Gamifying Primary Education in the 21st Century: A Scopus-Based Bibliometric Review (2017–2025)

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ABSTRACT

Gamification has emerged as a significant pedagogical approach in 21st-century education, offering innovative strategies to enhance motivation, engagement, and learning outcomes in primary schools. Despite its growing application, research on gamification in primary education remains fragmented, requiring systematic synthesis to identify prevailing trends and gaps. This paper presents a bibliometric review of studies on gamification in primary education published between 2017 and the present, using the Scopus database as the primary source. Bibliographic records were retrieved, screened, and analyzed using the Scopus Analyzer to examine publication trends, document types, source outlets, author contributions, institutional affiliations, and country-level distributions. The findings reveal a steady increase in publications, with peaks corresponding to the rise of digital and remote learning during the COVID-19 pandemic. Results also indicate that most research emphasizes gamification as a tool for improving motivation and engagement, particularly in STEM and literacy education. However, the literatures highlights challenges such as teacher readiness, equity issues, and the risk of over-reliance on extrinsic rewards. This review concludes that while gamification shows strong potential in primary education, further research is needed to explore long-term impacts, inclusive practices, and integration with emerging technologies.

Keywords: Gamification, Primary Education, Student Motivation, Educational Technology, Engagement, 21st-Century Learning

INTRODUCTION

The concept of gamification which is the integration of game-design elements into non-game contexts has gained extensive traction in education, driven by its capacity to enhance motivation, engagement, and learning outcomes (Deterding et al., 2011; Kapp, 2012; Park & Kim, 2021; Fiuza-Fernandez et al., 2022; Vrcelj et al., 2023). In a simple explanation, we can state that gamification is the process of applying game elements to non-gaming elements, and this application has expanded in commerce, health and education (Inocencio, 2018). Gamification in education refers to the application of elements of game design and game principles in the classroom to increase student motivation and engagement. Gamification uses mechanics, aesthetics, and thinking from the player's point of view to engage students and promote learning and problem-solving (Osatuyi et al., 2018; Pal'ová & Vejačka,2020). Gamification can be used in education at different levels, from primary and secondary schools to universities and adult education. An analysis of the literature on the use of gamification in education has shown that it is more common in university education and less common in primary and secondary schools (Vrcelj

et al., 2023). In the realm of primary education, where our young learners' attention spans are shorter and the need for interactive, meaningful engagement is critical, gamified approaches present a promising pedagogical strategy. Furthermore, the younger generation has been heavily influenced by technology and instant access to information and often exhibits a lack of motivation and interest in traditional classroom learning (Fiuza-Fernández et al., 2022). For today's young learners, often called digital natives, these game-like elements are not just play; they are powerful motivators that can transform how children experience learning. Imagine a classroom where solving a mathematics problem earns a digital badge, completing a reading task unlocks a new level, and teamwork leads to climbing a leaderboard. This practice, widely known as gamification, is increasingly being adopted in primary education as teachers and schools search for innovative ways to sustain attention, nurture curiosity, and build foundational skills in the 21st century especially for the digital native.

The rise of gamification in education is no coincidence. As global education systems grapple with challenges of engagement, motivation, and equity, gamification offers tools that resonate with children's lived experiences in a digital world. Points, rewards, progress bars, and interactive challenges have been shown to not only stimulate interest but also enhance learning outcomes when designed thoughtfully. Moreover, the COVID-19 pandemic accelerated the adoption of digital learning platforms, pushing gamified solutions further into mainstream primary classrooms worldwide. However, while gamification holds promise, the research landscape is fragmented. Some studies highlight its ability to improve motivation and academic performance, while others raise concerns about sustainability, teacher readiness, and over-reliance on extrinsic rewards. This diversity of findings calls for a systematic review to better understand how gamification is being studied and implemented in primary education. To address this gap, this paper conducts a bibliometric review of literature published between 2017 and the present, using the Scopus database and Scopus Analyzer tools. This review paper has two aims which are: 1) Map the growth and distribution of gamification research in primary education. 2) Identify leading authors, institutions, and countries that shaping the field. This study provides educators, researchers, and policymakers with a clearer picture of how gamification has evolved in primary education and what directions may guide its development in the years to come.

Primary Education

Primary education represents the initial stage of formal schooling, focusing on fundamental skills such as literacy, numeracy, and social development. While its purpose is globally recognized, the terminology and structure vary significantly across regions. According to UNESCO (2017), primary education generally covers children between the ages of 6 and 12, though national systems may extend slightly beyond this range. In Asian countries, there is considerable variation. For instance, in Malaysia and Singapore, the system is called primary school and covers six years of education (ages 7–12). In Japan, it is known as shogakko, lasting six years for children aged 6 to 12. Meanwhile, India often distinguishes between primary school (Grades 1–5) and upper primary or middle school (Grades 6–8), reflecting a broader categorization (Srivastava, 2020). In Europe, terms differ by country but align closely with the International Standard Classification of Education (ISCED). For example, in Germany, the stage is called Grundschule (Grades 1–4, ages 6–10), while in France it is école primaire (ages 6–11). In South America, particularly Brazil, the stage is referred to as ensino fundamental I (Grades 1–5, ages 6–10), while in Argentina it is educacion primaria (ages 6–12) (UNESCO, 2017). In Western countries, the United States typically refers to this stage as elementary school, encompassing Grades 1 through 5 or 6 (ages 6–11), whereas in the United Kingdom, the term primary school is used for Reception through Year 6 (ages 5–11) (OECD, 2020). Similarly, in Australia, the term primary school is used to describe Kindergarten through Year 6 (ages 5–12), while Canada often distinguishes between elementary school (Grades 1–6) and junior high thereafter. Despite these variations, the shared purpose of primary education is consistent: to provide the basic academic foundation, instill learning habits, and develop social and emotional competencies. Importantly, this stage also serves as a critical period to address educational equity, as it is often compulsory and universally accessible across most regions (UNESCO, 2017; OECD, 2020).

