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ESTABLISHING THE FUTURE DIRECTIONS OF EDUCATIONAL GAMIFICATION: A BIBLIOMETRIC PERSPECTIVE

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Abstract:

The integration of gamification in educational settings has been extensively discussed and utilized to enhance student engagement and learning outcomes. This study provides a bibliometric analysis of the existing literature, assessing the impact and themes prevalent in the research on gamification in education. This study aims to identify the major themes and trends in gamification in education over the past decade, evaluate the impact of significant publications and contributors, and suggest future research directions in this evolving field. Utilizing the Scopus database, we conducted a comprehensive bibliometric analysis. Key bibliometric indicators such as publication trends, citation analysis, and thematic evolution were examined using tools like BiblioMagika and VOSviewer. The analysis revealed a significant increase in publications over the years, with notable contributions from diverse geographic locations and institutions. The research highlights the dynamic and complex nature of gamification in education and its application across various educational settings. Several key themes, including student motivation, engagement strategies, and educational outcomes, were identified. Gamification in education continues to grow as an influential field of study. Future research should focus on longitudinal studies to assess the long-term impacts of gamification, explore under-researched areas such as adaptive learning through gamification, and develop more sophisticated gamification strategies that cater to diverse learning environments.

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Keywords:

Gamification, Gamification Education, Bibliometric Analysis, Scopus Database

Introduction

Background

Gamification research and the use of games as educational teaching tools are topics of increasing interest among scholars and professionals (Mullins & Sabherwal, 2020; Bouchrika et al., 2021). Since the Industrial Revolution, information technology has revolutionized education. Modern education sometimes replaces traditional methods (Bennani et al., 2020). Gamification integration in e-learning has received unparalleled attention from scholars and the gaming community (Ugur & Turan, 2018). Gamification-based learning can effectively motivate learners to improve learning performance (Chung & Lin, 2022) and improve teaching (Larson, 2020). It's low cost and self-contained nature have made e-learning it a powerful educational system (Asad et al., 2020). It offers students a feeling of empowerment in how they approach assignments, making students more interesting and fostering cooperation, effort, and other positive attributes common to games; consequently, e-learning platforms have high adoption rates (Rajabalee & Santally, 2021).

Problem Statements

Despite the increasing adoption of gamification in educational settings, as evidenced by its success in increasing student engagement and motivation (Legaki et al., 2020; Oliveira & Bittencourt, 2019), These approaches lack support in keeping students engaged and motivated. Challenges remain in terms of effectiveness and appeal. A key issue is the ongoing need for e-learning platforms to innovate and create more engaging, dynamic, and entertaining teaching experiences (Bouchrika et al., 2021). This is particularly important to effectively engage younger generations, such as Generations Y and Z, who have been shown to respond positively to gamified learning environments (Bhattacharyya, Jena, & Pradhan, 2018). In addition, gamification and teaching elements promote the development of learners' extrinsic and intrinsic motivation to participate in learning activities and play an important role in attracting and sustaining students' attention and efforts (Tsay et al., 2019). Therefore, there is an urgent need to develop and implement advanced gamification strategies to capture and sustain student interest beyond the initial novelty effect.

Objectives Of The Paper

This report presents a Scopus-based bibliometric evaluation of the most common literary themes. First, the similarities and key study topics between gaming and education must be identified. This bibliometric study seeks to illuminate the evolution of gamification and education. Second, identify future gamification and education research opportunities. This

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effort promotes gamification and education research by identifying areas as yet under-researched. The research's goals were met by searching "Scopus" and analyzing data using "BiblioMagika" and VOSviewer.captivating technologies that boost teaching-learning engagement and enthusiasm (Bouchrika et al., 2021).

Research Questions

RQ1: How has the volume and focus of publications in this research area evolved over time?
RQ2: Which authors have made the most significant contributions to the field, and what core topics do they consistently explore in their work?
RQ3: What collaboration patterns exist among researchers in this domain, and how do co-authorship trends differ by region, institution, or research theme?
RQ4: Which academic or research institutions have had the greatest impact on advancing this field, and in what ways have they shaped its development?
RQ5: Which publications are most frequently cited within the field, and what central issues or findings do they highlight?
RQ6: Based on keyword co-occurrence and text mining of titles and abstracts, what major research directions and thematic clusters can be identified in the literature?
RQ7: What are the prevailing keywords and conceptual trends in this area, and how have they shifted over the years?

Literature Review

Gamification In Education

Gamification is a cutting-edge teaching strategy that uses game design in non-gaming environments such as the classroom to improve learning and engagement. In educational settings, gamification is often implemented through features such as achievement badges, leaderboards, progress tracking tools, and point-based reward systems (Su & Cheng, 2014). It is becoming recognized as a technique for promoting motivation, dedication, and academic performance in many learning environments (Hung, 2017). Gamification in education aims to motivate students intrinsically and extrinsically via active learning (Manzano-León et al., 2021).

