

GAME-BASED LEARNING IN EDUCATION ACROSS FIVE ASIAN COUNTRIES: A BIBLIOMETRIC STUDY USING SCOPUS

***Nurfitri Ramadana¹, Rini Maharani², Fakhrol Husni³, Resky Nuralisa Gunawan⁴**

^{1,2,4}Universitas Negeri Yogyakarta, ³Sekolah Tinggi Agama Islam Nusantara, Banda Aceh

*Corresponden Author: nurfitriramadana.2022@student.uny.ac.id

Abstract

Game-Based Learning (GBL) is an innovative learning approach that integrates game elements into the learning process to increase student motivation, active participation, and learning outcomes. Amidst the acceleration of digital transformation, the application of GBL in Asian countries shows diverse developments, but has not been fully mapped scientifically. The main issues raised in this study are how publication trends, collaboration patterns, and thematic focuses of GBL research have developed in the context of education in Asia during 2010–2025. The research questions include: (1) to what extent is the productivity of GBL publications in the Asian region; (2) how is the structure of collaboration between researchers and institutions; and (3) what topics are the dominant focus and future research directions. This study uses a bibliometric approach with the PRISMA method and visualization using VOSviewer based on Scopus data. A total of 170 documents selected from five countries Indonesia, Hong Kong, Japan, Thailand, and India-were analyzed to examine trends, distribution, and keyword co-occurrence. The results show that Indonesia and Hong Kong are the most productive countries, with significant contributions from The Education University of Hong Kong and Malang State University. Cluster analysis identified four main focuses: (1) the development of game-based learning technologies and concepts; (2) learning systems and participants; (3) psychological and cognitive aspects; and (4) specific methodologies and contexts such as virtual reality and language learning. The latest findings highlight a shift in research direction towards strengthening critical thinking, educational technology, and contrastive learning, which signals the evolution of GBL from a mere learning medium to a comprehensive strategy for shaping 21st-century skills. This research makes an important contribution to mapping the development of GBL in Asia and provides a basis for future technology-based education policies.

Keywords: *Game Based Learning; Critical Thinking; Educational Technology; Contrastive Learning.*

A. Introduction

In the 21st century, Game-Based Learning (GBL) has emerged as an innovative educational approach that integrates game elements into the learning process to enhance learners' motivation, engagement, and academic achievement. This approach has proven effective in encouraging students to actively participate through interactive and enjoyable learning experiences (Pacheco-Velazquez et al., 2024; Katual et al., 2023). By combining cognitive, affective, and behavioral aspects, GBL strengthens conceptual understanding while improving students' critical and collaborative thinking skills (Ramadana & Widayati, 2025; Hu et al., 2025).

Furthermore, GBL is able to accommodate various ways of thinking that are often overlooked in traditional education, such as systems thinking, cooperation, strategic thinking, intelligent decision-making, and ethics. These skills are very important for the holistic development of students and can be effectively honed through well-designed educational games (Seelow, 2021). Thus, GBL not only serves as a learning tool, but also as a means of developing the higher-order thinking skills needed in today's complex and dynamic world.

The development of digital technology has accelerated the implementation of GBL in various countries. Digital transformation has enabled the emergence of serious games, learning simulations, and the application of augmented reality, which places students as active subjects in the learning process (Nuralisa et al., 2025). However, the adoption rate of GBL in Asia still varies greatly, influenced by infrastructure readiness, education policies, and research support in each country (Jossan et al., 2021).

Based on previous research oleh Luh et al., (2025) the use of Game-Based Learning (GBL) media effectively increases enthusiasm, motivation, learning outcomes, and active student engagement through fun and interactive learning. Yadav & Oyelere, (2021) saying the same thing Game-Based Learning is effective in improving students' understanding of algorithms, motivation, and learning satisfaction with easy use even in limited environments. Not only learning satisfaction for students, but well-developed GBL also helps improve motivation, cognitive skills, and learning styles of elementary school students in rural areas (Mohanty et al., 2021). However, the main challenges in implementing GBL are the availability of infrastructure, teacher support, and proper integration into the curriculum so that students at various levels of education can fully reap its benefits.

Based on Figure 1, Indonesia ranks first in the number of GBL publications in the field of education with more than 50 documents, followed by Hong Kong with more than 45 publications. Thailand and India show balanced contributions with around 30 publications, while Japan has around 15 documents below China, which recorded more than 15 publications. This variation reflects differences in

attention and priorities for GBL research between countries, which are influenced by education policies, funding support, and technological readiness.

