



The Impact of Educational Games on Learning: Systematic Review of Literature and Field Studies

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Abstract

Educational games in learning have a high interest among students, stimulating motivation and student involvement. This research aims to provide a summary of empirical findings from the latest literature in the field of gamification, which is currently developing in the learning domain. The study also uncovers cutting-edge scientific evidence on the development of emerging learning technologies and gamification plugins, as well as exploring the potential future directions of research in revolutionizing learning through gamification. A systematic literature review that combines thematic and content analysis of 46 empirical research papers published in the Scopus database between 2020 and 2024. This study provides an in-depth assessment and evaluation of the various contradictions found in the literature, setting the stage for future research studies to re-examine the theoretical underpinnings of gamification, its methodological approaches, theoretical models, game and platform applications, educational game mechanisms, and learning outcomes. This study not only attempts to explain the novelty of game-based learning, which is considered a game-changer and a key driver of learning motivation and user experience, but also seeks to outline the main challenges and obstacles of educational gaming.

Keywords: Gamification, Learning, Literature Review

Abstrak

Permainan edukatif dalam pembelajaran memiliki minat yang tinggi di kalangan siswa, merangsang motivasi dan keterlibatan siswa. Penelitian ini bertujuan untuk memberikan ringkasan temuan empiris dari literatur terbaru di bidang gamifikasi, yang saat ini sedang berkembang dalam domain pembelajaran. Studi ini juga mengungkap bukti ilmiah mutakhir tentang pengembangan teknologi pembelajaran yang baru muncul dan plugin gamifikasi, serta mengeksplorasi arah potensial masa depan penelitian dalam merevolusi pembelajaran melalui gamifikasi. Sebuah tinjauan

literatur sistematis yang menggabungkan analisis tematik dan konten dari 46 makalah penelitian empiris yang diterbitkan dalam basis data Scopus antara tahun 2020 dan 2024. Studi ini memberikan penilaian dan evaluasi mendalam tentang berbagai kontradiksi yang ditemukan dalam literatur, yang menyiapkan panggung untuk studi penelitian masa depan untuk memeriksa kembali dasar-dasar teoritis gamifikasi, pendekatan metodologisnya, model teoritis, aplikasi permainan dan platform, mekanisme permainan edukatif, dan hasil pembelajaran. Studi ini tidak hanya mencoba menjelaskan kebaruan pembelajaran berbasis permainan, yang dianggap sebagai pengubah permainan dan pendorong utama motivasi belajar serta pengalaman pengguna, tetapi juga berupaya menguraikan tantangan dan hambatan utama permainan edukatif.

Kata Kunci: Gamifikasi, Pembelajaran, Tinjauan Pustaka

Introduction

Gamification and game-based learning have become a trend in mobile and technology, with elements of gaming used to encourage desired behaviors and support learning outcomes. This method builds on constructivist learning, which prioritizes the need for experiential learning through social interaction with the environment and peers.¹ The term 'game-based learning' describes the use of content that contains games as an e-learning technique to meet learning objectives². In a corporate environment, organizational learning is closely tied to strategic goals and serious objectives, regardless of the level of game-based technology employed.

Gamification is defined as the process of applying *game* elements to a *non-gaming*³ context. The aspects of the game adopted in different fields of study are levels, points, badges, leaderboards, and avatars⁴. Many other mechanics are also available in the game's system, such as battles, content

¹ Kathryn A. McNaughton et al., "Neural Similarity and Interaction Success in Autistic and Non-Autistic Adolescents," *Scientific Reports* 15, no. 1 (2025): 1–15.

² Ludmila Walaszczyk and Sylvester Arnab, "Open-Source Gamification Plug-Ins: A Study on Usability and User Preferences," *Electronic Journal of e-Learning* 23, no. 1 (2025): 1–14.

³ Eric Zimmerling et al., "Exploring the Influence of Common Game Elements on Ideation Output and Motivation," *Journal of Business Research* 94 (2019): 302–312, <https://www.sciencedirect.com/science/article/pii/S014829631830105X>.