Gamification involves not just player connection, collaboration, and compassion but also player engagement attained via game mechanics. The beneficial effects of gamification on motivation and engagement have been shown by quantitative research. These studies also emphasize the role that gamification features play in increasing user involvement and engagement in e-learning processes (Jayalath & Esichaikul, 2020). Furthermore, it has been established that gamification strategies can mediate the relationship between gamification components in e-learning and e-learning adoption; this indicates a direct relationship between gamification strategies and successful educational outcomes (Jayalath & Esichaikul, 2020).

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Previous Studies on Bibliometric Analysis of Gamification in Education

The main results of previous studies that performed bibliometric analysis, and data sources, including their methods and limitations are summarized. The study by Behl, Jayawardena, Pereira, Islam, Giudice, and Choudrie (Behl et al., 2022) identified prominent themes in gamification and e-learning for young learners through a bibliometric analysis of 222 articles published between 2015 and 2020.

The findings highlighted four major future research themes: personalization, game elements, learner styles, and learner engagement. The bibliometric study used Google Scholar to identify critical themes by clustering terms from the selected articles. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyzes) guidelines were followed for the systematic review, emphasizing scientific validity and an unbiased analysis. The paper addresses this gap by connecting gamification in e-learning with broader educational and developmental contexts, especially for young learners.

Essential contributions in other formats, like books and book chapters, especially in humanities and social sciences, may be underrepresented due to their tracking limitations in databases like Web of Science and Scopus. Research conducted by Swacha (2021) demonstrates a rapid growth in the scientific output related to gamification in education. The study used a bibliometric approach and analyzed data from Google Scholar, Scopus, and Web of Science, ultimately focusing on 2517 records from Scopus. The study applied a bibliometric approach, which involves the statistical or quantitative description of literature. The research primarily relied on data from the Scopus database, supplemented by Web of Science and Google Scholar. Which may limit database coverage.

The research by Martí-Parreño et al.(2016) reviews 139 publications published between 2010 and 2014 using text mining, social networks, and bibliometric analysis. It lists essential writers, organizations, concepts, topics, and developments in educational gamification. The four main topics are effectiveness, acceptability, engagement, and social connections. Most research projects used quantitative techniques, and a sizeable percentage used statistical and experimental procedures. The study reveals various dimensions and a changing research environment, highlighting a rising academic interest in gamification in education. However, its primary emphasis on publications published in prestigious journals may restrict its applicability to research that has been published more broadly. Future studies should examine how well gamification works and how it affects different learning objectives.

Espinosa, Abellán, Moreno, Pérez, Jiménez and Martínez (Navarro-Espinosa et al., 2022), in order to investigate the impacts of gamification on health development in higher education institutions (HEIs), with a focus on both positive and negative outcomes, used bibliometric analysis in their research. Choosing relevant databases, establishing inclusion and exclusion criteria, and conducting a thorough investigation using auxiliary tools were all part of the process. The study's main conclusions include the prominence of Europe, especially Spain, in

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gamification research and the noteworthy rise in publications between 2013 and 2018. Some limitations include a narrow focus (the past 20 years) and an emphasis on higher education institutions (HEIs), which may leave out more extensive educational environments. Later studies examine the effects of gamification in higher education institutions and compare them to other academic levels.

Methods

In order to retrieve systematic reviews and meta-analysis articles related to gamification in education, a search was conducted in the database of Scopus using relevant keywords (gamification in education) (Nadi-Ravandi & Batooli, 2022). Scopus was chosen to ensure consistency in data collection, as it indexes a wide range of peer-reviewed literature and allows unified export of bibliographic records in a standardized format. Using a single database avoids duplicate counting across sources and helps maintain comparability of results. After reviewing the article titles and abstracts, the field, time, and language is restricted. The flow diagram for the search strategy is as shown in Figure 1. Collected from the Scopus database for this bibliometric analysis, these databases include peer-reviewed and published articles, ensuring a baseline level of quality and credibility (Singh & Arora, 2022) and are limited to articles, conference papers, and book chapters from 2011 to mid-2025 in the field mainly in English, and the field of Social sciences, Business, Management and Accounting. Finally, 3114 pieces of data were collected for bibliometric analysis.

