

Gamification as a Strategy for Increasing Learning Engagement: A Bibliometric Analysis and Implications for Online Learning

Salsabila Dwi Rosyidah¹, Heni Purwa Pamungkas², Retno Mustika Dewi³

¹Universitas Negeri Surabaya, e-mail: salsabila.22085@mhs.unesa.ac.id

²Universitas Negeri Surabaya, e-mail: henipamungkas@unesa.ac.id

³Universitas Negeri Surabaya, e-mail: retnomustika@unesa.ac.id

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ABSTRACT

This research is motivated by the research and implementation of online learning since the COVID-19 pandemic, which has raised issues of declining student motivation and participation, necessitating innovative strategies such as gamification to increase learning engagement in digital environments. This study aims to map research trends, key themes, and collaborations in gamification research during the 2015–2025 period. The approach used includes descriptive analysis and scientific network analysis through co-authorship, co-occurrence, and co-itation. The research subjects consisted of 478 Scopus-indexed articles analyzed using Bibliometrix software with the Biblioshiny tool. The results show that the number of publications on gamification has increased significantly with an annual growth rate of 27.38% supported by high citations per document, indicating the high relevance and scientific contribution of this topic. Key themes such as digital education, psychology and motivation, technology, and marketing are central themes with strengthening research in the field of education. The research network is dominated by collaborations in Europe, America, and Australia. The novelty of this research lies in its comprehensive analysis, which not only maps publication trends but also links them to gamification strategies for motivation and participation in the context of bold learning. The implications of this research encourage the use of gamification in the digital-era learning transformation of Merdeka Belajar (Freedom to Learn), combining Virtual Reality (VR) environments with gamification elements and incorporating digital literacy, creativity, problem-solving, and collaboration.

Keywords : Gamification; Education; Learning Engagement; Online Learning; Bibliometric

ABSTRAK

Penelitian ini dimotivasi oleh penelitian dan implementasi pembelajaran daring sejak pandemi COVID-19, yang telah menimbulkan masalah penurunan motivasi dan partisipasi siswa, sehingga memerlukan strategi inovatif seperti gamifikasi untuk meningkatkan keterlibatan pembelajaran di lingkungan digital. Studi ini bertujuan untuk memetakan tren penelitian, tema utama, dan kolaborasi dalam penelitian gamifikasi selama periode 2015–2025. Pendekatan yang digunakan meliputi analisis deskriptif dan analisis jaringan ilmiah melalui kepenulisan bersama, kemunculan bersama, dan sitasi bersama. Subjek penelitian terdiri dari 478 artikel yang terindeks Scopus yang dianalisis menggunakan perangkat lunak Bibliometrix dengan alat Biblioshiny. Hasil menunjukkan bahwa jumlah publikasi tentang gamifikasi telah meningkat secara signifikan dengan tingkat pertumbuhan tahunan sebesar 27,38% yang didukung oleh sitasi per dokumen yang tinggi, menunjukkan relevansi dan kontribusi ilmiah yang tinggi dari topik ini. Tema utama seperti pendidikan digital, psikologi dan motivasi, teknologi, dan pemasaran merupakan tema sentral dengan penguatan penelitian di bidang pendidikan. Jaringan penelitian didominasi oleh kolaborasi di Eropa, Amerika, dan Australia. Kebaruan penelitian ini terletak pada analisis komprehensifnya, yang tidak hanya memetakan tren publikasi tetapi juga menghubungkannya dengan strategi gamifikasi untuk motivasi dan partisipasi dalam konteks pembelajaran yang berani. Implikasi penelitian ini mendorong penggunaan gamifikasi dalam transformasi pembelajaran era digital Merdeka Belajar (Kebebasan Belajar), menggabungkan lingkungan Virtual Reality (VR) dengan elemen gamifikasi dan memasukkan literasi digital, kreativitas, pemecahan masalah, dan kolaborasi.