⁴ T H E Cross et al., "THE CROSS OF THE CZECH-SLOVAK LEGION AND ITS CREATOR KAZIMIERZ PACEWICZ Krzysztof Filipow The Commission Is Humanistic Polish Academy of Sciences Branch in Olsztyn- Bialystok (Bialystok , The Republic of Poland) КАЗИМЕЖ ПАЦЕВІЧ Кшиштоф Станіслав Філіпов" (2024).

unlocking, rewards, boss fights, quests, social graphics, certificates, and memes. This mechanism, known in gamification as 'elements,' stimulates learners to achieve a greater goal orientation by increasing their perseverance, learning through repetition, engaging in collaboration, and generating fun and friendly competition with peers.

The pioneering study of the concept of gamification featured in and the origins of the '*Serious Gaming Initiative*' outlined in Sawyer, is seen as an initiative taken to create awareness and encourage the wider community to consider The use of a serious game-based approach⁵ in the context of education because the elements of play provide an impact on the motivation, engagement, and social influence of learners⁶. With the advent of gamification in the world of education, it is further emphasized that the systematic application of gamification learning techniques has the potential to drive breakthroughs in gamification research. A growing body of evidence suggests that gamification is increasingly accepted as an effective learning strategy for creating engaging learning experiences. Based on empirical evidence from recent research, the success of digital games in education has sought to validate the effects of gamification, supporting its potential to increase motivation, engagement, and social influence while enabling students to engage in experiential learning. In recent years, gamification has generated widespread interest among academics and research networks, prompting them to intentionally explore the entirety of gamification elements used as part of the instructional design process to provide an engaging experience and enhance the program. Despite technological developments and their significant impact on learning and instruction, supporting and maintaining engagement in gamification pedagogy remains a challenge⁷. In

⁵ Xiao Hu, "Navigating the Sojourn: A Mixed-Methods Exploration of Game-Based Approaches for Enhancing Intercultural Adaptation among Chinese International Higher Education Students in Australia," *Discover Education* 4, no. 1 (2025), <https://doi.org/10.1007/s44217-025-00399-5>.

⁶ Zhonggen Yu, "A Meta-Analysis of Use of Serious Games in Education over a Decade," *International Journal of Computer Games Technology* 2019 (February 3, 2019): 1–8.

⁷ Lu Ding, Erkan Er, and Michael Orey, "An Exploratory Study of Student Engagement in Gamified Online Discussions," *Computers & Education* 120 (2018): 213–226, <https://www.sciencedirect.com/science/article/pii/S036013151830040X>.

addition, with gamification being a relatively new concept in the education sector⁸, we believe that emerging issues must be addressed to develop a more mature understanding of its nature and processes.

After entering the scientific debate on gamification in educational research, a critical review of the cutting-edge literature in the nascent field of gamification identified essential gaps in research that inadvertently raise the perspective for future studies. Important works on gamification learning highlight the need to build a strong theoretical foundation for gamification⁹. Edgar Dale theorized about the “*Cone of Experience*” (1969) in instructional design as an analogy that provides a concrete basis for reinforcing optimal learning, increasing students' sense of achievement, and encouraging levels of engagement, which in turn facilitates better knowledge, retention, and memory¹⁰. Considering the novelty of game-based learning strategies in the field of educational technology, it is further suggested that the Dale Cone is suitable for determining the anticipated direction of instructional design.

Previous studies have demonstrated how a strong theoretical foundation and a rigorous methodological approach can foster scientific rigor and education. An extensive review of the cutting-edge literature has shown that empirical research can offer implicit guidance for future studies by conceptualizing theoretical frameworks and identifying relevant methods, among other potential benefits. This summary of a systematic and up-to-date literature review forms a pathway for new research that aligns with previous educational research¹¹.

⁸ Derya Orhan Göksün and Gülden Gürsoy, “Comparing Success and Engagement in Gamified Learning Experiences via Kahoot and Quizizz,” *Computers & Education* 135 (2019): 15–29, <https://www.sciencedirect.com/science/article/pii/S0360131519300442>.

⁹ Nikitha Donekal Chandrashekhar et al., “Understanding User Behavior for Enhancing Cybersecurity Training with Immersive Gamified Platforms,” *Information (Switzerland)* 15, no. 12 (2024): 1–22.

