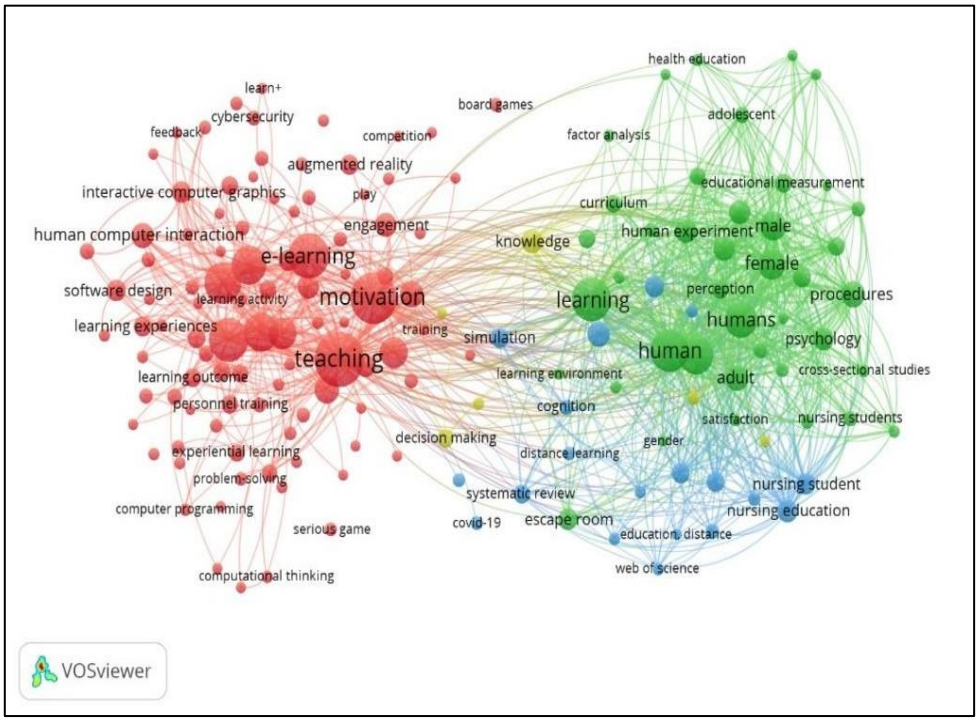


The selected publications were analyzed using VOSviewer for bibliometric mapping, followed by qualitative analysis to identify themes. Publication trends were examined across the 2012–2026 period, while network, overlay, and density visualizations were used to examine keyword relationships, thematic prominence, and changes in research emphasis over time.

4. Results

The results of the present bibliometric analysis of gamification and GBL in education, including research questions, are discussed in this section. Particular attention is paid to research trends, topic clusters, and keyword dynamics that highlight academic interests and provide insight into the field's development during the study period. The findings provide insight into the main areas of academic interest, common patterns in term co-occurrence and the importance of gamified technologies for educational motivation.