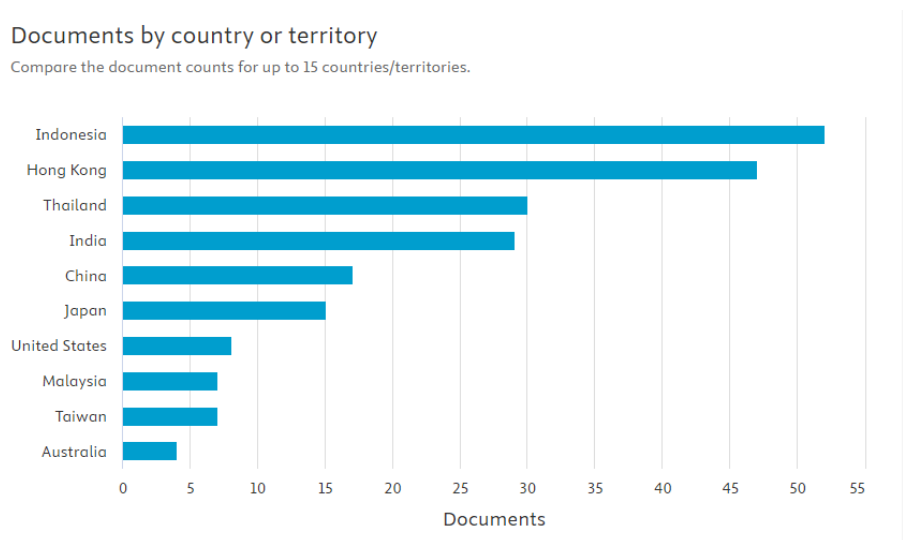


Figure 1. Documents by Country or Territory

The dominance of Indonesia and Hong Kong indicates a relatively strong research ecosystem, with consistent levels of productivity and scientific collaboration. Meanwhile, increased contributions from Thailand and India indicate significant potential for future expansion of GBL research. This pattern suggests that the Asian region is experiencing a phase of rapid growth in GBL research, but it has not yet been fully mapped scientifically. This necessitates comprehensive bibliometric studies to understand the direction of development, collaboration networks, and dominant topics emerging in GBL research in the region.

Based on these conditions, this study aims to bibliometrically analyze publication trends, collaboration patterns, and thematic focuses of Game-Based Learning research in the field of education in five Asian countries, namely Indonesia, Hong Kong, Japan, Thailand, and India, during the period 2010–2025. Through a bibliometric approach using the PRISMA method and visual analysis using VOSviewer, this study is expected to provide a comprehensive overview of the GBL research map in Asia, identify new thematic directions such as critical thinking, educational technology, and contrastive learning, and offer strategic recommendations for the development of technology-based education policies in the future.