Theoretical Foundations of Gamification in Education

Gamification is the application of game elements in non-game contexts and has gained recognition as a powerful pedagogical strategy. Its effectiveness in education is supported by established learning and motivational theories. Table 1 below shows different game elements that can be applied to the non-game context.

Table 1. Different Game Elements that can be applied to the non-game context.

Game Element	Simple Explanation	Non-Game Example
Points (or XP)	Numerical rewards given for completing tasks.	Earning points in a customer loyalty program for every dollar spent.
Badges / Achievements	Visual icons or titles that signal a user has reached a specific milestone or mastered a skill.	Earning a "Super Speller" badge after completing a unit on a learning app.
Leaderboards	Public rankings of users based on their points or achievements, fostering competition.	A sales team tracking who has the most closed deals this month.
Levels / Progress Bars	Visual indicators showing how close a person is to a goal or to unlocking the next stage.	A progress bar filling up as you complete your profile on a new website.
Challenges / Quests	Framing a task or learning objective as a structured mission to complete.	A training manual structured as a "New Hire Quest" with different stages to unlock.
Rewards	Tangible or virtual prizes, like unlocking a feature, a discount, or a new avatar.	Getting a free item after collecting enough points (like a frequent flyer program).

Gamification, serious games, and game-based learning have emerged as prominent pedagogical approaches, leveraging game design elements in non-game contexts to enhance engagement and learning outcomes. This approach is rooted in various theoretical frameworks that explain its effectiveness in fostering motivation and deeper cognitive processing (Krath et al., 2021). There are several theories that can explain the effectiveness of gamification in education. Theories such as Flow Theory, Self-Determination Theory, Behaviour Reinforcement and Goal-Setting Theory provide robust explanations for how gamified elements fulfill psychological needs, thereby enhancing motivation and engagement in educational settings (Ahmed et al., 2025). Table 2 shows the comparison of theories on gamification effectiveness in education.

Table 2. Comparison of Theories on Gamification Effectiveness in education

Theory	**Key Theorists**	**Core Concept**	**Gamification Design Focus**	**Mechanism of Effectiveness**
Flow Theory	Csikszentmihalyi (1990), Shernoff et.al (2003); Whitson & Consoli (2009)	Optimal experience achieved when there is a **balance between a perceived challenge and the individual's skill level**.	**Levels and Challenges:** Designing content to gradually increase in difficulty to match learner skill. **Immediate Feedback** (points, progress bars) to help users adjust	Induces a state of **deep immersion and concentration**, where the user is fully absorbed in the learning task, making the activity intrinsically rewarding (autotelic experience).

			performance.	
Self-Determination Theory (SDT)	Deci & Ryan (2000)	Focuses on **intrinsic motivation** being sustained by satisfying three innate psychological needs: **Autonomy, Competence, and Relatedness.**	**Autonomy:** Choices in tasks, learning paths, or avatar customization. **Competence:** Badges, points, and clear progress indicators (levels). **Relatedness:** Team challenges, collaborative missions, and social features.	Fulfilling the three basic needs shifts motivation from purely external rewards to **internal enjoyment and self-regulation**, leading to deeper learning and long-term engagement.
Behavior Reinforcement	Skinner (1953, 1989)	Behavior is a function of its consequences; it is strengthened by **positive reinforcement** (rewards) and weakened by punishment.	**Points, Badges, and Rewards:** Using these as immediate, positive reinforcers for desired learning behaviors (e.g., completing a task, answering correctly).	Directly **shapes and conditions behavior** through extrinsic motivation. The immediate reward reinforces the action, making the student more likely to repeat that behavior.
Goal Setting Theory	Locke (1968); Locke & Latham (1990, 2002); Schunk & Swartz (1993);	**Specific, difficult goals** lead to higher performance than vague goals (e.g., "do your best"), provided there is commitment and feedback.	**Quests/Missions, Levels, and Progress Bars:** Gamified systems inherently break large learning objectives into clear, measurable sub-goals.	Provides **clarity, challenge, and direction**. Gamification elements translate abstract learning objectives into concrete, trackable progress, increasing learner focus and sustained effort toward achieving the goal.

These theoretical underpinnings are crucial for understanding the mechanisms through which gamification influences learner behavior and academic achievement (Yang et al., 2023). While a multitude of theories contribute to the conceptual framework of gamification, many reviews highlight the prominence of motivational and behavioral theories in explaining its efficacy (Krath et al., 2021). Among these, Self-Determination Theory frequently appears as a cornerstone, emphasizing the satisfaction of intrinsic psychological needs for autonomy, competence, and relatedness as drivers of sustained engagement in gamified learning environments (Quba et al., 2024; Ghoulam et al., 2024; Grey & Gordon, 2022). Self-Determination Theory (SDT) highlights autonomy (the sense of agency and control over one's actions), competence (the feeling of mastery and effectiveness), and relatedness (the experience of social connection and belonging) as core drivers of intrinsic motivation (Ryan & Deci, 2000). All of which can be fostered through gamified elements such as meaningful choices, real-time feedback, and collaborative challenges. The theory proposes that when these basic needs are satisfied, intrinsic motivation increases, leading to more meaningful and autonomous learning (Slamet et al., 2024).