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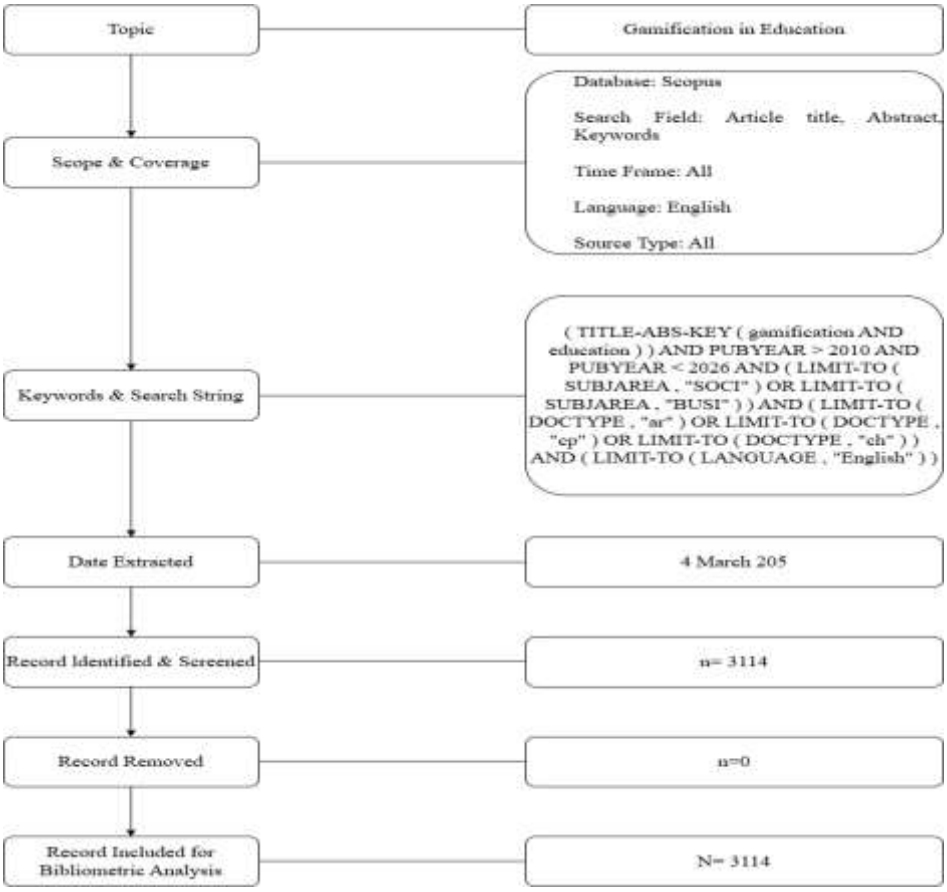

Figure 1: Search strategy. Source: Zakaria et al. (2021)

Specific functions in the Scopus database are used to identify duplicates and potential duplicates are manually checked after automatic detection. Duplicates were identified in Scopus and manually verified. Author Keywords were cleaned with OpenRefine (Schöbel et al., 2023) by first using "Split multi-valued cells" and then "Cluster and edit" (key collision and nearest neighbor) to merge synonyms and correct spelling (e.g., "game-based learning" vs. "game based learning"). Missing author names, affiliations, and other metadata were cross-checked via Scopus and Google Scholar and standardized in Microsoft Excel. These steps produced a consistent, deduplicated dataset for bibliometric analysis.

Regarding bibliometric analysis in this study, bibliometric measures used citation count, co-citation frequency, or bibliographic coupling (Leung, Sun, & Bai, 2017). First, citation counts simply count the number of times each paper has been cited in other academic works. Second, co-citation frequency is similar to citation count, comparing the same citation frequency relative to the average in the field of gamification in education can explain disciplinary differences. A final note on bibliographic coupling involves counting the number of references shared by multiple documents. In addition, citations were measured using h-index, g-index, and m-index. Network analysis may be utilized in this research to visualize and examine the interactions between various entities. Descriptive analysis also uses fundamental statistical

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methods to characterize the data collection, such as citation analysis, publication distribution across journals, author frequency, and institutional distribution (Loeb et al., 2017). Lastly, citation analysis looks for important articles, writers, or journals by analyzing citation trends in a data collection. In order to complete network analysis and achieve visualization, VOSviewer was used for visual processing after data cleaning, and Co-authorship Analysis and Co-occurrence Analysis were performed. This bibliometric analysis has two limitations. The first is the monotonicity of the database. Since only the Scopus database was selected this time, this means that it may not cover all gamification fields in education. Secondly, the subject area is restricted, which also may affect the comprehensiveness of the data.

Results

Documents Profiles

The first article about gamification in education was published by Barry, John, Patrick et al. in 2011. They studied the enhancement of gamification on students' reflective process. Publications related to the topic of gamification have developed well in recent years. Table 1 presents the main information about the data in this study.

Table 1: Documents Information

Main Information	
Publication Years	2011 - 2025
Total Publications	3114
Citable Year	15
Number of Contributing Authors	10452
Number of Cited Papers	2272
Total Citations	43,464
Citation per Paper	13.96
Citation per Cited Paper	19.13
Citation per Year	3104.57
Citation per Author	4.16
Author per Paper	3.36
Citation sum within h-Core	29,489
h-index	89
g-index	149
m-index	5.93

Publications By Source Titles

"Most Active Source Titles" give bibliometric data for many academic sources, especially in the areas of technology and education. Journal and conference-based "Most Active Source Titles" are presened in Tables 2 and 3, has the greatest h-index of 35 and an average number of citations per publication of 13.29, indicating an excellent academic reputation. Furthermore, the 'Sustainability (Switzerland)' h-index is 27, and the average number of citations per publication is 28.37, indicating superior productivity and influence. In Table 3, "Proceedings

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of the European Conference on Games-based Learning" and "IEEE Global Engineering Education Conference, EDUCON" have a significant impact in their fields due to their prominent total publications (127 and 113, respectively) and moderate h-index.