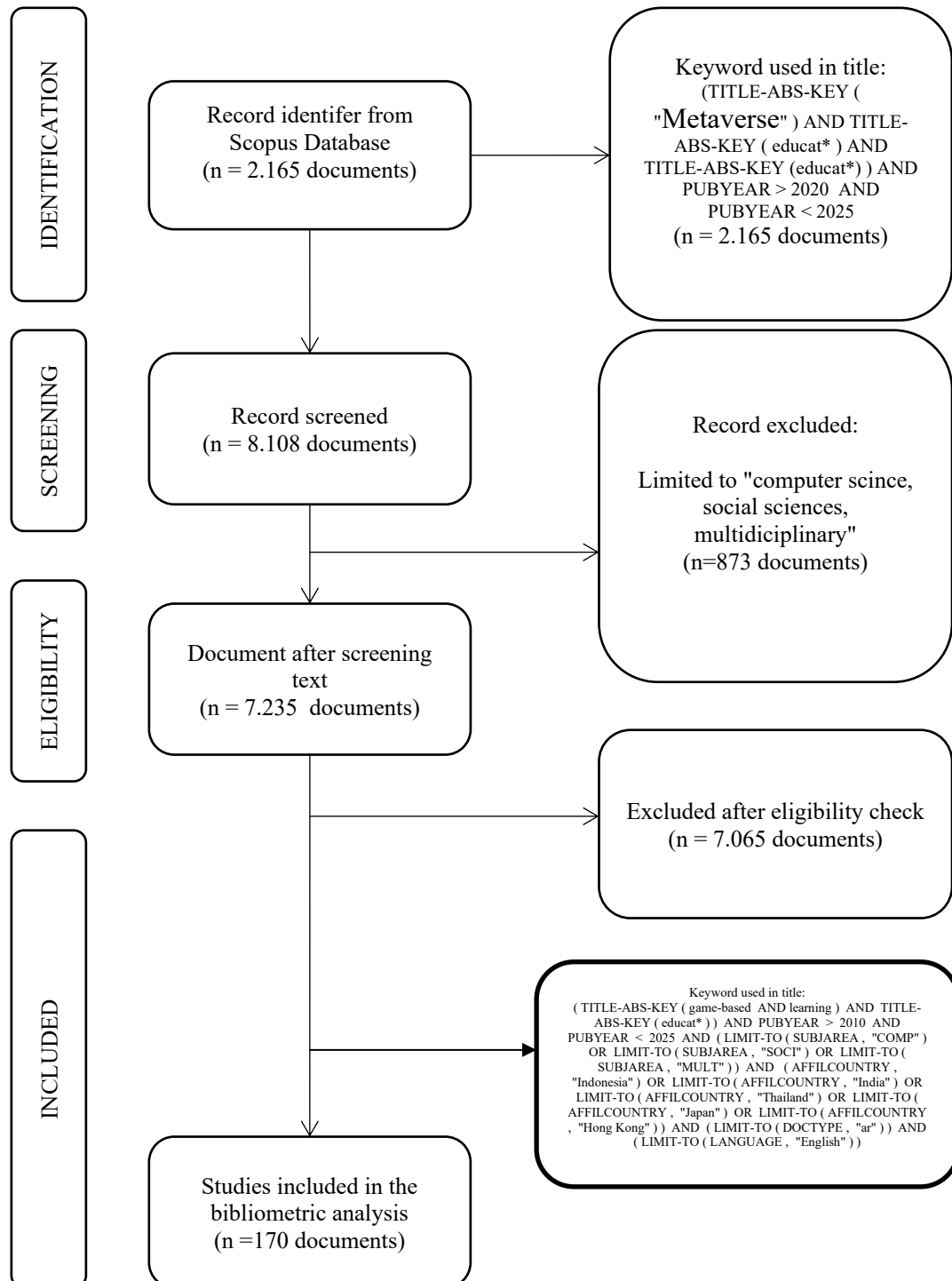
B. Research methods

This research is a bibliometric study that aims to explore trends, collaboration patterns, and scientific contributions related to Game-Based Learning in the context of education in five Asian countries, namely Indonesia, Hong Kong, Japan, Thailand, and India. Bibliometrics is a method used to evaluate and map scientific literature based on a number of indicators, such as the number of publications, citations, and keyword trends that appear in related research (Donthu et al., 2021; Ellegaard & Wallin, 2015; Passas, 2024 ;Zafrullah et al., 2023; Zafrullah, Gunawan, et al., 2024). The research data was obtained from the Scopus database with publications ranging from 2011 to 2024. The search strategy used the string (TITLE-ABS-KEY("Game-Based Learning") AND TITLE-ABS-KEY(educat*)) AND PUBYEAR > 2010 AND PUBYEAR < 2025, which yielded 8,108 documents in the initial stage. The selection process was conducted using the PRISMA framework to ensure that the methods and results of the systematic review were described in detail, thereby guaranteeing full transparency (Haddaway et al., 2022). The selection process began with identification, followed by initial screening based on subject area, which resulted in 7,235 documents remaining. This was followed by an eligibility stage, which produced 170 final documents as the basis for analysis.

The selection process was carried out in stages, including the removal of duplicates, checking titles and abstracts, and verifying metadata. Inclusion criteria included English-language publications on the topic of Game-Based Learning in education, while exclusion criteria included documents outside the topic, editorials, and non-scientific publications. The cleaned data were analyzed using a descriptive bibliometric approach and network visualization. The analysis included annual publication trends, top authors and institutions, journals with the largest contributions, and citation distribution.

Network visualization was performed using VOSviewer to map co-authorship, keyword co-occurrence, and co-citation relationships. This analysis provides a comprehensive overview of the development of Game-Based Learning research in the field of education in five Asian countries, while identifying dominant topics and collaborations. All procedures were designed to be replicable, noting search strings, selection parameters, and lists of publications analyzed.