Kata Kunci : Gamifikasi; Pendidikan; Keterlibatan Pembelajaran; Pembelajaran Daring; Bibliometrik

Corresponding Author : Salsabila Dwi Rosyidah, Jurusan Pendidikan Ekonomi, Fakultas Ekonomika dan Bisnis, Universitas Negeri Surabaya, Jl. Ketintang No. 2, Kelurahan Ketintang, Kecamatan Gayungan, Kota Surabaya, Provinsi Jawa Timur, Indonesia, e-mail: salsabila.22085@mhs.unesa.ac.id

INTRODUCTION

The rapid development of digital technology and the massive shift to online learning since the COVID-19 pandemic have created serious challenges related to declining student motivation and engagement, due to monotonous activities and a lack of meaningful interactions (Balalle, 2024). Recent empirical research and meta-analyses have shown that gamification through elements such as points, badges, levels, challenges, and leaderboards is often effective in increasing learning motivation and engagement, but the effects vary depending on the pedagogical design, implementation context, and duration of exposure (Zhan et al., 2022a). Several systematic reviews confirm the benefits of gamification on student motivation while warning of the potential for temporary novelty effects if strategies are not designed in a way that supports needs and is based on a pedagogical framework (Park & Kim, 2021a). Contemporary case studies also show that gamification designs that support psychological needs can increase students' autonomous motivation in the medium term (Grabner-Hagen & Kingsley, 2023a). Since these findings show promising yet contextual effects, empirical research is needed that simultaneously tests motivation and participation indicators in the context of online learning in developing countries such as Indonesia so that the recommended gamification strategies are truly effective and sustainable (Bitrián et al., 2024).

Research in the last five years on gamification in education has shown rapid growth and an increasing focus on practical applications in online and blended learning environments (dos Santos et al., 2025). Numerous bibliometric studies and systematic reviews report a surge in the number of publications, with recurring core themes being the influence of gamification on motivation and engagement, the design of game elements such as points, badges, leaderboards, and narratives, and the evaluation of effects on academic achievement and affective aspects. This trend summary is supported by several international bibliometric reviews and studies published recently (Murillo-Zamorano et al., 2023). Geographic distribution shows a concentration of publications in countries such as the United States, China, some European countries and Southeast Asia with increasing international collaboration in bibliometric studies (Zeng et al., 2024a). Additionally, several field-specific studies show that gamification is used more frequently in courses that have repetitive quiz/exercise activities, while evidence regarding long-term learning and social skills improvements is mixed or weak (Romero-Rodríguez et al., 2024).

Ratinho & Martins, (2023), conducted a systematic review of 40 studies on gamification strategies in secondary and higher education. They found that elements such as points, badges, and leaderboards generally increase student motivation in the short term, but their effects can diminish due to novelty effects and reliance on external rewards. The authors recommend further research examining the influence of individual characteristics and long-term exposure (McHenry & Makarius, 2023). Zhan et al., (2022b) present a meta-analysis in programming education and show that gamification has the greatest impact on student motivation, followed by improvements in academic achievement. They also identify variations in effects based on the type of game/gamification, such as reasoning strategies vs. puzzles, and how it is implemented, emphasizing the importance of contextual pedagogical design. Grabner-Hagen & Kingsley, (2023b) conducted a mixed-methods study on blended learning environments at the elementary level and proposed a needs-supportive scaffolding design model, namely gamification that consciously supports the psychological needs of autonomy, competence, and relatedness. This model has been shown to increase student motivation and engagement when game elements are gradually structured and integrated with instructional scaffolding. Hong et al., (2024) present a systematic literature review of customization

approaches such as personalization, and recommendations in digital gamification. Their findings indicate that most research still focuses on the design phase, with rewards being the most frequently used. They emphasize the need for further empirical research on customized gamification that game elements based on participant profiles to create more lasting motivational effects. Park & Kim, (2021b) examined the sustainability of gamification-based online learning and reported that gamified online programs can improve motivation and comprehension, with the caveat that the sustainability of the effect is highly dependent on pedagogical engagement and the stability of the digital infrastructure. This article supports the idea that gamification can foster sustainable online learning when combined with appropriate instructional design.

Bibliometric methods have become an increasingly popular approach to mapping and understanding the evolution of scientific literature in a field of study (Radha & Arumugam, 2021). By analyzing metadata from hundreds or even thousands of articles such as number of publications per year, authors, institutional affiliations, collaboration networks, citations, and bibliometric keywords, researchers can uncover intellectual structures, dominant themes, research trends, and the emergence of new research areas (Guleria & Kaur, 2021). In the context of research on educational gamification, the application of bibliometrics provides significant advantages (Yıldız & Karakuş Yılmaz, 2024). Because “gamified learning” cuts across educational levels, disciplines, and cultural contexts, bibliometrics offers a systematic way to see how broadly and rapidly this literature is growing, who the main contributors are, and the most researched topics such as motivation, engagement, design elements, e-learning, and academic impact (Sudrajat et al., 2024). Recent bibliometric studies in the field of gamification have shown that the gamified learning literature is growing rapidly, with a peak in activity around 2021, and identified geographic distribution, key journals, and clusters of research themes (Donthu et al., 2021).