Table 2: Most Active Source Titles: Journal

Source Title	h	g	m	TP	NCA	NCP	TC	C/P	C/CP
Sustainability (Switzerland)	27	45	2.455	78	274	74	2213	28.37	29.91
Education and Information Technologies	21	37	1.909	64	209	53	1434	22.41	27.06
Education Sciences	16	33	2.000	59	200	53	1176	19.93	22.19
International Journal of Emerging Technologies in Learning	16	29	1.231	46	157	45	963	20.93	21.40
BMC Medical Education	35	203	0.909	35	203	27	465	13.29	17.22
Computers and Education	20	25	1.538	25	83	24	4078	163.12	169.92
International Journal of Information and Education Technology	5	8	0.833	24	105	16	82	3.42	5.13
International Journal of Engineering Education	7	17	0.700	19	62	18	314	16.53	17.44

Table 3: Most Active Source Titles: Conference

Source Title	h	g	m	TP	NCA	NCP	TC	C/P	C/CP
Proceedings of the European Conference on Games-based Learning	10	25	0.667	127	380	87	783	6.17	9.00
IEEE Global Engineering Education Conference, EDUCON	18	27	1.385	113	435	89	1019	9.02	11.45
Proceedings - Frontiers in Education Conference, FIE	10	15	0.769	57	208	49	365	6.40	7.45
Proceedings of the 11th European Conference on Games Based Learning, ECGBL 2017	6	14	0.667	30	87	23	211	7.03	9.17
Proceedings of the European Conference on e-Learning, ECEL	5	7	0.417	28	75	23	95	3.39	4.13

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

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Highly Cited Documents

Table 4, "Top Highly Cited Articles," focuses on gamification in education and learning. Each item includes the authors, paper title, journal, total citations, and annual average citations. Most cited is Seaborn and Fels's 2015 "Gamification in Theory and action: A Survey" in the International Journal of Human-Computer Studies with 1670 citations. Following this, Domínguez et al. published research in "Computers and Education," with 1264 citations, on the practical consequences of gamified learning. Buckley and Doyle's (2016) investigation of gamification and student motivation and Dicheva et al.'s (2015) thorough mapping research on school gamification is also significant. The high number of citations for these papers shows their field influence. The list covers digital badges, mobile learning systems, student motivation and achievement, theoretical surveys, and practical effects of gamification. These articles in different journals and conferences demonstrate transdisciplinary gamification research.

Table 4: Top 10 Highly Cited Articles

No.	Authors	Title	Cites	Cites per Year	Category Quartile
1	Seaborn, Fels (2015)	Gamification in theory and action: A survey	International Journal of Human Computer Studies	1670	Q1
2	Domínguez, Saenz-De-Navarrete, De-Marcos, Fernández-Sanz, Pagés,C Martínez-Herráiz (2013)	Gamifying learning experiences: Practical implications and outcomes	Computers and Education	1264	Q1
3	Dicheva, Dichev Agre, Angelova (2015)	Gamification in education: A systematic mapping study	Educational Technology and Society	1256	Q1
4	Buckley, Doyle (2016)	Gamification and student motivation	Interactive Learning Environments	485	Q1
5	Su, Cheng. (2015)	A mobile gamification learning system for improving the learning motivation and achievements	Journal of Computer Assisted Learning	412	Q1

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Publications By Authors

Table 5 ranks the "Most Productive Authors" in this study's data set by academic productivity and influence, evaluated by citations, the h-index and g-index. Oliveira and Wilk (2022) lead with 20 publications (TP), practically all of which have been referenced (NCP) and 445 citations. Hamari and Juho has a good citation effect, with an average C/P of 24.84 and a C/CP of 36.31. Isotani and Seiji follows with 13 publications and a higher average citation count, suggesting field influence. Hew and Khe Foon have 10 publications, yet their average citation per publication is over 878, much more significant than others on the list, proving their reach and impact.

Table 5: Most Productive Authors

Author's Name	TP	NCP	TC	C/P	C/CP
Oliveira, Wilk	20	14	445	22.25	31.79
Hamari, Juho	19	13	472	24.84	36.31
Isotani, Seiji	13	12	585	45.00	48.75
Toda, Armando M.	13	13	582	44.77	44.77
Palomino, Paula T.	11	10	434	39.45	43.40
Rodrigues, Luiz	10	9	308	30.80	34.22
Hew, Khe Foon	10	9	878	87.80	97.56

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

"Table 6. Productivity Patterns of Authors and Research Contributions" indicates how authors disperse their study's output based on how many papers they have written. Lotka's Law of Scientific Productivity suggests that the number of authors who make a single contribution is the biggest and reduces quickly for those who make many contributions. The research supports this idea. The table reveals that 77.17% of authors have written only one paper, matching Lotka's Law with 60%. Few authors produce many articles; those with two declines significantly (13.53%), and those with three or more drop substantially more. This trend is shown in the accompanying line graph with two curves: the actual data and Lotka's Law's anticipated tendency. Research shows that when a few authors submit several publications, both angles swiftly decrease from one to two and then level off. The data and graph show research author productivity patterns, supporting the idea that a small number of researchers dominate a topic. Together, 10421 authors have provided 15697papers.