Figure 2. Stages of Bibliometric Analysis Method

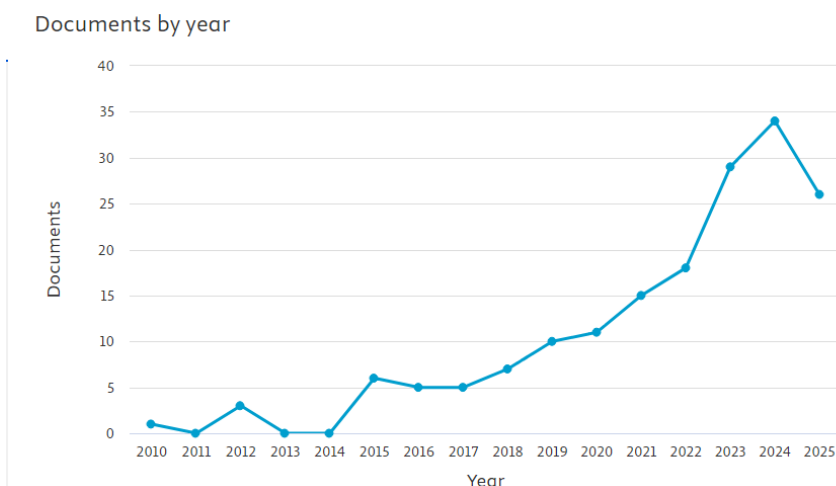


C. Results and Discussion

Document By Year Game-Based Learning in Education

The data in Figure 3 shows that publications on game-based learning fluctuated in the early period of 2010–2014, with relatively low and unstable numbers. From 2016 to 2021, the publication trend tended to increase gradually and more consistently. A significant increase was seen in 2022, reaching its peak in 2024 with 34 publications, indicating a high level of researcher interest in this topic. However, in 2025, there was a slight decline, although the number of publications remained higher than in the early period. These findings indicate that research related to game-based learning continues to grow and has become an important trend in educational research in recent years.

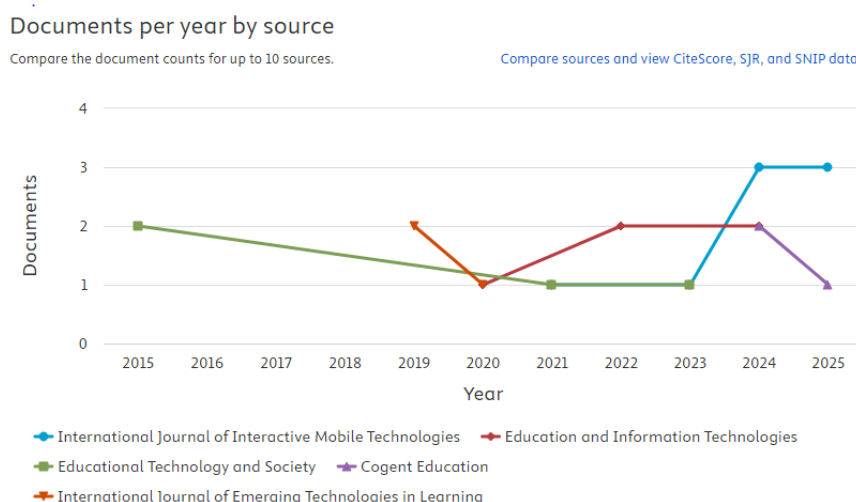
Figure 3. Document Publikasi By Year



Document Per Year By Source Game-Based Learning in Education

Figure 4 shows the distribution of publications related to the topic of game-based learning in education in several Scopus-indexed journals for the period 2015–2025. Publications in Educational Technology and Society were fairly consistent, despite a decline from two articles in 2015 to one article since 2018. The International Journal of Emerging Technologies in Learning recorded contributions in 2019–2020, but did not continue in the following year. Meanwhile, Education and Information Technologies has seen an increase since 2020 and has stabilized with 2 articles in 2022–2023. The most notable trend is seen in the International Journal of Interactive Mobile Technologies, which became the dominant source in 2023–2024 with 3 articles, indicating a high level of interest in interactive technology-based game-based learning approaches. Cogent Education began contributing in 2024 with 2 articles, although this dropped to 1 article in 2025. Overall, this data shows that research on game-based learning in education has gained widespread attention since 2020, with a shift in dominance towards interactive technology and digital learning innovation journals.