¹⁰ Brian J. Birdsell, “Crossing Language Boundaries on Campus: Using a SALC as a Learning Space for Interactive Homework,” *SiSal Journal* 15, no. 4 (2024): 420–441.

¹¹ Victor Reis Machado, João Marcelo Niquini Caríssimo, and Israel Teoldo, “The Effects of the Opposition on Collective and Individual Behaviours in Soccer: A Systematic Review,” *Kinesiology* 56, no. 2 (2024): 325–337.

This review provides an overview of empirical research that represents current trends, as well as providing valuable guidance for researchers to formulate theoretical propositions based on current evaluation practices. Again, this aligns with the recommendations put forward by Landers in discussing the theoretical underpinnings of gamification research. Although a number of empirical studies have alluded to the positive impact on learning outcomes, some other studies have produced contradictory findings.

Method

This research process involves a systematic literature review of published articles on e-learning and instructional learning.¹² Rigorous methodological research techniques are used for the systematic interpretation of empirical documentation¹³. This systematic methodological approach uses the collaboration of analytical and thematic content, thus empowering to synthesize all data (e.g., phrases) into themes (e.g., positive and negative learning outcomes or impacts), and allows textual data to be transformed into meaningful code, themes, and categories (e.g., keywords, theories, game mechanics, and game platforms).

This systematic approach and review serve to measure research trends in thematic and content analysis within the field of educational technology. This study systematically examines general trends in research within the field of distance education. This review examined the most frequently used keywords, theoretical and conceptual background, research design, data collection instruments, data analysis techniques, types of variables, target populations, participant groups, cited references, and cited authors. In another study conducted by Ozyurt, the adaptation of individual

¹² Anouschka van Leeuwen and Jeroen Janssen, "A Systematic Review of Teacher Guidance during Collaborative Learning in Primary and Secondary Education," *Educational Research Review* 27 (2019): 71-89, <https://www.sciencedirect.com/science/article/pii/S1747938X18303403>.

¹³ Keqiang Li et al., "Transcriptomic Insights into UTUC: Role of Inflammatory Fibrosis and Potential for Personalized Treatment," *Journal of Translational Medicine* 22, no. 1 (2024): 1-19, <https://doi.org/10.1186/s12967-023-04815-y>.

learning styles to accommodate an adaptive e-learning environment was examined. These studies are categorized based on objectives, nature, methods, characteristics of participants, level, data collection tools, student modeling, learning styles, subjects, and findings.

1. Search process

To facilitate the database search, this study examined peer-reviewed scientific articles published between 2020 and mid-2023. All articles were accessed from January 18, 2022, to June 15, 2023, and underwent a bibliometric citation impact analysis through the Web of Science database (InCites Journal Citation), the primary bibliographic database. The databases searched were ScienceDirect, EBSCOhost, Emerald Insight, Taylor & Francis Online, Wiley Online Library, and SpringerLink. The terms used are 'gamification', 'gamify', 'gamifying', and 'gamified'. During the document review, articles containing the above terms were downloaded and reviewed individually by three researchers.

One hundred and ninety-nine articles were found in the ScienceDirect database, 478 from EBSCOhost Web, 64 from the Wiley Online Library, 439 from Emerald Insight, 141 from Taylor & Francis Online, and 84 from SpringerLink ($n = 1405$). The following articles were excluded from the study: (1) duplicate studies ($n = 272$); (2) articles from conference proceedings, books, and book chapters are not included ($n = 470$); (3) articles not related to learning and instruction were also excluded ($n = 359$); and (4) papers that were not indexed by the Clarivate Analytics database were also excluded ($n = 258$). Forty-six articles focusing on learning and instruction were thoroughly reviewed (2021, 5 articles; 2022, 10 articles; 2023, 16 articles; and 2024, 15 articles; [Table 1](#)).