Table 6: Productivity Patterns Of Authors And Research Contributions

Documents Written	No. of Authors	Proportion of Authors	Total No. of Contributions	Lotka's Law
1	8042	77.17%	8042	60.00%
2	1410	13.53%	2820	15.00%
3	420	4.03%	1260	6.67%
4	220	2.11%	880	3.75%
5	110	1.06%	550	2.40%
6	72	0.69%	432	1.67%

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7	42	0.40%	294	1.22%
8	40	0.38%	320	0.94%
13	26	0.25%	338	0.36%
19	19	0.18%	361	0.17%
20	20	0.19%	400	0.15%
Grand Total	10421	1	15697	92.32%

Co-Authorship Analysis

Co-Authorship by Organizations

Figure 3 shows the VOSviewer visualization of 2,122 academic publishing organizations' co-authorship networks. The approach rejects documents co-authored by over 25 organizations to avoid results distortion from excessive collaboration. Each organization's map node size indicates the strength of its co-authorship contacts with other organizations and its joint research efforts. Since they meet document and citation criteria, 2,122 organizations in the network have contributed to academic literature. Despite the network's large size, several organizations are independent research efforts. However, 626 enterprises in 39 clusters form the largest connected entity group. These groupings possibly represent various scientific domains or related research. The VOSviewer visualization shows the co-authorship network of 2,122 academic publishing organizations. To avoid influencing findings, the method excludes documents co-authored by over 25 organizations. Each organization's map node size indicates the strength of its co-authorship contacts with other organizations and its joint research efforts. Since they meet document and citation criteria, 2,122 organizations in the network have contributed to academic literature. Despite the network's large size, several organizations are independent research efforts. However, 626 enterprises in 39 clusters form the largest connected entity group.

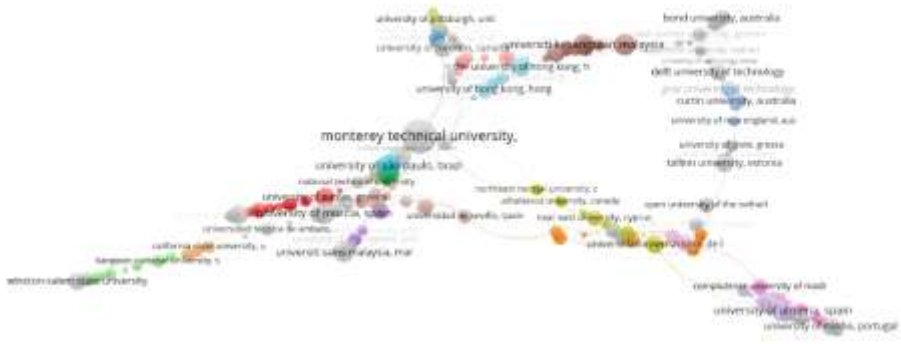

Figure 3: Network Visualization Map of The Co-Authorship by Organizations

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Co-Authorship by Countries

Based on academic papers, co-authorship links between 101 nations are shown in this VOSviewer network visualization. The interconnectivity of co-authorship by countries in the dataset is shown on the map in Figure 4. The use of fractional counting shows that the shared contributions are dispersed equally across the participating nations in a single document. To keep the emphasis on more direct joint efforts, the research does not include any documents co-authored by more than 25 nations. With at least one document and one reference, each nation in the dataset satisfies the basic requirements, guaranteeing complete representation in the network. Certain nations are separated from one another in this worldwide co-authorship network, which reflects their autonomous research contributions or relationships within certain areas. 89 nations, divided into 16 clusters, make up the network's most linked portion, however. These clusters represent cross-national topic research alignments or regional cooperation. The purpose of the visualization is to draw attention to the nations with the strongest co-authorship relationships, which are essential to the network and may be a sign of leadership positions in global research partnerships. This map helps to comprehend the distribution of joint activities across nations, highlight important figures in the worldwide research community, and detect trends of global scientific collaboration.

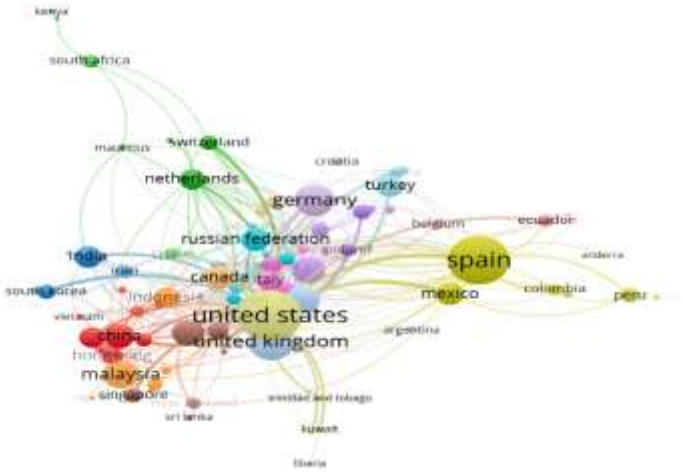

Figure 4: Network visualization map of the co-authorship by countries

Co-Occurrence Analysis

Co-Occurrence Analysis of Author's Keywords

The interconnectivity of author keywords in the dataset is shown on the map in Figure 5, where each term has a minimum occurrence threshold of 10. One hundred and forty-two (142) keywords out of 3,511 satisfy this requirement. The overall strength of co-occurrence linkages with other keywords is shown by the size of each keyword node. Nine clusters, one for each theme of research emphasis, make up the network. In this topic, "gamification" is the most popular term, indicating a high concentration on research. It is associated with ideas such as "education," "game-based learning," and "active learning."