Figure 4. Documents per year by source



Documents by Affiliation on the Topic of Game-Based Learning in Education Research

Based on Table 1, research on Game-Based Learning in Education is dominated by universities in Hong Kong, namely The Education University of Hong Kong and Chinese University of Hong Kong with 13 publications each, where Chinese University obtained the highest citations (281). The University of Hong Kong and The Hong Kong Polytechnic University also stand out with 11 publications and a significant number of citations. Outside Hong Kong, Mahidol University in Thailand contributed 7 publications and 190 citations, while Indonesia, through Malang State University (6 publications, 39 citations) and Jakarta State University (5 publications, 33 citations) also participated, albeit with lower citation impact. National Taiwan University of Science and Technology is also noteworthy with 4 publications but high citations (199). This data shows that Hong Kong is the main center for game-based learning research in Asia, although contributions from Thailand, Indonesia, and Taiwan also strengthen the diversity of research in the region.

Table 1. Documents by Affiliation Game-Based Learning in Education

Rank	AFFILIATION	City	Country	Publication	Citation
1	The Education University Of Hong kong	Hong kong	China	13	257
2	Chinese University Of Hong kong	Hong kong	China	13	281
3	The Hong kong Polytechnic University	Hong kong	China	11	168
4	The University Of Hong kong	Hong kong	China	11	242
5	Mahidol University,	Naxhon Pathom	Thailand	7	190

6	Universitas Negeri malang	Malang	Indonesia	6	39
7	Lingnan University	Hong kong	China	5	123
8	Thammasat University	Pathum Thani	Thailand	5	21
9	Universitas Negeri Jakarta	Jakarta	Indonesia	5	33
10	National Taiwan University Of Science and Tecnologi	Teipei	Taiwan	4	199

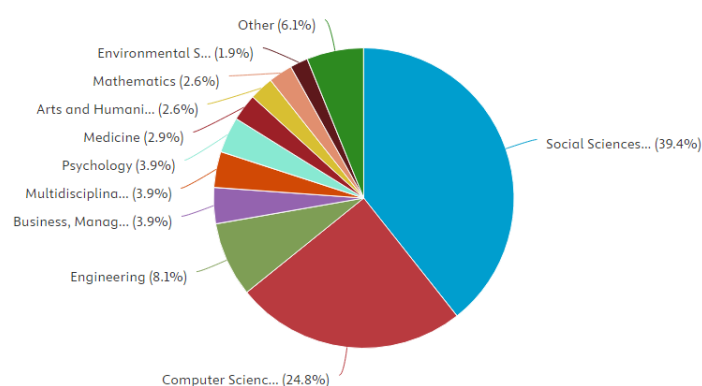
Documents by Subject Area on the Topic of Game-Based Learning in Education

Based on Figure 6, the distribution of documents according to field of study on the topic of Game-Based Learning in Education shows that most publications come from the field of Social Sciences (39.4%). This indicates that the game-based learning approach is widely researched in the context of education, learning, and social interaction. Furthermore, significant contributions also come from Computer Science (24.8%) and Engineering (8.1%), which confirms that the development and application of game-based learning is closely related to technology design and software engineering.

Other fields such as Psychology (3.9%), Business and Management (3.9%), and Multidisciplinary Sciences (3.9%) also show involvement, indicating that game-based learning research does not only focus on pedagogical aspects, but also on motivation, user behavior, and implementation management in various sectors. Contributions from Medicine (2.9%), Arts and Humanities (2.6%), and Mathematics (2.6%) show that this method is beginning to be integrated into broader disciplines, including STEM learning and cultural literacy. Overall, this distribution indicates that game-based learning in Asia is developing as a multidisciplinary field of research, with a dominance in social sciences and computer science, but still involving a variety of other disciplines that strengthen its potential for widespread application in the world of education.

Figure 5. Document by subject area

Documents by subject area



Blue	Learning systems & participants	Students, learning systems, teaching, computer-aided instruction, e-learning, educational game, motivation, mathematics, surveys	Focus on the implementation of GBL in formal education settings, with attention to students, motivation, and supporting technology.
Red	Psychological and behavioral aspects	Learning, human, humans, perception, questionnaire, procedures, psychology, critical thinking, child, video games	Focus on human interaction, cognitive development, learning psychology, and evaluation through research instruments
Yellow	Research methodology & special context	Virtual reality, language learning, meta-analysis, systematic review	Focus on the research approaches used in GBL, including systematic literature reviews, meta-analyses, and the application of VR and language learning.