Empirical Applications in Primary Education

Gamification has been applied across multiple primary school subjects, producing encouraging results. In literacy and language learning, digital storytelling tools and quiz platforms like Kahoot! and Quizizz have been shown to enhance vocabulary acquisition and reading comprehension (Wen, 2023). He found that gamification across ESL skills such as listening, speaking, reading, and writing can produced positive outcomes, suggesting comprehensive applicability in language education. Similarly, Aljraiwi (2019) found that gamified web-based learning in English significantly improved both academic achievement and creative thinking in primary students. In science and STEM subjects, gamification has supported inquiry-based learning, with simulations and challenges fostering curiosity and persistence. In mathematics for example, gamified platforms have demonstrated improvements in problem-solving and reduced math anxiety among students. Liu (2023) examined gamification in primary mathematics instruction and reported increased student motivation and subject interest, especially where individual differentiation was limited in standard classrooms. Similarly, Yan (2023) analyzed gamified methods in arithmetic and geometry, finding enhanced motivation, understanding, and creative thinking, albeit noting challenges in design and classroom management. Cunha et al., (2018) evaluated the use of gamification in third-grade mathematics education. They used Ocatalysis proposed by Yu Kai-Chou constructs to measure third graders' experience as gamers. They found that third graders actively collaborated throughout the process, developing multiple skills and abilities. Sotoz et al (2023) used gamification to investigate the effect of gamification on students in physical education, and it resulted in an increased motivation of the learners toward the lesson.

Reported Benefits and Challenges of Gamification

Through these contexts, several recurring benefits of gamification in primary education have been documented. Zhang (2023) discussed how gamification enhances general learning engagement, presenting it as an innovative pedagogy that increases enjoyment and accommodates varied learner personalities. Gamification also encourages children to participate in active learning, where the students themselves will play more roles compared to teachers (Avdiu, 2019). Second, there is evidence of improved academic performance, with experimental and quasi-experimental studies showing superior outcomes compared to traditional teaching (Aljraiwi, 2019). An action research study in Egypt compared badge-based versus leaderboard-based gamified systems for teaching the circulatory system to 5th graders. Both systems improved cognitive and achievement motivation, with slight nuances in user preference (Mohammed, Fatemah, & Hassan, 2024). Third, gamification promotes social interaction and collaboration, as features like leaderboards and team challenges encourage cooperative learning. Finally, gamification supports differentiated learning, as adaptive systems can tailor feedback and difficulty levels to individual learners' needs.

Despite its promise, gamification is not without challenges. The integration of gamification into primary education presents a multifaceted array of challenges, despite its recognized potential to enhance student engagement and learning outcomes (López et al., 2023). One significant hurdle involves preventing students from becoming overly focused on extrinsic rewards, potentially diverting their attention from the core educational content (Maryana et al., 2024). This over-reliance on external motivators can compromise deep learning and foster a competitive rather than collaborative environment (Fuchs, 2024). Furthermore, designing gamified elements that genuinely align with pedagogical objectives and cater to the diverse needs and interests of all learners proves difficult, often leading to disengagement if not carefully implemented (Hidayat et al., 2023, Rokhmat et al., 2025). Moreover, an improperly designed gamification framework can inadvertently foster negative social dynamics among students, including jealousy, resentment, and a reduction in self-esteem among those who perceive themselves as less successful in the game (Yaşar et al., 2020). These issues highlight the necessity of careful design to ensure that gamification supports intrinsic motivation and equitable participation rather than superficial engagement or competitive inequalities (Ferraz et al., 2024). Beyond the pedagogical and social complexities, the practical implementation of gamification in primary education faces significant constraints, particularly concerning teacher preparedness and resource availability (Rokhmat et al., 2025). Recent literature highlights emerging directions for gamification in primary education. The COVID-19 pandemic accelerated the adoption of gamified digital tools, embedding them into hybrid and online classrooms.

Integration with artificial intelligence (AI) is becoming increasingly common, enabling adaptive and personalized learning pathways. Furthermore, inclusive gamification is gaining attention, particularly in designing accessible tools for learners with special educational needs. Notably, teachers often require additional training to integrate gamification effectively, and there is a risk of overemphasizing extrinsic rewards, which may reduce long-term intrinsic motivation (Sailer & Homner, 2020). Moreover, issues of equity and digital access are particularly salient in developing countries, where infrastructure limitations hinder consistent application. Research is also broadening beyond motivation, examining gamification's role in supporting emotional, behavioral, and cognitive engagement which give a more holistic approach to 21st-century learning.

METHODOLOGY

This study adopted a bibliometric review methodology to examine research on gamification in primary education published between 2017 and 2025. By definition, bibliometrics is the science that studies the nature and course of a discipline through its publications (Hincapie et al., 2021). A bibliometric approach was chosen as it enables systematic mapping of publication patterns, author contributions, and emerging themes in a research domain, providing both quantitative and qualitative insights (Donthu et al., 2021).

Data Source

The Scopus database was selected as the primary source of data due to its extensive coverage of high-quality peer-reviewed journals and conference proceedings across multiple disciplines. Compared to other indexing services, Scopus offers broader coverage in education and technology research, and can provide robust citation data and built-in analytic tools that are particularly suitable for bibliometric studies (Falagas et al., 2008).