The purpose of this study is to map research trends, key themes, and collaborations in gamification research during the 2015–2025 period. The novelty of this study lies in the comprehensive mapping of gamification literature in the context of learning engagement in online learning through a bibliometric approach that not only evaluates publication trends, scientific collaborations, and the structure of global research themes, but also directly links these bibliometric findings to the effectiveness of gamification strategies in increasing student motivation and participation in digital environments such as those faced during the transformation of education towards online learning. This research focuses on the engagement of online learning, not gamification, in a broad sense, integrating it with the context of the Merdeka Belajar policy, and emphasizing post-pandemic trends. This approach provides an evidence-based overview of the direction of research developments while generating practical recommendations for more targeted and sustainable gamification implementation, especially in the era of digital learning and Merdeka Belajar.

RESEARCH METHOD

The bibliographic data search mechanism in Scopus with initial findings of 21,266 documents based on searches related to “Title (“gamification”)”. The selection process began with filtering over a specific period, namely 2015–2025, to obtain final data of 20,135 documents. Then, continued with the “Subject Area” filter, 2,115 documents were obtained. Continued using the “Document Type” filter, 1,164 related article titles were obtained. Next, the filtering was repeated using the “English Language” category and 1,118 articles were obtained. These articles were further narrowed down to 478 documents using the “Open Access” filter. The entire selection process can be illustrated in Figure 1.

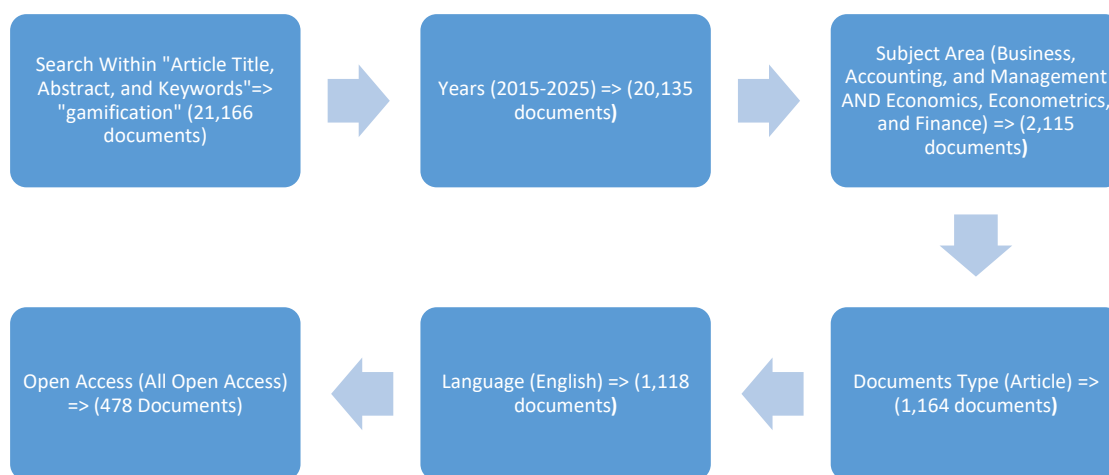


Fig. 1. Article Selection Process and Methods

The data analysis method uses two main approaches, descriptive bibliometric analysis and scientific network analysis. Descriptive analysis is used to describe the number of publications per year, the distribution of authors, countries, journals, and citation patterns, thereby identifying quantitative trends in gamification research. Meanwhile, scientific network analysis is used to identify relationships between researchers, keywords, and research topics through co-authorship, co-occurrence, and co-citation techniques. The analysis results are visualized using Biblioshiny to facilitate interpretation of relationship patterns and the evolution of research themes. This analysis is conducted systematically and replicated so that the findings can be transparently verified by other researchers.