The first cluster is marked in green and focuses on core concepts and game-based learning technologies, including game-based learning, education, gamification, educational technology, experiential learning, contrastive learning, learning process, and educational games. This cluster emphasizes that GBL is a fundamental approach to learning innovation because it combines educational theory with the use of game-based technology. The application of GBL not only increases student motivation and engagement, but also strengthens the learning process through more interactive and contextual experiences. Camacho-Sánchez et al., (2023), explains that game-based learning (GBL) and gamification are significant learning methods because they can increase learning motivation, academic performance, and student commitment to improving health and physical performance. In addition, the integration of educational technology in serious games further enriches the interactive learning experience and opens up new directions for innovative educational research (Lee et al., 2024).

The second cluster is marked in blue and focuses on learning systems and participants, with keywords such as students, learning systems, teaching, computer-aided instruction, e-learning, educational games, motivation, mathematics, and surveys. This cluster confirms that game-based learning (GBL) research is largely directed at implementation in formal educational environments, particularly in relation to motivation, engagement, and improving student learning outcomes. Thus, game-based learning can shape students' perceptions and attitudes toward technology, which are key determinants of learning perceptions and academic achievement in game-based online resource classrooms (Zhang, 2024).

The third cluster is marked in red and focuses on psychological and behavioral aspects, with keywords such as learning, human, humans, perception, questionnaire, procedures, psychology, critical thinking, child, and video games.

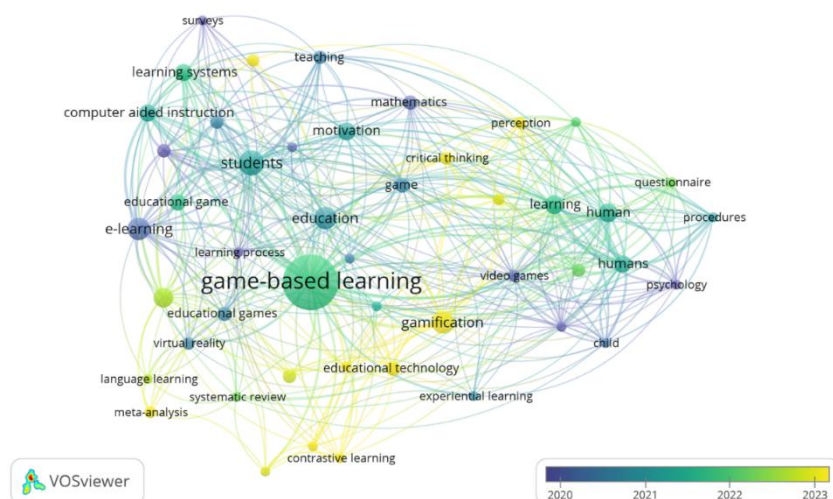
This cluster emphasizes that GBL is understood as a human-centered cognitive-behavioral psychology-based learning medium, not merely “learning through play.” Game mechanics are designed to activate perception, attention, motivation, self-efficacy, self-regulation, and encourage critical thinking skills. According to Krath et al., (2021), game-based learning (GBL) technology-based learning improves student effectiveness and motivation, thereby contributing to improved academic achievement and a positive perception of the learning process.

Finally, the fourth cluster is marked in yellow and focuses on research methodology and specific contexts. Its main keywords include virtual reality, language learning, meta-analysis, and systematic review. This cluster emphasizes rigorous evaluative approaches, such as the PRISMA protocol and random effects meta-analysis, to synthesize findings across studies while assessing heterogeneity and publication bias. In terms of context, VR and language learning serve as testing grounds for evaluating the effectiveness of GBL in diverse learning environments, including online and hybrid settings. Consequently, intervention design and outcome reporting need to be standardized so that findings can be easily generalized, replicated, and directly guide practice for educators and developers.