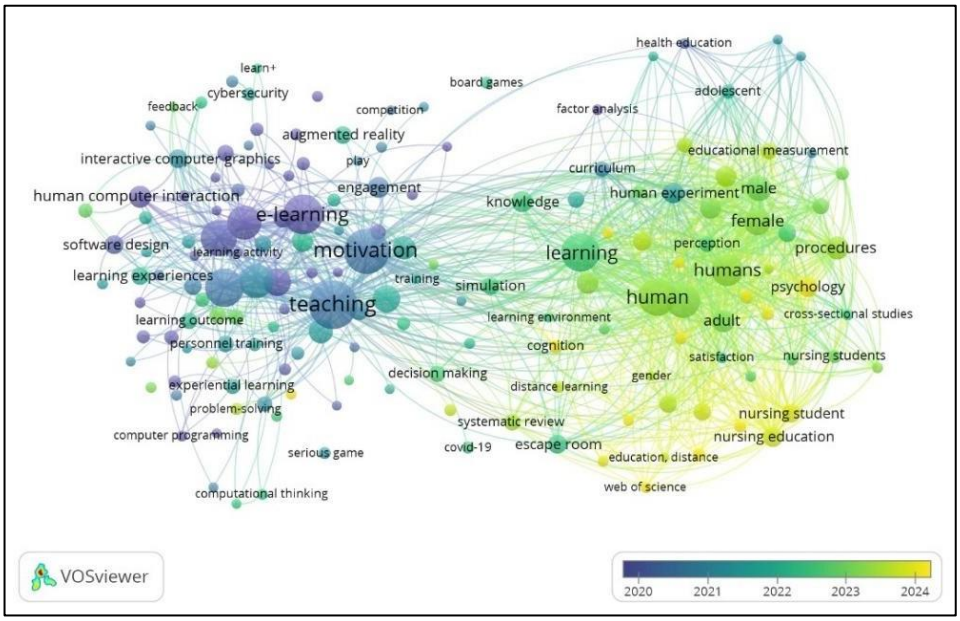
Figure 2: Network Visualization



VOSviewer was used to conduct an in-depth analysis of the articles by examining each keyword identified in the previous step. The tool helped identify the relevance and weight of emerging gamification and students' motivation to learn. The network visualization is shown in Figure 2, where the four nodes are the most prominent. These nodes are "motivation", "e-learning", "teaching", and "human", signifying the most widespread topics and positive influences on game-based learning among students, with "motivation" being the major theme.

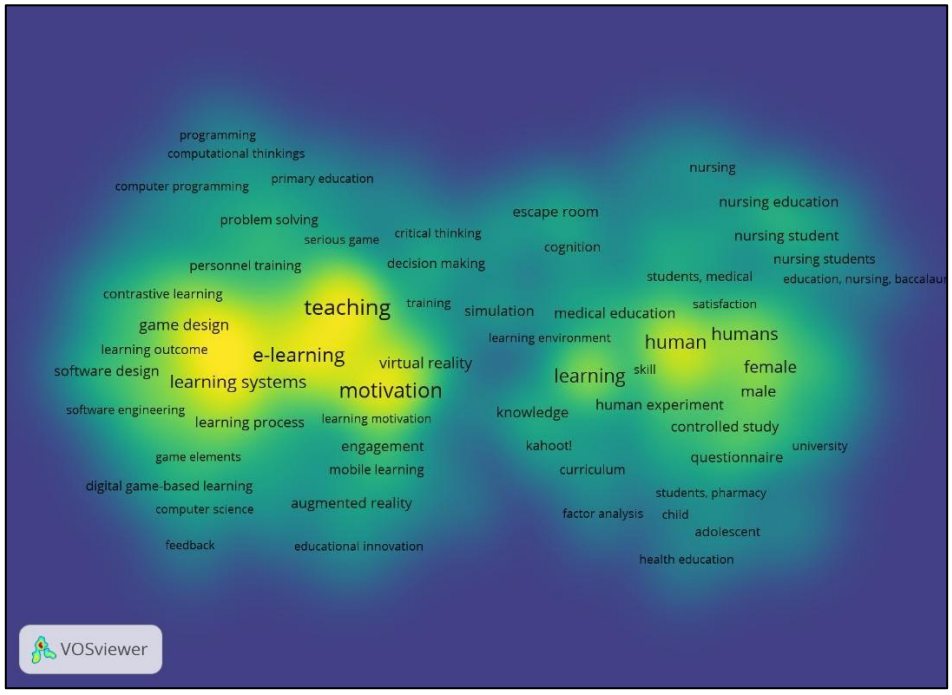
The largest green area includes the words "motivation" and "teaching" and is linked to the green area labeled "human-centered learning." This connection strongly suggests that the current trend in gamification is toward human-centered learning, with a strong emphasis on student motivation. On the other hand, the "teaching" node is linked to the blue area labeled "nursing student". The connection suggests that GBL and gamification methods are used in nursing and health education, as students are often required to develop skills through simulation. Overall, the network visualization highlights a focus on studies in the teaching field, motivation, and human-centered learning, with involvement of health/nursing education themes. This implies that the latest trends in game-based learning research prioritize learner-centered, experiential learning, with gamification as a tool to increase motivation and encourage skill mastery.