Search Strategy

The search was conducted in August 2025 using a combination of keywords and Boolean operators to ensure comprehensive retrieval of relevant literature. The final search string was:

("gamification in education" OR "game-based learning") AND ("primary education" OR "primary school" OR "elementary school")

The search was limited to publications from 2017 to 2025, as this period reflects a surge of research interest following the rapid adoption of digital technologies in classrooms, especially during and after the COVID-19 pandemic. Only articles and conference proceedings written in English were considered, as these represent the majority of peer-reviewed, internationally accessible works. The search was restricted to the document type (articles and conference papers), language (English), and time frame (2017–2025). This period was selected to capture recent developments in gamification research aligned with the rapid integration of digital learning technologies in primary education.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were designed to ensure that the review captured relevant, high-quality studies. Specifically, only peer-reviewed journal articles and conference papers focusing on the application of gamification or game-based learning in primary education contexts were included. Publications outside the 2017–2025 range, as well as those not written in English, were excluded to maintain consistency and comparability of findings. In addition, studies focusing solely on secondary, tertiary, or adult education were omitted, as the scope of this review is restricted to the primary level.

Analysis

The dataset was then analyzed using Scopus Analyzer, which provides descriptive bibliometric insights into publication trends, author productivity, source distribution, institutional contributions, and geographical patterns. Additionally, keyword co-occurrence analysis was conducted to identify research themes and emerging directions within the field of gamification in primary education.

Research Procedure

The research followed a systematic process. First, the Scopus search was conducted using the predefined query. The retrieved records were screened based on the inclusion and exclusion criteria. Next, the filtered dataset was organized and prepared for analysis. The Scopus Analyzer tool was then employed to examine trends such as annual publication growth, most productive authors, leading institutions, and country-level distributions. In addition, keyword co-occurrence analysis was used to identify thematic clusters and emerging topics in gamification research. Following the guidelines of Donthu et al. (2021), both quantitative metrics and qualitative synthesis were combined to generate a comprehensive understanding of the field.

RESULTS AND DISCUSSION

The output of the query gives us about 573 documents consisting of conference papers and journal articles published in Scopus from 2017 to November 2025 and is shown in Figure 1. The publication trends are increasing steadily, leading to the conclusion that the research area of gamification in education for primary school is gaining more interest from researchers. There was a slight dip occurred in 2020, likely due to the global impact of the COVID-19 pandemic, but the volume of publications recovered and continued to rise thereafter.

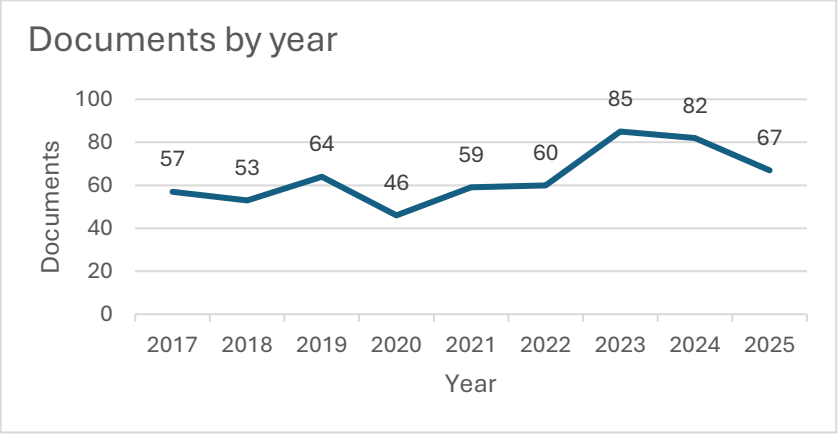

Figure 1. Bar graph to show the number of articles published from October 2017 to November 2025 in the area of gamification in education for primary school.

The research output is overwhelmingly dominated by a conference papers (69.6%) as shown in Figure 2 which significantly outnumber articles (journal publications). This suggests the field prioritizes the rapid dissemination of findings, likely employing conferences as the primary venue for presenting preliminary results, work in progress, and novel ideas to quickly solicit specialized peer feedback and establish priority. The process is generally faster and less rigorous than a full journal article. The primary goal of a conference paper is to ensure the work is relevant and well-presented for the conference setting. While articles represent a smaller portion of the total, their presence is crucial, as they typically signify the culmination of mature research that has undergone a more rigorous and lengthier peer-review process, making them the most authoritative and lasting contributions.

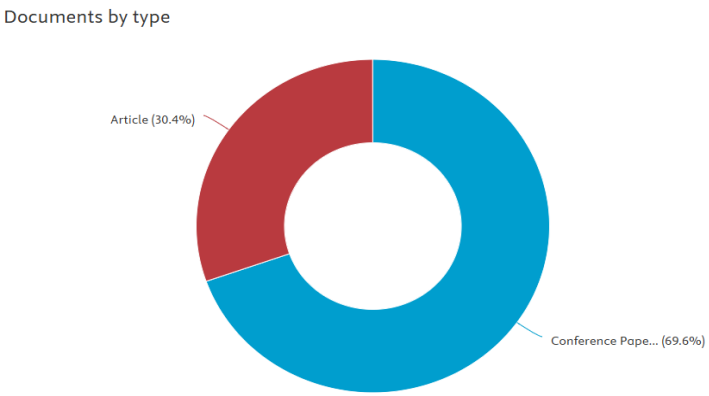

Figure 2. Percentage of documents published during the period based on type

In term of active researchers in this area of concern is shown as in Table 1 and Figure 3. The researchers represent institutions across multiple countries, including the USA (North Carolina State University, University of Wyoming, Indiana University Bloomington), Taiwan (National Yang Ming Chiao Tung University), Macau (City University of Macau, Macao Polytechnic University), Italy (Università di Trento), and Greece (Democritus University of Thrace). This demonstrates that the research on gamification in primary education is a globally active field.