Novelty Research on Game-Based Learning in Education

Based on Figure 9, recent research around 2022–2023 (yellow) stands out on the keywords “critical thinking,” “educational technology,” and “contrastive learning.” Game-based learning remains the largest node and center of the network, serving as an umbrella concept for other topics. This indicates a shift in research focus from simply applying games in learning to more complex integration, namely linking games with critical thinking skills, the use of educational technology, and contrastive learning approaches.

Figure 7 Visualization of Keyword Co-occurrence Map on Game Based Learning in Education



Critical thinking in learning-based learning can have a significant and consistent effect on critical thinking. Similarly, findings show that Mao et al., (2022), that GBL has a significant and stable influence on the development of students' critical thinking skills, according to Huber et al., (2024), GBL provides a context for problem solving, perspective exchange, and formative reflection. This combination strengthens evidence-based evaluation and the quality of students' decision-making. Furthermore, GBL also encourages active engagement, intrinsic motivation, and provides authentic learning experiences through simulations and challenges that resemble real-life situations. Thus, GBL not only improves cognitive aspects, but also fosters collaborative, communication, and creativity skills that are essential in 21st century learning.

Additionally, the keyword educational technology as a digital learning medium can create game-based learning that delivers interactive and adaptive educational games tailored to learners' needs. Educational technology enables the development of realistic game-based simulations, so learners not only receive information but also engage in active learning experiences. Ishak et al., (2023). With the support of digital technology, GBL can integrate visual and audio elements, as well as artificial intelligence, to increase student motivation and engagement. Furthermore, contrastive learning plays an important role in optimizing GBL because it is able to compare concept representations and distinguish similarities and differences in information, enabling students to construct a more critical understanding. The integration of contrastive learning not only strengthens conceptual memory, but also improves analytical, synthesis, and reflective decision-making skills.

D. Conclusion

The results of bibliometric analysis show that Game-Based Learning (GBL) research in Asia has increased significantly since 2016 and will peak in 2024. Indonesia and Hong Kong dominate publications, indicating a strong research ecosystem in both countries. The research focus is divided into four major clusters covering the integration of educational technology, cognitive and psychological aspects, and a more rigorous methodological approach. The latest trends show a shift towards strengthening critical thinking skills, digital technology integration, and contrastive learning that emphasizes reflection and conceptual analysis. These findings confirm that GBL is not merely a pedagogical innovation, but also a means of developing 21st-century competencies such as collaboration, creativity, and communication. Going forward, research is encouraged to expand the cross-disciplinary context, strengthen evidence-based evaluation, and optimize the use of smart technology in the implementation of game-based learning.

REFERENSI

- Camacho-Sánchez, R., Manzano-León, A., Rodríguez-Ferrer, J. M., Serna, J., & Lavega-Burgués, P. (2023). Game-Based Learning and Gamification in Physical Education: A Systematic Review. *Education Sciences*, 13(2). <https://doi.org/https://doi.org/10.3390/educsci13020183>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133(April), 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, 105(3), 1809–1831. <https://doi.org/10.1007/s11192-015-1645-z>
- Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Systematic Reviews*, 18(2), 1–12. <https://doi.org/https://doi.org/10.1002/cl2.1230>
- Hu, Y., Wouters, P., van der Schaaf, M., & Kester, L. (2025). Timing of information presentation matters: Effects on secondary school students' cognition, motivation and emotion in game-based learning. *British Journal of Educational Technology*, 56(1), 318–338. <https://doi.org/https://doi.org/10.1111/bjet.13510>
- Huber, S. E., Kiili, K., Nebel, S., Ryan, R. M., Sailer, M., & Ninaus, M. (2024). Leveraging the Potential of Large Language Models in Education Through Playful and Game-Based Learning. *Educational Psychology Review*, 36(1), 1–20. <https://doi.org/https://doi.org/10.1007/s10648-024-09868-z>
- Ishak, S. A., Hasran, U. A., & Din, R. (2023). Media Education through Digital Games: A Review on Design and Factors Influencing Learning Performance. *Education Sciences*, 13(2). <https://doi.org/https://doi.org/10.3390/educsci13020102>
- Jossan, K. S., Gauthier, A., & Jenkinson, J. (2021). Cultural implications in the acceptability of game-based learning. *Computers and Education*, 174(August), 104305. <https://doi.org/https://doi.org/10.1016/j.compedu.2021.104305>
- Katual, D., Goede, R., & Drevin, L. (2023). Game-Based Learning To Improve Critical Thinking and Knowledge Sharing: Literature Review. *67th Annual Proceedings of the International Society for the Systems Sciences, ISSS 2023*.
- Krath, J., Schürmann, L., & von Korfflesch, 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(January), 106963. <https://doi.org/https://doi.org/10.1016/j.chb.2021.106963>
- Lee, L. K., Wei, X., Chui, K. T., Cheung, S. K. S., Wang, F. L., Fung, Y. C., Lu, A., Hui, Y. K., Hao, T., U, L. H., & Wu, N. I. (2024). A Systematic Review of the Design of Serious Games for Innovative Learning: Augmented Reality, Virtual Reality, or