In order to identify research topics, trends and knowledge gaps, the study was analyzed using Biblioshiny, a small application of the Bibliometrix R package developed by Aria and Cuccurullo (2017). The analysis identifies 12 clusters in different research fields. The clusters

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can be described based on the keywords and their centrality measures. Figure 6 shows a thematic map of the author's keywords which are categorised into 12 clusters.

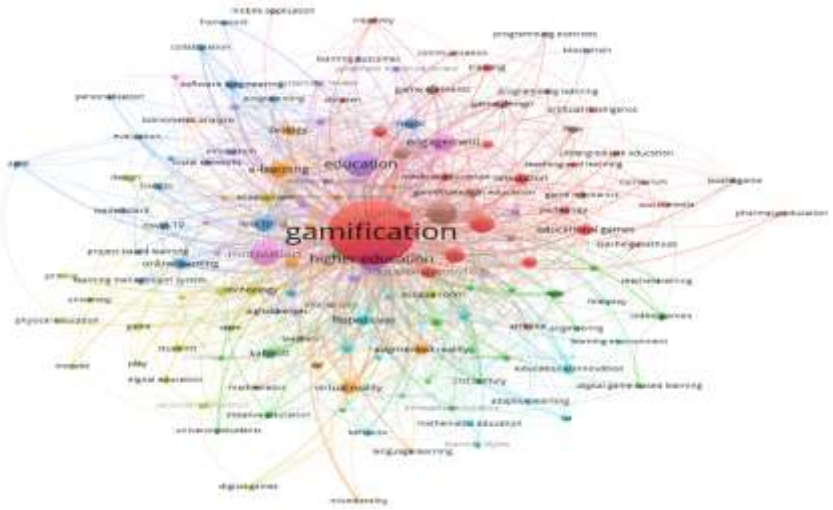

Figure 5: Network Visualization of The Author's Keywords

Among these twelve clusters, the most valuable area for future research is the integration of apps and intrinsic motivation. Educational apps represent the forefront of digital and personalized learning, offering flexible, on-demand platforms enhanced by gamification, artificial intelligence, and real-time feedback. As mobile learning becomes increasingly prevalent, apps serve as powerful tools to deliver customized content and interactive experiences. On the other hand, intrinsic motivation is the psychological foundation of sustained and meaningful learning. Unlike external rewards, intrinsic motivation fosters long-term engagement, deeper understanding, and self-directed learning. By combining these two clusters, future research can explore how gamified elements within educational apps can effectively stimulate learners' internal drive, leading to more engaging, autonomous, and impactful learning experiences.

When considered together, these organizations show that educational gamification is a diverse, multidisciplinary area that encompasses innovation in teaching methods, application of learning theory, assessment of efficacy, and technological integration. The implementation of gamified education in various cultural settings, the assessment of long-term benefits, and the investigation of adaptation to student groups with needs are examples of research gaps. Future study might examine ways to integrate gamification tactics with newly developed educational technologies to create learning environments that are more effective and interesting.

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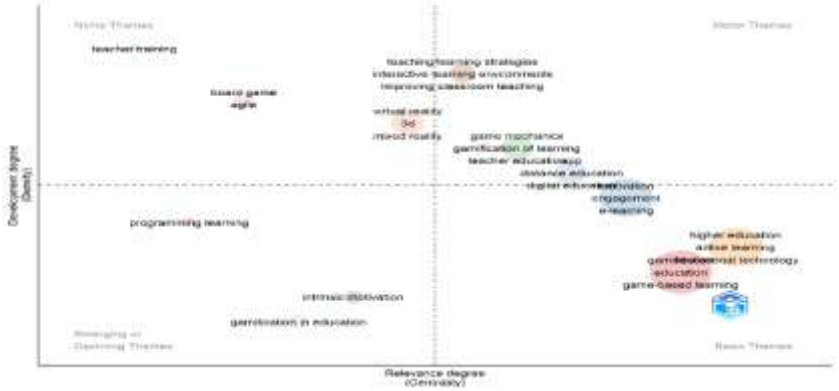

Figure 6: Thematic Map of The Author's Keywords in Research.

When considered together, these organizations show that educational gamification is a diverse, multidisciplinary area that encompasses innovation in teaching methods, application of learning theory, assessment of efficacy, and technological integration. The implementation of gamified education in various cultural settings, the assessment of long-term benefits, and the investigation of adaptation to student groups with needs are examples of research gaps. Future study might examine ways to integrate gamification tactics with newly developed educational technologies to create learning environments that are more effective and interesting.