Table 2. List of the 10 most prolific authors in Gamification in Education for Primary School

	Author	**Scopus Author ID**	**Year of first Publication**	**Total Publication**	**H-index**	**Total Citation**	**Current affiliation**	**Country**
1	Mott, Bradford	57203231751	2012	169	23	1,810	North Carolina State University	USA
2	Hwang, Gwo Jen	720267765 5	1990	663	94	31,163	National Yang Ming Chiao Tung University	Taiwan
3	Lester, James C.	57203179695	1995	393	50	9,916	University of Wyoming	USA
4	Choi, Iek Chong	59012658900	2024	12	4	29	City University of Macau	Macau
5	Choi, Wan Chong	58509078900	2022	11	5	56	Macao Polytechnic University	Macau
6	Gini, Federica	57896304400	2023	23	4	62	Università di Trento	Italy
7	Glazewski, Krista D.	24436207800	2003	108	21	1,852	NC State University	USA
8	Hmelo-Silver, Cindy E.	650738322 6	1987	287	45	12,667	Indiana University Bloomington	USA
9	Kazanidis, Ioannis K.	23990530500	2007	91	19	1,656	Democritus University of Thrace	Greece
10	Lee, Seung Y.	36194869400	1999	41	11	465	North Carolina State University	USA

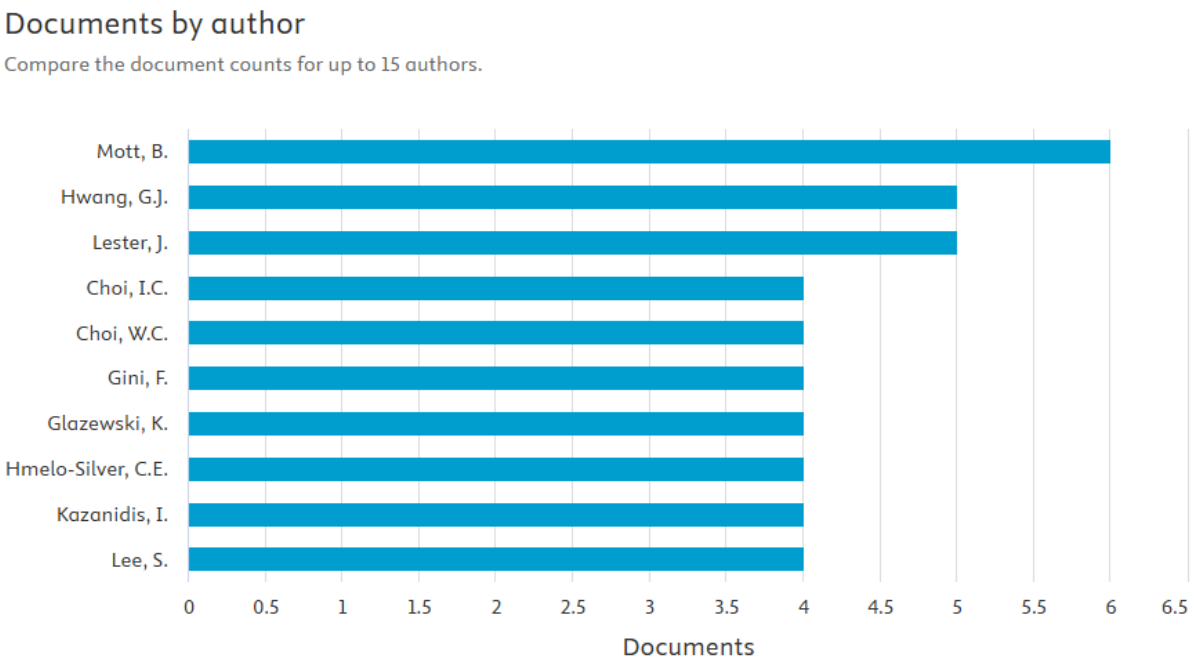

Figure 3. Top ten most prolific authors in Gamification in Education for Primary School

In Figure 4 shown an interesting facts and figures as 40% of the paper's publication in the area from 2017 to 2025 are coming from Asia continent.