- Mixed Reality? *Electronics (Switzerland)*, 13(5).
<https://doi.org/https://doi.org/10.3390/electronics13050890>
- Luh, N., Andika, P., Agustini, K., Gde, I., & Sudatha, W. (2025). Studi Literatur Review: Peran Media Game Based Learning terhadap Pembelajaran. *Didaktika: Jurnal Kependidikan*, 14(1 Februari), 799–812.
<https://doi.org/https://doi.org/10.58230/27454312.1645>
- Mao, W., Cui, Y., Chiu, M. M., & Lei, H. (2022). Effects of Game-Based Learning on Students' Critical Thinking: A Meta-Analysis. *Journal of Educational Computing Research*, 59(8), 1682–1708.
<https://doi.org/https://doi.org/10.1177/07356331211007098>
- Mohanty, A., Alam, A., Sarkar, R., & Chaudhury, S. (2021). Design and Development of Digital Game-Based Learning Software for Incorporation into School Syllabus and Curriculum Transaction. *Design Engineering*, 8(1), 4864–4900.
- Nuralisa, R., Fahdhi, M., Akbar, F., Gusti, N., & Ary, A. (2025). Bibliometric Mapping of Augmented Reality in Indonesian Education : A Decade of Trends and Insights. *Journal of Technological Pedagogy and Educational Development*, 2(1), 43–54.
<https://doi.org/https://doi.org/10.59247/jtped.v2i1.9>
- Pacheco-Velazquez, E., Rodés, V., & Salinas-Navarro, D. (2024). Developing Learning Skills Through Game-Based Learning in Complex Scenarios: a Case in Undergraduate Logistics Education. *Journal of Technology and Science Education*, 14(1), 169–183. <https://doi.org/https://doi.org/10.3926/jotse.2219>
- Passas, I. (2024). Bibliometric Analysis: The Main Steps. *Encyclopedia*, 4(2), 1014–1025. <https://doi.org/https://doi.org/10.3390/encyclopedia4020065>
- Ramadana, N., & Widayati, A. (2025). Development of E-Comic Based Learning Media to Increase Student Learning Motivation on Journal Material Adjusted by Service Companies for Class XII High School Students. *International Journal of Educational Development*, 2(1), 25–38.
<https://doi.org/https://doi.org/10.61132/ijed.v2i1.169>
- Seelow, D. (2021). *Teaching in the Game-Based Classroom: Practical Strategies for Grades 6-12 (1st ed.)*. Routledge.
<https://doi.org/https://doi.org/10.4324/9781003042693>
- Yadav, A. K., & Oyelere, S. S. (2021). Contextualized mobile game-based learning application for computing education. *Education and Information Technologies*, 26(3), 2539–2562. <https://doi.org/https://doi.org/10.1007/s10639-020-10373-3>
- Zafrullah, Z., Annisa Fitriani, Atika Miftah Ramadhani, & Siti Muflihah Nur Hidayah. (2023). Transformasi Adobe Flash dalam Dunia Pendidikan: Analisis Bibliometrik (2006-2023). *Indo-MathEdu Intellectuals Journal*, 4(3), 1652–1666.
<https://doi.org/10.54373/imeij.v4i3.387>
- Zafrullah, Z., Sembiring, Y. K., Ramadana, N., Gunawan, R. N., & Yogyakarta, U. N. (2024). Research Trends on the Use of Artificial Intelligence in Educational Environments in Southeast Asia on Scopus Database : A Bibliometric Analysis (

2014-2024). *INNOVATIVE: Journal Of Social Science Research*, 4(5), 8972–8989.
<https://doi.org/https://doi.org/10.31004/innovative.v4i5.15810>

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), e36249. <https://doi.org/https://doi.org/10.1016/j.heliyon.2024.e36249>