Tabel 1

List of Articles and Journals in the Scopus Analysis Database (2020-2024)

| No | Studies | Journal | Publisher | Number of Articles | Impact Factor (JCR 2024) | Categories |
|----|---|-----------------------------|-----------|--------------------|--------------------------|---|
| 1 | Aldemir et al. (2022) ; Barata et al. (2021) ; Cakiroglu et al. (2021) ; da Rocha | Computers in Human Behavior | Elsevier | 10 | 1105 | Psychology, multidisciplinary, psychology |

| | | | | | | |
|--|---|---|------------------|----|-------|---|
| <p>Seixas et al. (2020); Ding (2023); Kuo and Chuang (2020); Groening and Binnewies (2023); Landers and Armstrong (2021); Lopez and Tucker (2023); Mekler et al. (2021)</p> | | | | | | |
| 2 | Adukaite et al. (2022); Albuquerque et al. (2023); Buckley and Doyle (2021); De-Marcos et al. (2021); Doumanis et al. (2024); Ding et al. (2023); Ding et al. (2023); Garcia- Sanjuan et al. (2022); Ge (2023); Göksün and Gürsoy (2023); Huang and Hew (2022); Jagušt et al. (2022); Kyewski and Kramer (2022); Tsay et al. (2022); van Roy and Zaman (2022); Zainuddin (2022) | <i>Computers & Education</i> | Elsevier | 16 | 1620 | Education and educational research |
| 3 | Io et al. (2022); Jurgelaitis et al. (2023); Ortiz-Rojas, et al (2024); Sousa- Vieira et al. (2021) | <i>Computer Applications in Engineering Education</i> | Wiley | 4 | 1.435 | Computer science, interdisciplin ary applications; education, scientific disciplines, engineering, multidisciplin ary |
| 4 | Bouchrika et al. (2023); Hassan et al. (2023); Huang et al. (2024); Lo and Hew (2022); Zatarain Cabada et al. (2023) | <i>Interactive Learning Environment</i> | Taylor & Francis | 5 | 1.929 | Education and educational research |

| | | | | | | |
|----|---|--|---|---|-----------------|---|
| 5 | <u>Chang and Wei (2021)</u> | <i>Educational Technology & Society</i> | National Taiwan Normal University, Taiwan | 1 | 1.767 (IF 2022) | Education and educational research |
| 6 | <u>Yildirim (2022)</u> | <i>Internet and Higher Education</i> | Elsevier | 1 | 5.284 | Education and educational research |
| 7 | <u>Sanchez-Martin and Davila-Acedo (2022)</u> | <i>Thinking Skills and Creativity</i> | Elsevier | 1 | 1.655 | Education and educational research |
| 8 | <u>Özdener (2023)</u> | <i>Telematics and Informatics</i> | Elsevier | 1 | 3.714 | Information science and library science |
| 9 | <u>Davis et al. (2023)</u> | <i>Journal of Computer Assisted Learning</i> | Wiley | 1 | 2.451 | Education and educational research |
| 10 | <u>Baydas and Cicek (2024)</u> | <i>Technology, Pedagogy and Education</i> | Taylor & Francis | 1 | 1.712 | management |
| 11 | <u>Aparicio et al. (2024)</u> | <i>Information & Management</i> | Elsevier | 1 | 4.120 | Information science and library science; |
| 12 | <u>Toda et al. (2024)</u> | <i>International Journal of Information Management</i> | Elsevier | 1 | 5.063 | Information science and library science |
| 13 | <u>Ioannou (2024)</u> | <i>Educational Technology Research and Development</i> | Springer | 1 | 2.115 | Education and educational research |
| 14 | <u>Wu (2023)</u> | <i>Innovations in Education and Teaching International</i> | Taylor & Francis | 1 | 1.171 | Education and educational research |
| 15 | <u>Rachels and Rockinson-Szapkiw (2023)</u> | <i>Computer-Assisted Language Learning</i> | Taylor & Francis | 1 | 2.018 | Education and educational research; linguistics |

2. Inclusion and exclusion criteria for research studies

Rigorous and extensive criteria and processes were employed in this study to ensure the validity of global findings and minimize bias in study selection. Academic journals were selected from Clarivate Analytics' Web of Science to ensure the inclusion of competent and high-quality scientific content. One of the most trusted citation index platforms in the world serves as the basis for this data, providing evidence-based, quality scientific information.