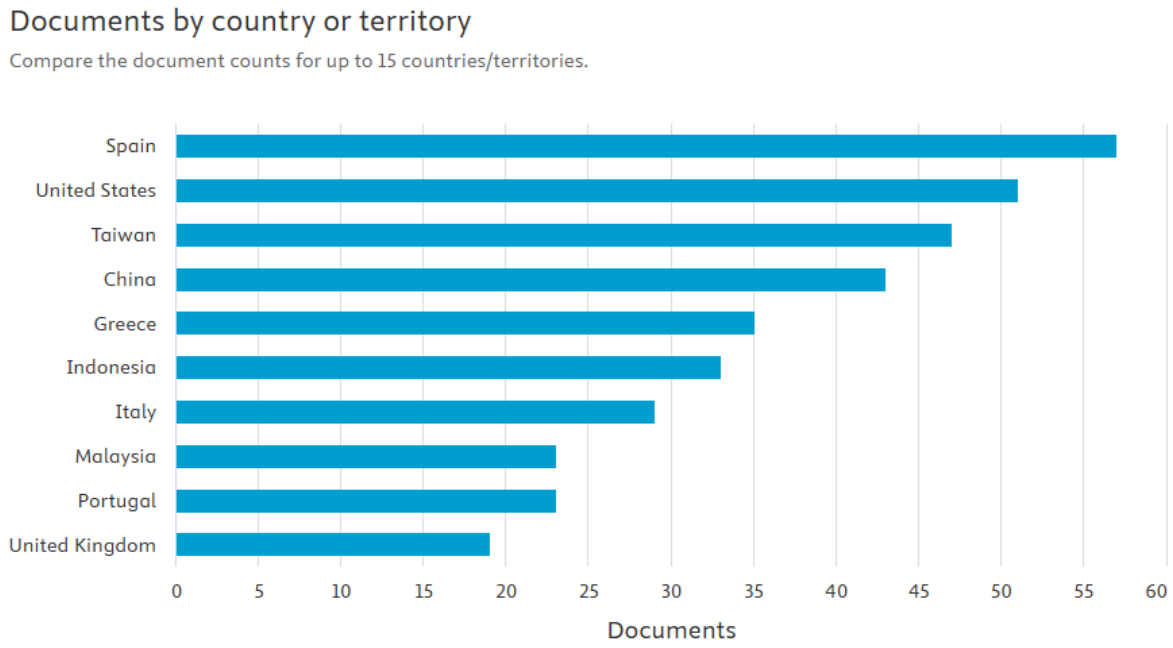

Figure 4. Top 10 countries actively involved in article publication from 2017 to 2025.

Figure 5 illustrates the research output volume of the top affiliations in the field, likely related to the previously analyzed topic of Gamification in Education. The data clearly shows National Taiwan University of Science and Technology as the leading institution, with approximately 11 documents. Closely following are National Taiwan Normal University and Bina Nusantara University, each contributing around 9 documents. The remaining institutions, including the University of Patras, Universidad de Castilla-La Mancha, Universiti Kebangsaan Malaysia, Tampere University, National University of Tainan Taiwan, and Universidad Rey Juan Carlos, show document counts clustered between 7 and 8. NC State University rounds out the top ten with around 6 documents. The chart highlights the global nature of this research, with high-contributing institutions spread across Asia (Taiwan, Indonesia, Malaysia) and Europe (Greece, Spain, Finland), but emphasizes the strong leadership role played by institutions in Taiwan.

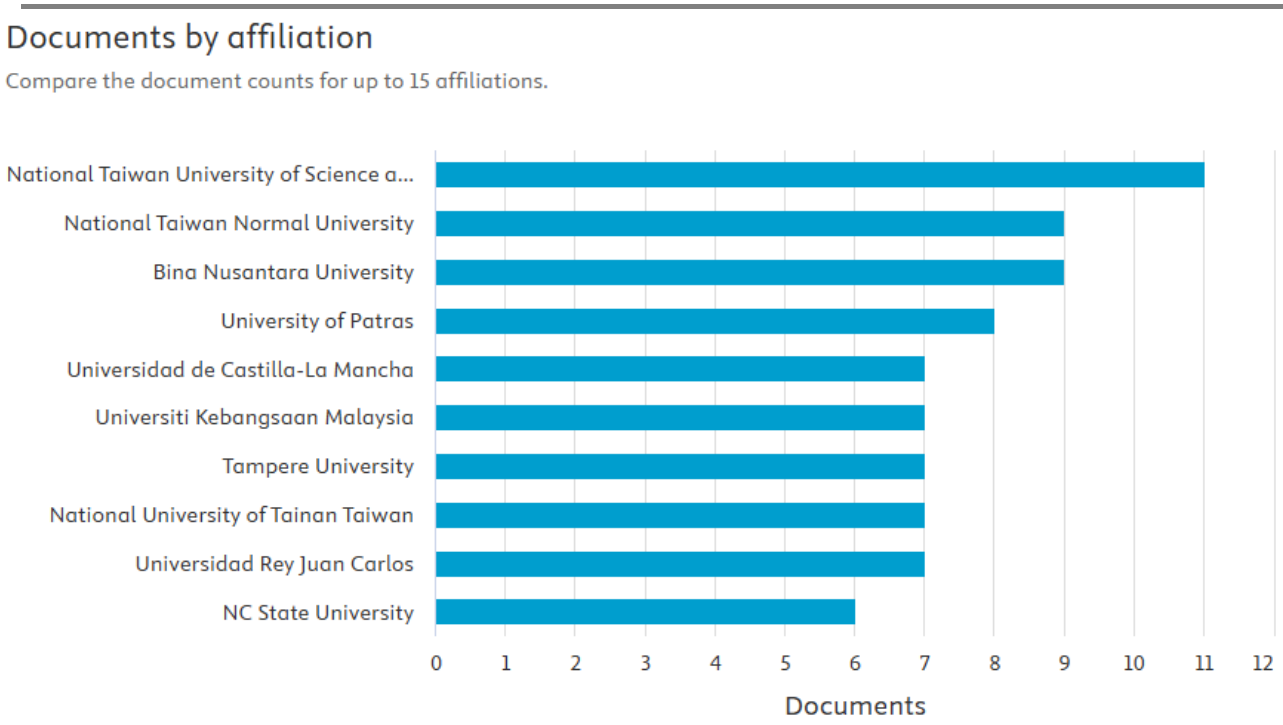

Figure 5. Top 10 Universities actively involved in article publication from 2017 to 2025.

CONCLUSION

This bibliometric review examined the use of gamification in primary education from 2017 to 2025, drawing on publications indexed in Scopus. The findings show that research on gamification has grown steadily over the past decade, with a notable dip during the COVID-19 pandemic. Most studies emphasize gamification's role in enhancing student engagement, motivation, and learning outcomes, particularly in STEM and literacy education. The analysis also revealed active contributions from European and Asia countries, highlighting the global relevance of this approach. However, the review also identified several challenges and limitations. Teacher readiness and professional development remain critical barriers to effective gamification integration. Additionally, there is a risk of over-reliance on extrinsic rewards, which may undermine intrinsic motivation in the long run. Equity issues, particularly in low-resource settings, further complicate the adoption of gamification strategies. Looking ahead, future research should focus on several promising directions. First, more longitudinal studies are needed to examine the sustained impact of gamification on primary school learners. Second, scholars should investigate inclusive gamification models that address the needs of diverse learners, including those with special educational needs and varying cultural backgrounds. Third, there is growing potential in exploring the integration of gamification with emerging technologies, such as artificial intelligence, virtual reality, and augmented reality, to provide adaptive and personalized learning experiences. Finally, comparative cross-country studies would provide valuable insights into how different educational systems and cultural contexts influence the design and effectiveness of gamification in primary education. In conclusion, gamification represents a powerful pedagogical approach with the potential to reshape primary education in the 21st century. By addressing current limitations and exploring new avenues, educators and researchers can ensure that gamification not only enhances engagement but also contributes to equitable, sustainable, and meaningful learning experiences for young learners worldwide.