Figure 3: Overlay Visualization



Next is to evaluate the overlay visualizations, which show how research on a specific technology has changed over time. The color and area of each circle correspond to the quantity of research undertaken in that field. Figure 3 displays the findings for the earlier years of 2020 to 2021, depicted in shades of blue, with the research primarily focusing on foundational technological aspects of gamified learning, namely "e-learning" and "teaching". Then, studies shifted toward "motivation" and "engagement" as they became more prominent in 2022. However, in 2023, the study broadened to a human-centered approach that involves human perception. Last but not least, recent research trends have shifted to health education and distance learning.

Figure 4: Density Visualization



The colors in the overlay visualization illustrate how research interest has changed over time. Darker or colder hues indicate earlier work, whereas brighter or warmer hues are more likely to display current work. Based on Figure 4, the density visualization shows that "motivation," "teaching," and "e-learning" are the center of the most active research hotspots in gamification and game-based learning. For instance, “motivation” and “teaching” remain the primary areas of emphasis in gamified learning research, with the highest numbers of citations and studies. On the other hand, the result shows that during a washout, yellow hues are focused on “medical education”, indicating that the integration of GBL reflects the effectiveness of gamified approaches in skill-based and experiential learning environments. This visual method offers insight into the emergence and expansion of interest and activity in these connected areas.

In order to answer the first research question, which is how emerging gamification and game-based learning evolved in relation to student motivation, according to the bibliometric analysis, publications on gamification and GBL increased steadily starting in 2018 and then significantly after 2020. This growth aligns with the post-pandemic shift in the education sector, in which digital and interactive learning became necessary and important.

As shown on the overlay visualization in Figure 3, Augmented Reality (AR), serious games and simulation, e-learning, and escape room-based learning play an important role in the growing trend of gamification and GBL in education. These technologies can significantly improve students' education by boosting their motivation to study and their engagement, leading to better academic results. This development indicates that research has shifted from studying technology tools and system design to focusing more on the behavioral and psychological implications of gamified learning. Accordingly, these findings highlight the increasing understanding that technology alone does not lead to academic success. Instead, factors like student motivation, engagement, and emotional connection are essential.

Additionally, according to the second research question, the findings in Figure 2 highlight the growing importance of e-learning and digital platforms. This emphasizes the need for strong technological readiness. The availability of digital infrastructure, such as stable internet connectivity, proper devices, and easily accessible learning management systems, is essential for the successful integration of GBL. In the meantime, adequate training and exposure for educators also play a vital role in educators' confident use of GBL in the classroom. These factors require careful preparation, as they may lead to failure even with the most effective GBL approach.

Discussion

The research has utilized a bibliometric method to analyze the trends in gamification and game-based learning (GBL) research and education articles from 2012 to 2026. Among the results, there are several trends in publication counts, the most common themes, changes in themes over time, and areas of interest in gamification and GBL.

The first trend concerns the number of publications. The years 2012 – 2018 show steady growth in the number of works, whereas 2020 and subsequent years witness a significant increase. The growth may be related to the shift towards more digital and technology-enabled learning initiatives within educational settings, which is explained by the overall tendency towards online learning and its adoption by educational institutions. Yet, the number of publications is not necessarily linked to the efficacy of the new trends.

The next two trends concern the most common themes in research on gamification and GBL. The network visualization shows that the terms “motivation”, “teaching”, “e-learning”, and “human” are the most frequent ones. The words “motivation” and “teaching” are both connected to a considerable number of other terms, suggesting that they are significant themes in current gamification and GBL research. The connection to “human” probably signals a focus on human experience in studies that aim to find the link between gamification/GBL and education. The terms “nursing students” and “health” also appear frequently and are connected to “teaching” and other educational terms. This means that health education, especially nursing, is another common theme in gamification and GBL research. Thus, the network visualization shows that most studies focus on the relationship between gamification/GBL and motivation in teaching, particularly in health education. However, the mere appearance of the terms together does not mean that they are related.