RESULTS AND DISCUSSION

A. Discussion 1



Table 1. Main information of bibliometric

The bibliometric data in the figure shows an overview of research developments over the 2015–2025 period. During this period, there were 240 publication sources producing 478 scientific documents. This rapid increase in publications is consistent with the pattern of accelerated scientific output in the field of gamification and digital learning reported in bibliometric studies and systematic reviews, namely a surge in research interest after 2015 and a peak in activity seen around early 2020, indicating that this topic has become a substantial research focus in digital education (Krath et al., 2021). Publication growth in this field is quite rapid, reflected in an annual growth rate of 27.38%, indicating increasing interest and relevance of the topic year over year. The number of authors involved reached 1,379, with 44 authors

producing single-authored works. Furthermore, the level of international collaboration is also quite high, at 33.89%, and each document has an average of 3.3 authors, demonstrating a strong collaborative pattern in research in this field.

In terms of quality and scientific impact, the data shows that published documents have an average age of 2.97 years, indicating that the literature in this field is relatively new and continues to develop. The average citation rate per document is 26.79, indicating that publications in this field are quite influential and frequently referenced by other researchers. This demonstrates the presence of several key articles that serve as theoretical and empirical references for further development, such as studies elaborating on the theoretical foundations of gamification and meta-reviews on its effects on student motivation and engagement (Hong et al., 2024). The author's keywords total 1,603, indicating the diversity of topics and research perspectives within the study domain. Meanwhile, the "References" column shows 0, indicating that the total number of references is not displayed in this section.

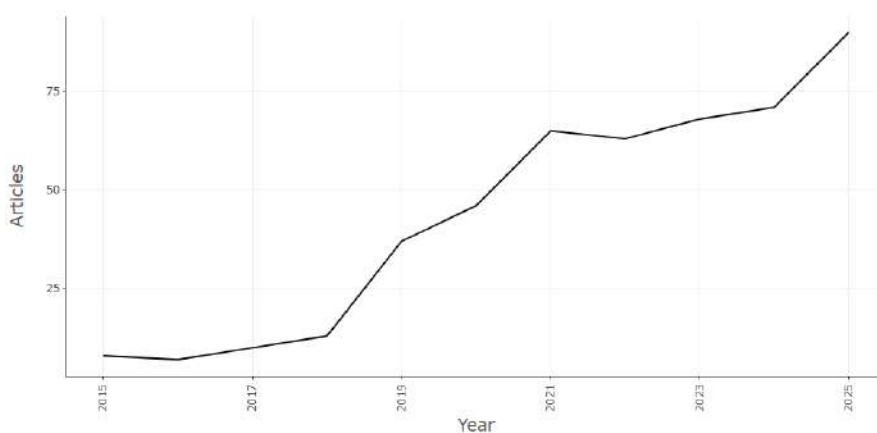


Fig. 2. Annual Scientific Production

The graph shows a significant upward trend in the number of research articles from 2015 to 2025. At the beginning of the 2015–2017 period, the number of articles was relatively low and stable, ranging from 6–8 articles per year. Starting in 2018, and especially in 2019, the number of articles began to show a significant increase, reaching around 12 articles in 2018 and jumping to 35 articles in 2019. This sharp increase indicates growing researcher interest in this research topic towards the end of the 2020s.

The most significant increase was seen from 2020 to 2025, when the number of publications increased consistently. In 2020, the number reached around 45 articles, then jumped to 65 articles in 2021. Although there was a slight decrease in 2022, the number increased again in 2023 and 2024, reaching around 70 articles. The publication peak occurred in 2025, with over 85 articles published, marking the year with the highest research productivity during the observation period. Overall, this graph shows a strong and sustained growth trend, indicating that this research topic is gaining widespread attention in the global academic community (Ruiz et al., 2024a).

The spike pattern in 2019–2021 is likely related to increased attention to online learning during the COVID-19 pandemic, which prompted research on strategies to maintain student motivation and engagement, including gamification, as an effort to maintain the sustainability of online learning (Christopoulos & Mystakidis, 2023). The increase in the number of articles and the high average citations per document not only indicate an increase in output, but also the emergence of a number of influential articles that can be used as quick references for further research (Ruiz et al., 2024b).