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REFERENCES

1. Ahmed, H. M. M., El-Sabagh, H. A., & Elbourhamy, D. (2025). Effect of Gamified, Mobile, Cloud-Based Learning Management System (GMCLMS) on student engagement and achievement. International Journal of Educational Technology in Higher Education, 22(1). https://doi.org/10.1186/s41239-025-00541-1
2. Aljraiwi, S. (2019). Effectiveness of gamification of web-based learning in improving academic achievement and creative thinking among primary school students. International Journal of Education and Practice, 7(3), 242–257. https://doi.org/10.18488/journal.61.2019.73.242.257
3. Avdiu, E. (2019). Game-based learning practices in Austrian elementary schools. Educational Process: International Journal, 8 (3), 196-206. https://doi.org/10.22521/edupij.2019.83.4
4. Csikszenthihalyi, M. (1990). Flow: The psychology of optimal experience. NY: Harper & Row, Publishers, Inc.
5. Cunha, G. C. A., Barraqui, L. P., & de Freitas, S. A. A. (2018). Evaluating the use of gamification in mathematics learning in primary school children. 2018 IEEE Frontiers in Education Conference (FIE). https://doi.org/10.1109/fie.2018.8658950
6. Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human needs and the Self-Determination of Behavior. Psychological Inquiry, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01
7. Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From Game Design Elements to gamefulness: Defining "gamification." Proceedings of the 15th International Academic MindTrek Conference on Envisioning Future Media Environments - MindTrek '11, 11, 9–15. https://doi.org/10.1145/2181037.2181040
8. 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, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070
9. Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. The FASEB Journal, 22(2), 338–342. https://doi.org/10.1096/fj.07-9492LSF
10. Ferraz, R., Ribeiro, D., Alves, A. R., Teixeira, J. E., Forte, P., & Branquinho, L. (2024). Using gamification in teaching physical education: a survey review. Montenegrin Journal of Sports Science and Medicine, 13(1), 31-44. doi: https://doi.org/10.26773/mjssm.240304
11. Fiuza-Fernández, A., Lomba-Portela, L., Soto-Carballo, J., & Pino-Juste, M. R. (2022). Study of the knowledge about gamification of degree in primary education students. PLoS ONE, 17(3), e0263107. https://doi.org/10.1371/journal.pone.0263107
12. Fuchs, K. (2024). Challenges with Gamification in Higher Education: A Narrative Review with Implications for Educators and Policymakers. International Journal of Changes in Education, 1(1), 51–56. https://doi.org/10.47852/bonviewIJCE32021604
13. Ghoulam, K., Bouikhalene, B., Babori, A., & Falih, N. (2024). Gamification in E-learning: Bridging Educational Gaps in Developing Countries. International Journal of Advanced Corporate Learning (iJAC), 17(1), 85. https://doi.org/10.3991/ijac.v17i1.47631
14. Grey, S. & Gordon, N. A. (2022). Increasing Engagement Through Explicit and Implicit Gamification in Higher Education. In O. Bernardes, V. Amorim, & A. Moreira (Eds.), Handbook of Research on the Influence and Effectiveness of Gamification in Education (pp. 662-681). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-6684-4287-6.ch032
15. Hidayat, I. K., Arizal, F. W., & Sutrisno, A. (2023). Primary Student and Teacher Game Based Learning Engagement: The Problem and the Challenge. KnE Social Sciences. https://doi.org/10.18502/kss.v8i15.13928
16. Hincapie, M., Diaz, C., Valencia, A., Contero, M., & Güemes-Castorena, D. (2021). Educational applications of augmented reality: A bibliometric study. Computers & Electrical Engineering, 93, 107289. https://doi.org/10.1016/j.compeleceng.2021.107289
17. Inocencio, F. (2018). Using gamification in education: A systematic literature review. ICIS 2018 Proceedings. https://aisel.aisnet.org/icis2018/behavior/Presentations/3
18. Kapp, K. (2012). The Gamification of Learning and Instruction: Game-Based Methods and Strategies