Studies are included in the analysis only if they meet the following criteria: (1) the study is confirmed to be an empirical research article published in a journal indexed by the Web of Science (WOS). This means that conference proceedings, book chapters, reviews of theoretical articles and books are not considered; (2) research is conducted at all levels of educational environments around the world such as primary, secondary, and higher education; (3) empirical research (quantitative, qualitative, and collaborative methods) in the context of learning; (4) research with an explicit description of the underlying theory and process; and 5) research prepared in English.

To avoid bias during the selection and review of papers/articles, the first three authors follow the criteria mentioned above and search for and sort out research studies that are independent of each other. The three researchers or authors of this study worked separately in selecting papers that were appropriate for this study. After this initial process, the first researcher identified 48 relevant articles, the second researcher identified 47 articles, and the third researcher identified 46 articles. After researchers discussed the differences between the studies they were looking for and the established traits, the authors decided to select 46 studies and dismiss the other two.

The articles by Lixandriou, Maican, and Constantin (2020) are not included because they were not conducted in the context of learning and instruction. The study by Laine, Lindberg, and Haaranen (2021) was also

excluded because it was not an empirical study.¹⁴ Finally, the 46 selected articles were also reviewed by the fourth author of this study to ensure the selection of suitable articles based on the established criteria.

Most of the articles represented are considered to be of high quality and are published in journals with higher rankings in the field of educational technology (i.e., Computer & Education; Interactive Learning Environment). The participants came from a variety of different cultural backgrounds and countries, such as Belgium, Brazil, China, Croatia, Cyprus, Germany, Hong Kong, Indonesia, Ireland, Lithuania, Mexico, Pakistan, Portugal, South Africa, South Korea, Spain, Switzerland, Taiwan, the United Kingdom, the United States, and Turkey. All samples selected for this study also mostly represent articles that are repeated in the database. Based on this review, we conclude that this collection of articles is robust enough to provide valid generalizations about gamification studies in the field of education, encompassing educational and civic journals from various countries.

3. Methodological approach

The methodological approach presented in this section is a summary of the methodological approach employed in this study. Most of the research used quantitative methods, followed by a mixed approach. In these 25 articles, it is implicitly concluded that quantitative approaches are used using various data collection procedures, such as experimental tests, questionnaire surveys, and assessments. ([Table 2](#)).

According to the analysis results, 19 (41.3%) articles employed a collaborative approach as a data collection technique through various procedures. These articles utilize a diverse range of data sources, including tests, questionnaire surveys, assessments, observations, and interviews ([Table 2](#)). In addition to quantitative methods and a colloquial approach, two studies employed qualitative methods, and data collection

¹⁴ Renny Lindberg, Teemu Laine, and Lassi Haaranen, "Gamifying Programming Education in K-12: A Review of Programming Curricula in Seven Countries and Programming Games," *British Journal of Educational Technology* 50 (September 11, 2021)

was conducted through document analysis, observation, and interviews ([Table 2](#)).

Tabel 2
Approaches to gamification studies

| No. | Approaches | Number of articles | Studies |
|-----|---------------|--------------------|--|
| 1 | Mixed methods | 19 | Wu (2023); Yildrim (2022); Zatarain Cabada dkk. (2023); Baydas dan Cicek (2024); Çakiroglu dkk. (2022); Chang dan Wei (2021); da Rocha Seixas dkk. (2021); Ding dkk. (2021). (2023); Ding dkk. (2022); Ding (2023); Garcia-Sanjuan dkk. (2023); Göksün dan Gürsoy (2024); Huang dan Hew (2023); Huang dkk. (2024); Jagušt dkk. (2023); Jo dkk. (2023); Kuo dan Chuang (2021); Lo dan Hew (2023); Özdemir (2018); Sousa-Vieira dkk. (2021); Toda dkk. (2024); Zainuddin (2022) |
| 2 | Quantitative | 25 | Adukaite dkk. (2022); Albuquerque dkk. (2022); Aparicio dkk. (2024); Barata dkk. (2022); Bouchrika dkk. (2024); Buckley dan Doyle (2022); Davis dkk. (2023); De-Marcos dkk. (2021); Doumanis dkk. (2023); Ge (2022); Groening dan Binnewies (2023); Hassan dkk. (2024); Jurgelaitis (2023); Kyewski dan Kramer (2023); Landers dan Armstrong (2022); Lopez dan Tucker (2024); Mekler dkk. (2022); Orfiz-Rojas dkk. (2024); Rachels & Rockinson-Szapkiw, 2023; Sanchez-Martin dan Davila-Acedo (2022); Tsay dkk. (2023); van Roy dan Zaman (2022) |
| 3 | Qualitative | 2 | Aldemir dkk. (2022); Ioannou (2024) |
| | Total | 46 | |