In Figure 7 the same terms are shown across time in an overlay view, where the hue designates the average year of occurrence. The monitoring of the development and trends in the study topic is made possible by this temporal dimension. Yellow keywords indicate more current study, while blue keywords indicate prior research. The blue-to-yellow colour shift throughout the clusters may represent changes in study focus over time, such as the rising popularity of "gamification" and "active learning."

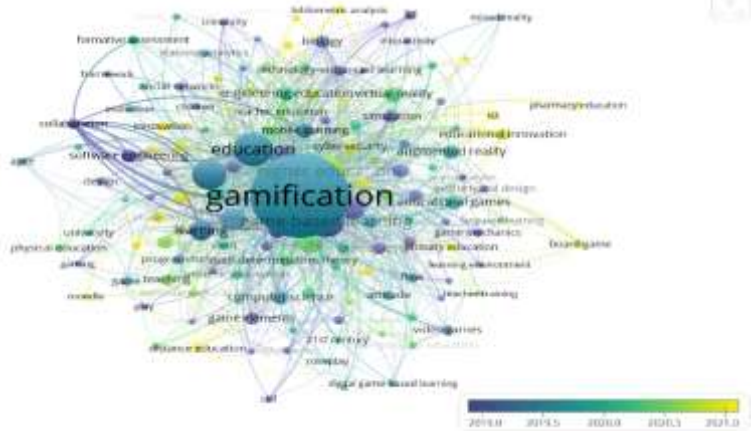

Figure 7: Overlay Visualization of The Author's Keywords

Co-Occurrence Analysis of Terms Based on Title and Abstract.

The relationships between words are shown in Figure 8 according to how often they appear in abstracts and titles. Out of 35,486 words, 1,151 were deemed to have occurred ten or more times. The map's organisation comprises five clusters, each signifying a group of linked phrases and denoting distinct study subjects or regions. Lagger nodes, such as "effect," "reality," and "child," imply phrases that are more prevalent and might be significant subjects in the field of study.

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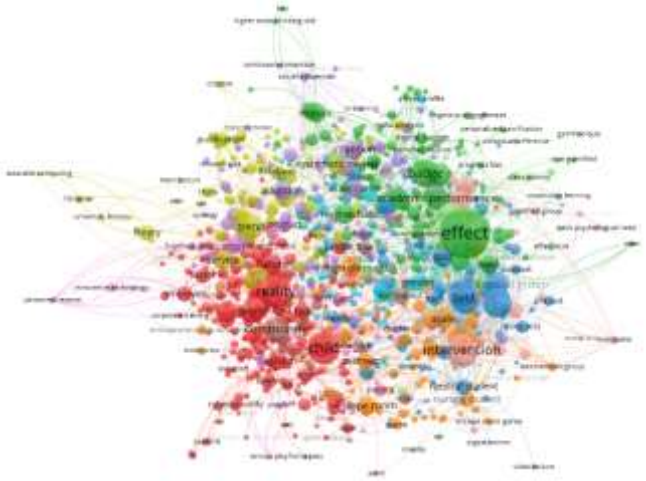

Figure 8: Network Visualization of a Term Co-Occurrence Network Based on Title and Abstract Fields.

Discussion and Conclusion

Summary of Key Findings

The first education gamification article appeared in 2011. The number of publications increased dramatically after 2015, reaching 3,114 by 2025. Citations also increased, notably from 2013 to 2015. In 2015, the public began to recognize gamification in education, and it has subsequently gained popularity. Since more articles have been published, the average number of citations has declined. Proceedings of the European Conference on Games-based Learning and IEEE Global Engineering Education Conference EDUCON are important publications with high h-indices and many papers. Most cited is Seaborn and Fels (2015) "Gamification in Theory and Action: A Survey" (1760citations), highlighting its effect on the issue. Collaboration patterns favour small to medium-sized author groups. Two authors per document are most common, followed by three. As a publication's number of writers climbs, the number of authors per article drops, indicating smaller groups work together. Oliveira and Wilk (2022) is the most prolific with 20 publications.

The top 20 most referenced articles, excluding those from conferences, predominantly belong to Q1 journals, with a significant portion originating from 'Computers and Education'. This indicates that 'Computers and Education' has made the most substantial contribution to the field of gamification in education research. Additionally, this suggests that 'Computers and Education' has dedicated more time to studying gamification in education in its early stages compared to other research studies.

In the challenging COVID-19 setting, the Monterey Technical University research emphasizes the benefits of gamification in education. The university acknowledges that education is evolving, and that technology is crucial to student engagement (Chans & Portuguez Castro, 2021) Gamification, formerly considered only as entertainment, is now being appreciated for its educational potential. This approach may boost student motivation and engagement (Manzano-León et al., 2021). Monterey Technical University will study gamification in education in response to this development. Their dedication to integrating game-based learning into education has made them a top producer in this field. The University of Granada, University of Almeria, and Monterey Technical University also produce and impact research.

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The University of Toronto has a high h-index and citation metrics, indicating strong impact per item and total citation count.