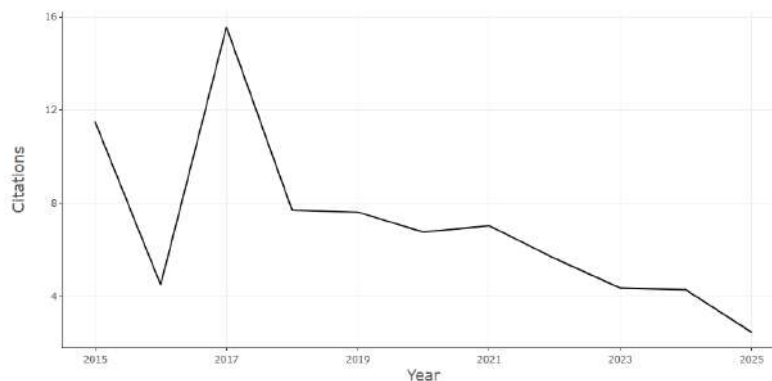


Fig. 3. Average Citations Per Year

Figure 3 shows a relatively high peak in citations in early 2017, followed by a gradual decline until 2025. One of the main reasons for this pattern is the citation age effect: early articles, conceptual or review, typically accumulate citations more quickly and become references for subsequent research, while more recent publications take time to be cited. This decline is consistent with bibliometric dynamics where recent articles have not had enough time to accumulate citations (citation age effect) and when publication volume increases rapidly, citations are spread across many new articles, so the average per article tends to fall (Zeng et al., 2024b). Bibliometric approaches and literature reviews support this pattern as a common phenomenon in rapidly growing research areas (Behl et al., 2022a). Furthermore, the decline in average citations per document may reflect a shift in research themes from theory to application/local scales (Gini et al., 2025b). Other contributing factors include methodological heterogeneity and differences in the design of gamification interventions. Finally, the surge in the number of articles from 2019–2021 is closely related to research responses to the challenges of online learning during and after the pandemic, which accelerated many new publications (Behl et al., 2022b).

In the context of Gamified Learning literature, several recent bibliometric studies support this pattern, such as the article ‘A Comprehensive Bibliometric Review of Gamified Learning in Higher Education’ which reports that publication activity grew rapidly until 2021, then leveled off despite the continued growth of the literature (Sergeeva et al., 2024). Similarly, ‘Gamification in Online Education: A Visual Bibliometric Analysis’ found that even though the number of studies increased, the spread of citations among many articles caused the distribution of citations to become more dispersed, which could decrease the average citations per article (Yazdi et al., 2024). Thus, the decline in citations in the graph is not an indication that the quality of gamification research is declining but rather a reflection of the natural evolution of the research field: an acceleration in quantity, many new articles not yet cited, and a shift in focus from conceptual/groundbreaking studies to practical applications in various contexts.

Table 3. List of top authors and their impact

Authors	Articles	Article Fractionalizeddh	Year
Hamari JJ	12	3.95	2018 & 2022
Catalan S	11	3.50	2023
Buil I	9	2.83	2020

Table 3 lists the top three authors with the most significant contributions to the field of gamification, calculated by the number of articles published and the article fractional score, an indicator of its impact. Hamari J.J. is ranked first with a total of 12 articles and an article fractional score of 3.95, indicating that although Hamari is involved in various collaborations,

his individual contributions remain significant and influential in the development of gamification theory and implementation. His 2018 study, "Gamification of Education and Learning: A Review of Empirical Literature," shows that gamification in education most often uses "achievement/progression" elements such as points, badges, levels, leaderboards, and study results generally show a positive effect on motivation, engagement, and learning performance so that in online learning it can be used to make students more active and consistent in participating in learning activities (Majuri et al., n.d.). Their second research on gamification in 2022, titled "Tailored Gamification in Education: A Literature Review and Future Agenda," highlights that with the increasing development of gamification, there is a need to adapt gamification design to individual characteristics. This study confirms that personalized gamification according to student profiles and needs is more effective, so that in online learning it is necessary to apply different gamification for each type of student to increase engagement (Oliveira et al., 2023).

Catalan S. ranked second with 11 articles and an article fractional score of 3.50, indicating significant productivity and strong collaborative contributions in this field. His 2023 research, entitled "The use of gamification strategies to enhance employees' attitudes towards e-training systems," found that gamification elements such as challenges and narratives increase user enjoyment, which in turn strengthens perceptions of ease of use and usefulness, thus improving attitudes towards the training system. These results indicate that gamification is effective not only in formal education, but also in the context of training/workplace learning and online learning. Gamification can help students become more accepting, comfortable, and interested in using online platforms (Bitrián et al., 2023).