for Training and Education. San Francisco, CA: Pfeiffer.
19. Kitchenham, B. (2004). Procedures for performing systematic reviews. Keele University Technical Report TR/SE-0401.
20. Krath, J., Schürmann, L., & von Korflesch, H. F. O. (2021). Revealing the Theoretical Basis of gamification: a Systematic Review and Analysis of Theory in Research on gamification, Serious Games and game-based Learning. Computers in Human Behavior, 125(1), 106963. https://doi.org/10.1016/j.chb.2021.106963
21. Liu, Q. (2023). Gamification in Primary School Mathematics Teaching. Journal of Education, Humanities and Social Sciences, 22, 428–433.
22. Locke, E. A. (1968). Toward a Theory of Task Motivation and Incentives. Organizational Behavior and Human Performance, 3(2), 157–189. https://doi.org/10.1016/0030-5073(68)90004-4
23. Locke, E. A., & Latham, G. P. (1990). A Theory of Goal Setting and Task performance. The Academy of Management Review, 16(2), 480. http://dx.doi.org/10.2307/258875
24. Locke, E. A., & Latham, G. P. (2002). Building a Practically Useful Theory of Goal Setting and Task Motivation: a 35-year Odyssey. American Psychologist, 57(9), 705–717. https://doi.org/10.1037/0003-066X.57.9.705
25. López, J. M. S., Santamaría, G., García, M. del P. Q., & Cano, E. V. (2023). Teaching the Use of Gamification in Elementary School: A Case in Spanish Formal Education. Technology Knowledge and Learning, 29(1), 557. https://doi.org/10.1007/s10758-023-09656-8
26. Maryana, M., Halim, C., & Rahmi, H. (2024). The Impact of Gamification on Student Engagement and Learning Outcomes in Mathematics Education. International Journal of Business Law and Education, 5(2), 1697. https://doi.org/10.56442/ijble.v5i2.682
27. Mohammed, M., Fatemah, A., & Hassan, L. (2024). Effects of gamification on motivations of elementary school students: An action research field experiment. Educational Insights, 29(2). https://doi.org/10.1177/10468781241237389
28. OECD (2020). Primary education: Building strong foundations. OECD Publishing. https://doi.org/10.1787/primary-edu-en
29. Osatuyi, B., Osatuyi, T., & De La Rosa, R. (2018). Systematic review of gamification research in IS education: A multimethod approach. Communications of the Association for Information Systems, 42, 95-124. https://doi.org/10.17705/1CAIS.04205
30. Pal'ová, D., & Vejačka, M. (2020). Gamification tools improving university students' involvement in the education process. IEEE Xplore. https://doi.org/10.23919/MIPRO48935.2020.9245113
31. Park, S., & Kim, S. (2021). Is sustainable online learning possible with gamification?–The effect of gamified online learning on student learning. Sustainability, 13(8), 4267. https://doi.org/10.3390/su13084267
32. Quba, A. A., Eid, O. A. A.-H., Hasan, G. A., & Herz, J. A. (2024). The Effect of Utilizing Gamification in Enhancing English Language Skills in University Settings. World Journal of English Language, 14(4), 428. https://doi.org/10.5430/wjel.v14n4p428
33. Rokhmat, J., Gunawan, G., Sukarso, A., Rahmatiah, R., Mahmudah, H., & Amanah, P. D. (2025). Revealing the Weaknesses of Applying Gamification in Science Learning and Overcoming It: A Systematic Review. TEM Journal, 2462–2471. https://doi.org/10.18421/tem143-50
34. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78. https://doi.org/10.1037//0003-066x.55.1.68
35. Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. Educational Psychology Review, 32(1), 77–112. https://doi.org/10.1007/s10648-019-09498-w
36. Schunk, D.H., & Swartz, C.W. (1993). Goals and Progress Feedback: Effects on Self-Efficacy and Writing Achievement. Contemporary Educational Psychology, 18, 337-354.
37. Shernoff, D. J., Csikszentmihalyi, M., Shneider, B., & Shernoff, E. S. (2003). Student engagement in high school classrooms from the perspective of flow theory. School Psychology Quarterly, 18(2), 158–176. https://doi.org/10.1521/scpq.18.2.158.21860
38. Skinner, B. F. (1953). Science and human behavior. Macmillan.
39. Slamet, J., Basthomi, Y., Ivone, F. M., & Eliyanah, E. (2024). Utilizing an SDL Approach in Designing a Gamification-Based MOOC to Enhance Autonomous Learning. Journal of Information Technology

Education Research, 23, 10. https://doi.org/10.28945/5278

40. Sotos-Martínez, V. J., Tortosa-Martínez, J., Baena-Morales, S., & Ferriz-Valero, A. (2023). Boosting student's motivation through gamification in physical education. Behavioral Sciences, 13(2), 165. https://doi.org/10.3390/bs13020165
41. UNESCO (2017). Primary education. UNESCO Institute for Statistics. http://uis.unesco.org/en/topic/primary-education
42. Vrcelj, A., Hoić-Božić, N., & Dlab, M. H. (2023). Use of Gamification in Primary and Secondary Education: A Systematic Literature Review. International Journal of Educational Methodology, 9(1), 13–27.
43. Wen, X. (2023). The effect of gamification learning on primary school students' second language learning. Journal of Education, Humanities and Social Sciences. https://doi.org/10.54097/ehss.v22i.12510
44. Whitson, C. & Consoli, J. (2009). Flow theory and student engagement. Journal of Cross Disciplinary Perspectives in Education, 2(1), 40–49.
45. Yan, Y. (2023). Gamification in Primary School Mathematics Education. Journal of Education, Humanities and Social Sciences. https://doi.org/10.54097/ehss.v22i.12468
46. Yang, Q., Lian, L.-W., & Zhao, J. (2023). Developing a gamified artificial intelligence educational robot to promote learning effectiveness and behavior in laboratory safety courses for undergraduate students. International Journal of Educational Technology in Higher Education, 20(1). https://doi.org/10.1186/s41239-023-00391-9
47. Yaşar, H., Kıyıcı, M., & Karataş, A. (2020). The Views and Adoption Levels of Primary School Teachers on Gamification, Problems and Possible Solutions. Participatory Educational Research, 7(3), 265. https://doi.org/10.17275/per.20.46.7.3
48. Zhang, Y. (2023). Improvement of learning engagement of primary school students by gamification. Journal of Education, Humanities and Social Sciences. https://doi.org/10.54097/ehss.v22i.12462