The overlay visualization shows shifts in research foci over time. The earlier studies, dated 2020 and 2021, tend to focus on e-learning and teaching. The later articles are more likely to mention motivation and engagement and include terms related to humans and education. The density visualization confirms the prevalence of terms connected to teaching, e-learning, and motivation. It also shows that terms connected to health and nursing are gaining popularity. Moreover, recent articles mention concepts such as augmented reality, serious games, simulation, and escape rooms. Thus, the three visualizations reveal several trends in gamification and GBL research, education, and practice. While some terms, such as teaching, e-learning, motivation, and engagement, remain popular, newer articles feature concepts of augmented reality and serious games.

The three trends revealed by the study can be developed by future research in different directions. First of all, although the current articles are dominated by mentions of motivation and teaching, further research is needed to determine whether gamification/GBL has a significant effect on these themes. Secondly, it would be interesting to see how gamification and GBL influence different areas of education with regard to their level (school, university, vocational education) and particular educational settings (online instruction, blended learning, classroom activities). Finally, newer trends in gamification and GBL tend to focus on augmented reality and serious games in education. These themes could also be explored in depth to determine whether they have any noteworthy effect on the learning experience.

In conclusion, the present bibliometric study has analyzed the trends in gamification and GBL research and education. All three aspects – research, education, and practice – show multiple trends and shifts in focus. The study found that most articles focus on motivation and engagement in gamification and GBL, particularly in health education. Yet, current attention to this issue does not necessarily mean that gamification/GBL has a significant effect on learning in general, or in the fields of education most popular among researchers. The study can be continued with further bibliometric analysis or with quantitative and qualitative analyses of individual articles to examine the methodologies and results they present.

5. Conclusion

Contributions and Practical Implications

This study extends the existing literature by providing insight into the main themes and directions of research on gamification and GBL. The methodology used in this study is also a valuable contribution to the literature on gamification and GBL, as it provides an example of how keyword co-occurrence analysis can be used to identify topics that share common elements. The findings of this study are significant for educational settings, as they identify the themes that dominate research on gamification and GBL, as well as the areas that require further research.

The findings of this study have important implications for both educators and educational institutions. To an educator, the findings would emphasize the need to consider the inclusion and role of game elements and goals within a particular educational setting. The findings would indicate the need for gamification, in which elements of games are integrated into the educational setting, rather than simply increasing the presence of games. Educational institutions, however, would be responsible for ensuring that educators have the necessary support and training to incorporate games into instructional settings to optimize learning. Finally, the implications of these study findings would be significant for researchers, as they would highlight themes warranting further in-depth exploration of how gamification and GBL can be used to optimize learning across different educational settings.

Limitations and Future Research

The study has certain limitations, among which is the use of only English-language sources cataloged in Scopus. The analysis might have produced different results if multiple databases, including non-English ones, had been used. Furthermore, the bibliometric method is highly dependent on the accuracy of keyword combinations and might not account for qualitative differences in studies.

Future research on gamification should be extended to multiple databases and sources, including Web of Science and IEEE Xplore and should consider differences across fields and educational stages. Additionally, the

factors affecting GBL implementation and application might be evaluated using a mixed-methods approach. More studies are needed on student motivation, engagement, and learning outcomes both in the short and long term. Particular emphasis should be placed on educators' views, competencies, and abilities, as well as on institutional barriers to adoption.

Conclusion

This study aimed to explore the development of research on gamification and game-based learning through a bibliometric analysis. The analysis revealed key themes and relationships between the terms in this area. The review found that motivation, teaching, and engagement are the most common themes in gamification and game-based learning research. Additionally, the analysis showed that e-learning and the use of these methods in practice, particularly in health and nursing education, are significant research topics.

The findings emphasize that most papers focus on learning and the educational aspects of gamification and game-based learning. The majority of the reviewed articles discuss how this new approach can be used in teaching to promote participation and engagement. They suggest that educators should pay more attention to the characteristics of games and their impact on learning outcomes. This bibliometric analysis did not determine whether gamification and game-based learning methods affect education. However, it revealed the need for further studies exploring the effectiveness of this approach.