Buil I. is ranked third with 9 articles and an article fractional value of 2.83, indicating that, although his productivity is slightly lower than the previous two authors, his contribution is still substantial and relevant to the development of adaptive learning research. His 2020 study entitled 'Understanding Applicants' Reactions To Gamified Recruitment', shows how game elements can influence user perceptions of non-learning processes demonstrating the flexibility of gamification applications and relevance in various domains, including education, training, and HR management, so that in online learning game elements can create a more positive learning experience and reduce student boredom (Bitrián et al., 2024). Overall, these three authors can be categorized as major contributors, providing a conceptual and empirical foundation for the development of adaptive learning research globally.

Table 4. Top sources and their impact

Source Name	N	H_Index	G_Index	M_Index	TC	Py_Start
Journal of Business Research(Q1)	13	15	1.625	1559	15	2018
International Journal of Information Management(Q1)	9	9	1.286	689	9	2019
Contemporary Educational Technology(Q1)	8	9	1.000	328689	9	2018

Table 4 shows the three publication sources with the largest contribution to gamification research based on the number of articles (N), publication quality and impact (H-index, G-index, M-index), total citations (TC), and publication start year (PY Start). The Journal of Business Research (JBR) tops the list with a total of 13 articles, an H-index of 15, and a G-index of 1,625, indicating that this journal is not only productive but also contains articles with a high citation impact. Its M-index of 1,559 indicates significant annual article

productivity, while its TC of 15 indicates that JBR has become one of the most influential publication channels since its introduction in 2018. The article, titled ‘Does gamification affect brand engagement and equity? A study in online brand communities’, found that gamification can significantly increase brand engagement and brand equity among community users. These findings suggest that game mechanics are not only relevant for education or training, but also effective in building user engagement and loyalty. Therefore, in online learning, game elements can be used to make students more engaged, active, and committed to the learning platform (Xi & Hamari, 2020).

The second-highest-ranked journal is the International Journal of Information Management (IJIM), with 9 articles, an H-index of 9, and a G-index of 1,286, reflecting consistent publication quality and significant contributions to information technology studies, including the application of adaptive learning. Its M-index of 689 indicates a strong contribution, although not as high as JBR, while its TC of 9 indicates a moderate citation rate. The article, titled ‘The rise of motivational information systems: A review of gamification research’, discusses how motivational information systems use gamification elements to influence user behavior. This review helps understand the theoretical and empirical mechanisms behind gamification, as well as key trends in the global gamified systems literature, so that gamification can be applied to online learning to encourage student participation, persistence, and motivation (Koivisto & Hamari, 2019).

The third journal, Contemporary Educational Technology (CET), has 8 articles, an H-index of 9, and a G-index of 1.000, indicating that it is also an important forum for technology-based educational research. CET shows a very high M-index (328.689), indicating a significant acceleration in productivity since 2018. The article, titled ‘Analyzing gamification elements in educational environments using an existing Gamification taxonomy’, provides a systematic framework for designing and evaluating gamified learning strategies, and shows how various game elements such as points, badges, challenges, and feedback are used in educational settings. This helps researchers and practitioners design gamification interventions with a strong theoretical basis, so that in online learning, teachers can choose the right elements according to their goals, such as increasing focus, progress, or collaboration (Toda et al., 2019). These three journals collectively demonstrate that adaptive learning research is growing not only in education but also across disciplines such as business and information management.