The United States has become the country or region that has made the greatest contribution to the integration of gamification into education. This significance stems from the country's recognition that its education system is in dire need of scalable and successful solutions. Serdyukov (2017) asserts that such innovations are crucial to promoting high-quality learning outcomes in all contexts. Due to this, the United States is increasingly interested in and involved in gamification technologies as they see their ability to revolutionize the teaching and learning process.

Implications For Practice

The increasing number of publications and the significant impact of multiple studies suggest that some gamification strategies are more effective than others. Drawing on the Technology Acceptance Model (TAM), it is important to ensure that gamification elements are both useful and easy to use, as perceived usefulness and ease of use directly influence learners' adoption intention (Davis, 1989). For instance, components such as leaderboards, badges, and points should clearly demonstrate progress and remain simple to navigate to enhance motivation and engagement.

Flow Theory further emphasizes maintaining an optimal balance between challenge and skill to keep learners engaged (Csikszentmihalyi, 1990). Gamified activities should be designed with appropriate difficulty levels and timely feedback to sustain immersion and enjoyment.

Finally, the Expectation-Confirmation Model (ECM) highlights the role of meeting learners' expectations to encourage continued use (Bhattacherjee, 2001). Practitioners should align gamified activities with the subject matter, context, and learner demographics to improve satisfaction and promote long-term engagement. Interdisciplinary collaboration among educators, psychologists, and technology experts can ensure that gamification strategies are pedagogically sound, technically feasible, and psychologically appealing.

Future Directions and Limitations

There is growing academic interest in using games in education, but related research gaps still need to be addressed (Parreño, Ibáñez, & Arroyo, 2016). The future of gamification in education, as illustrated by these twelve clusters, envisions a transformative and immersive learning landscape. Key areas include integrating game-based methods in teacher training, revisiting board games for enhancing cognitive skills, and employing virtual reality for interactive learning. Gamification is set to enhance student engagement, personalize learning through apps and AI, and foster intrinsic motivation. It aims to deepen the impact on student performance and retention, particularly in higher education, and reshape programming education. The overarching goal is to create a more engaging, personalized, and effective educational experience across various disciplines, driven by the innovative integration of gamification elements. To enhance analysis based on the data from VOSviewer, it is important to emphasize potential research directions and strategies. The current analysis reveals that the gamification of 'language learning' and 'personalization' in education is an underexplored area. While 'language learning' in gamification is linked primarily to augmented reality and e-learning, 'personalization' shows a significant connection only with agile methodologies. For 'language learning', investigating how gamification can be integrated with augmented reality

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and e-learning to enhance engagement and effectiveness could be a fruitful area of research. This could involve experimental studies that test various gamified AR and e-learning strategies in language education settings. Regarding 'personalization', the focus could be on how agile methodologies can be applied to create more personalized learning experiences. This might include research into adaptive learning systems that use agile principles to tailor content and learning paths to individual student's needs and progress. Future research should aim to not only investigate these weakly explored areas but also to develop practical applications and methodologies that leverage the unique benefits of gamification in language learning and personalization in education.

The limitations of this study are twofold. First, the study was mostly conducted using the Scopus database. This method removed relevant material that was not indexed in Scopus, which reduced the analysis's comprehensiveness. Subsequent studies may consider including more repositories, such Web of Science or Google Scholar, to include a wider variety of papers and perspectives. Secondly, the research was limited in the scope of findings it could make since its concentration was on a specific issue area. The extent to which the data is comprehensive and the research's alignment with the broader educational framework may be impacted by this area of expertise. Though the research provided quantitative insights, it did not conduct a qualitative examination of the articles' content. Subsequent investigations may explore the techniques, conceptual models, and particular academic environments of the studies to provide a more profound comprehension of the practical implementations of gamification.

Contributions To the Field

Gamification research in education between 2011 and 2025 is extensively examined in this paper which gives a chronological view of the field's growth and key turning moments in the gamification research community. By finding the most active journals and widely cited items, the study provides insight into the fundamental literature. For academics and practitioners seeking to learn more about gamification research, this helps locate key papers and thought leaders. The study shows cooperative tendencies and gamification research preferences for small- to medium-sized author groups. This understanding of authorship dynamics illuminates gamification research's diverse nature and facilitates collaboration. The paper analyzes gamification research from diverse universities and nations to provide a worldwide perspective. This highlights the geographical variation and institutional engagement in gamification in education research and implementation, providing a more complete picture. The study contributes to the literature by providing a current and comprehensive bibliometric analysis of gamification in education. It contributes to knowledge by emphasizing new directions and gaps in the literature and reviewing existing research. The report guides future gamification research. The study identifies key papers, authors, trends, and gaps to inform future research. It opens new paths for academic study and practical application, guiding inquiry into understudied domains. The study’s findings align with prior works, such as Seaborn & Fels (2015), whose review emphasized the theoretical underpinnings of gamification, which this study extends by analyzing recent trends. Similarly, Domínguez et al (2013) explored the practical applications of gamification, and this study validates their work by providing deeper insights into gamification’s role in student engagement. Additionally, it builds upon Swacha’s (2021) bibliometric analysis by covering a longer timeframe (2011-2025) and utilizing a larger dataset (3114 articles), thus offering a more comprehensive assessment of the research landscape in gamification and education.

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