Thus, this analysis provided findings about the themes and trends in gamification and game-based learning research. The findings may be useful to researchers seeking to identify the most common topics in this field. Moreover, the results can help educators and institutions interested in promoting learning through games identify aspects that warrant further investigation.

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References

Al-Jamili, O., Aziz, M., Mohammed, F., Almogahed, A., & Alawadhi, A. (2024). Evaluating the efficacy of computer games-based learning intervention in enhancing English speaking proficiency. Heliyon, 10(16), Article e36440. https://doi.org/10.1016/j.heliyon.2024.e36440

Carpio de los Pinos, C., Durán Medina, J. F., Rodríguez Arenas, D., & Cid García, H. (2026). Artistic and cultural education to improve creativity and motivation in students experiencing academic failure in secondary school. Thinking Skills and Creativity, 60, Article 102026. https://doi.org/10.1016/j.tsc.2025.102026

Chang, C. Y., Setiani, I., Darmawansah, D., & Yang, J. C. (2024). Effects of game-based learning integrated with the self-regulated learning strategy on nursing students' entrustable professional activities: A quasi-experimental study. Nurse Education Today, 139, Article 106213. https://doi.org/10.1016/j.nedt.2024.106213

Che Mansor, N. S., & Rosly, N. S. (2024). A study on the relationship between game-based learning and secondary school students' mathematics achievement in SMK Kompleks Gong Badak. Malaysian Journal of Computing, 9(1), 1776–1788. https://doi.org/10.24191/mjoc.v9i1.26081

Chen, C.-M., Li, M.-C., & Kuo, C.-P. (2023). A game-based learning system based on the Octalysis gamification framework to promote employees' Japanese learning. Computers & Education, 205, Article 104899. https://doi.org/10.1016/j.compedu.2023.104899

Ding, A. C. E., & Yu, C. H. (2024). Serious game-based learning and learning by making games: Types of game-

based pedagogies and student gaming hours impact students' science learning outcomes. Computers & Education, 218, Article 105075. https://doi.org/10.1016/j.compedu.2024.105075

Ghapar, M. A., Ibrahim, N., Shamsudin, A., & Hassan, N. F. N. (2024). Digital game-based value learning model for management students in Malaysian higher education institutions. Journal of Creative Practices in Language Learning and Teaching, 12(2), 88–99. https://doi.org/10.24191/cplt.v12i2.3621

Hsu, M.E., & Cheng, M.-T. (2021). Immersion experiences and behavioral patterns in game-based learning. British Journal of Educational Technology, 52(5), 1981–1999. https://doi.org/10.1111/bjet.13093

Kaimara, P., Fokides, E., Oikonomou, A., & Deliyannis, I. (2021). Potential barriers to the implementation of digital game-based learning in the classroom: Pre-service teachers' views. Technology, Knowledge and Learning, 26(4), 825–844. https://doi.org/10.1007/s10758-021-09512-7

Krath, J., Schürmann, L., & von Korflesch, H. F. O. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. *Computers in Human Behavior*, 125, Article 106963. https://doi.org/10.1016/j.chb.2021.106963

Sabornido, E. B., Garma, V. A., Niepes, G. L., & Cabria, F. M. N. (2022). Key challenges and barriers in gamification: A systematic review. Asia Pacific Journal of Advanced Education and Technology, 1(1), 13–19. https://doi.org/10.54476/apjaetv1i1mar20221054

Shalgimbekova, K., Smagliy, T., Kalimzhanova, R., & Suleimenova, Z. (2024). Innovative teaching technologies in higher education: Efficiency and student motivation. Cogent Education, 11(1), Article 2425205. https://doi.org/10.1080/2331186X.2024.2425205

Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. Educational Research Review, 30, Article 100326. https://doi.org/10.1016/j.edurev.2020.100326

Zhang, F. (2024). Effects of game-based learning on academic outcomes: A study of technology acceptance and self-regulation in college students. Heliyon, 10(16), Article e36249. https://doi.org/10.1016/j.heliyon.2024.e36249