Discussion 2

1) Knowledge structures analysis

- Conceptual structure

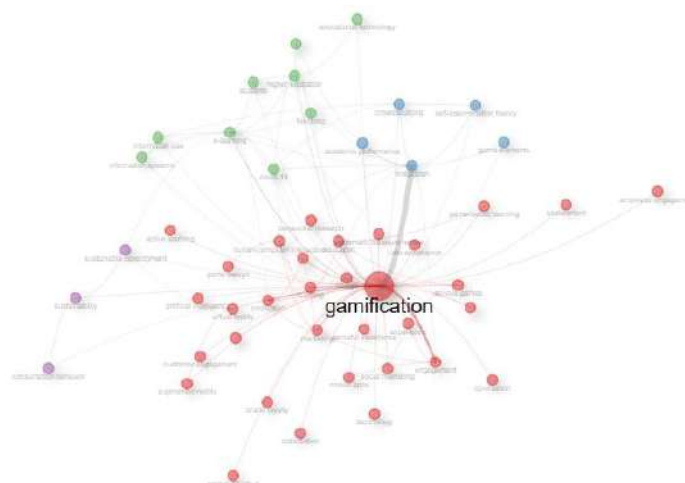


Fig. 4. Co-occurrence Network

The network visualization in the figure shows gamification's position as a central field of study with the most dominant connections to various other research topics. Larger nodes indicate a high frequency of occurrence and relevance of the concept in the academic literature. Several colored clusters are visible, grouped by field of study. The red cluster indicates topics related to marketing and user experience, such as customer engagement, brand loyalty, mobile apps, and technology. Meanwhile, the green cluster reflects a focus on education, including online learning, academic performance, university students, and higher education, indicating that gamification is widely applied to improve motivation and learning outcomes. The blue cluster relates to aspects of behavioral psychology, specifically motivational theories such as self-determination and motivation theory. Furthermore, the purple cluster illustrates the relationship between gamification and sustainability issues and consumption behavior, although the research frequency is still lower. The connections between nodes, depicted by connecting lines, indicate the degree of proximity of each concept to gamification; the closer and thicker the lines, the stronger the connection. Overall, this visualization shows that gamification is developing as a multidisciplinary topic, mostly studied in the fields of marketing and education, and shows a trend towards applications in sustainability issues and innovative technologies.

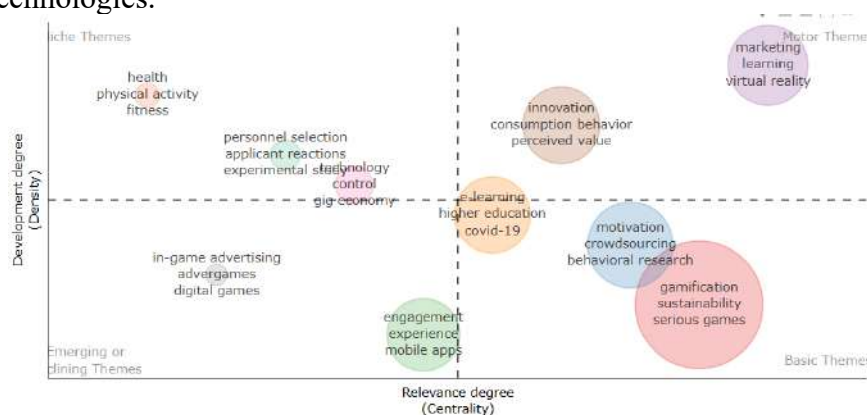


Fig. 5. Thematic Map

Figure 5 displays a thematic map that plots various research themes related to gamification based on two metrics, the degree of theme development (density) on the vertical axis and the degree of theme relevance or connectedness (centrality) on the horizontal axis. The four quadrants indicate the varying position and strength of the themes. In the bottom right quadrant, gamification, sustainability, and serious games fall into the basic themes category, meaning they are highly relevant to research but have not yet been fully developed in depth. In the top right quadrant, themes such as marketing, learning, and virtual reality fall into the motor themes category, meaning they are important and growing because they make a strong contribution to the development of science. Furthermore, in the top left quadrant, health, physical activity, and fitness are categorized as niche themes, meaning they are highly developed but their relevance is still limited to a specific area. Meanwhile, the bottom left quadrant shows emerging or declining themes, such as in-game advertising, advergaming, and digital games, which can be interpreted as topics that are developing but have not yet become a primary focus of research or are starting to be abandoned. Furthermore, several topics in the center of the map, such as e-learning, higher education, and COVID-19, are also visible, indicating moderate relevance and significant development potential. Themes such as motivation, crowdsourcing, and behavioral research are in the transition area toward the motor themes quadrant, indicating a trend of increasing attention in current research. Engagement, experience, and mobile applications emerge as topics with less strong relevance but with

potential for further development in line with the development of digital technology. Overall, this thematic map demonstrates that the field of gamification research is highly dynamic and continues to expand across various domains, particularly in marketing, learning, and sustainability.

- Social Structure

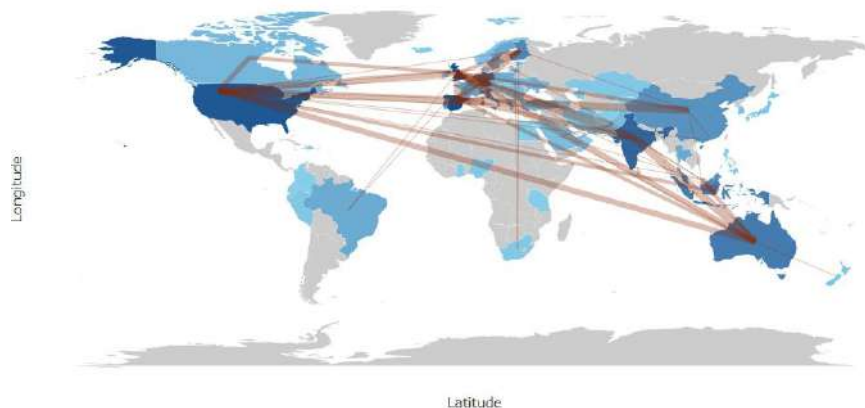


Fig. 6. Countries Collaboration Map

Figure 6 shows the distribution and collaboration of gamification-related research across countries. The blue areas represent regions contributing to scientific publications on the topic of gamification, with darker shades of blue indicating a higher number of publications. The map shows that countries in Europe, North America, and Australia dominate research contributions in this area, with countries such as the United States, the United Kingdom, Germany, and Australia appearing to have the strongest research activity. The interconnected red lines on the map indicate the presence of international collaboration networks in scientific publications. Collaborative relationships are most common in Europe and North America, with subsequent expansion into Asia and Australia. Meanwhile, several countries in Asia, such as China, Japan, and South Korea, are also beginning to show increasingly significant contributions to gamification research. However, regions in Africa and parts of South America still appear to have relatively low participation. Overall, this visualization suggests that research on gamification remains concentrated in developed countries, but global collaboration trends indicate an expansion of research networks into Asia and other developing regions.

CONCLUSION

Bibliometric analysis shows that research on gamification in online learning experienced rapid growth during the 2015–2025 period, with a growth rate of 27.38%, demonstrating the relevance and high interest among researchers in this topic. Key themes include digital education, psychology and motivation, and technology, with research strengthening in the field of education. The thematic map shows a shift in research themes from basic to more advanced themes such as learning and virtual reality, indicating the increasing maturity of theoretical foundations and their application in education. Research distribution remains concentrated in developed countries, but global collaboration trends indicate increasing contributions from developing countries. Research networks are dominated by collaborations in Europe, the United States, and Australia.

Future research will be more focused because the application of gamification is not limited to online learning but can also be extended to offline and hybrid learning models. With increasingly mature theoretical foundations and supporting technologies, gamification has the

potential to be integrated into various physical classroom contexts to increase motivation, participation, and create a more interactive learning experience. For policymakers, particularly in Indonesia, these findings emphasize the importance of supporting digital infrastructure, strengthening teacher technology literacy, and integrating pedagogically based gamification into curriculum policies. Bibliometric trends indicate a shift toward advanced technology-based learning themes, which can inform the development of adaptive and interactive instructional designs in the future. Overall, these findings confirm that gamification is effective as a strategy for increasing motivation and participation in learning, but its sustainability is still highly dependent on pedagogical design, implementation context, and supporting online learning infrastructure.

Pedagogical design in learning is oriented toward achieving competency by effectively integrating game elements such as points, levels, and challenges. Clear real-time feedback and structured challenge stages are necessary to maintain the continuity of the learning process. The use of interactive technologies such as VR and contextual presentation of materials will enrich the learning experience. This research is limited to the use of a single database (Scopus), title-based searches, open-access article screening, and a bibliometric approach that does not evaluate the empirical effectiveness of gamification. Furthermore, publications are still dominated by developed countries. Future research is recommended to use more diverse databases, expand search strategies, and combine bibliometric analysis with empirical studies in broader regional contexts. Bibliometric analysis only describes general trends without assessing the quality of gamification implementation in depth. Furthermore, differences in learning contexts and infrastructure availability have not been fully taken into account.

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