4. Data collection and analysis process

The data collection process in this study begins with compiling research objectives, followed by a review and analysis of gamification research trends, utilizing a methodology that encompasses the approach, field of study, theory, objectives, effects, and platforms. As indicated in the document review, systematic keyword tracking was identified and employed as a useful technique to gather a wide range of data, thereby maintaining the credibility of the research. Document analysis becomes an invaluable part of the triangulation process. In tracing convergence and amplification, triangulation of diverse data sources helps enrich credible convergent evidence. The data obtained through thematic content analysis are then analyzed descriptively, in the form of percentages, frequencies, identified themes, and the meaning of texts and concepts.

Result And Discussion

The findings in this study primarily employ a quantitative approach, followed by a mixed-methods approach. In these 25 articles, it is implicitly and/or explicitly concluded that quantitative methods are used using various data collection procedures, such as experimental tests, assessments, and questionnaire surveys.

Further analysis showed that 19 papers (41.3%) used a mixed-methods approach to collect data through various procedures. These papers use a variety of data sources to collect data. This includes tests, assessments, questionnaire surveys, interviews, and observations. In addition to the quantitative approach and mixed methods, two studies employed a qualitative approach, collecting data through observation, interviews, and document analysis.

It was also found that the research design was used to design gamification instructions, where data was collected from various sources. This study employs a mixed-methods research design, as it involves the collection and analysis of both quantitative and qualitative data. Although there is no explicit mention of 'design-based research' in the publication, we are still considering using this term because the product development process is the focus of this research. In another example, design-based research attempts to solve real-world problems by designing and implementing interventions, refining design principles, and expanding their effectiveness. Overall, several articles were found to be in accordance with the characteristics of design-based research methods.

Of all the data collection methods used, questionnaires (34 papers) appear to be the most commonly employed, followed by experimental tests or assessments (27 papers), interviews (16 papers), observation (5 papers), and document analysis (1 paper).

Tabel 3

Summary of key findings regarding learning engagement and motivation in gamification research

| Learning engagement/motivation | Studies |
|--------------------------------|---------|
| | |

| | |
|--|--|
| Resulted in students' intrinsic motivation (e.g., perceived playfulness, fun, enjoyment, usefulness, meaningfulness, and attractiveness) | Adukaite et al. (2022); Jurgelaitis et al. (2024) |
| Gamification instruction had positive effects on students' engagement in terms of behaviour, emotion, and cognition. | Çakiroglu et al. (2022); da Rocha Seixas et al. (2021); Ding et al. (2022); Ding et al. (2023); Göksün and Gürsoy (2024); Hassan et al. (2024); Huang and Hew (2023); Huang et al. (2024); Lo and Hew (2023); Tsay et al. (2023); Sánchez-Martín (2022); Zatarain Cabada et al. (2023) |
| Improved learning motivation through positive values of friendly competition, challenge, socialisation, and imagination. Narrative imagination components played a unique role in creating successful gamification initiatives in the classroom. | Aldemir et al. (2023); Özdener (2023) |
| Friendly competition positively influenced learners' engagement. | Çakiroglu et al. (2022) |
| The gamification quizzes conducted at the beginning and end of each class reinforced students' mastery of the course, motivated them during class activities, and improved their cognitive, emotional, and behavioral engagement. | Göksün and Gürsoy (2024); Huang and Hew (2023); Huang et al. (2024); Jo et al. (2023); Lo and Hew (2023); Zainuddin (2023) |
| Virtual goods became one of the most engaging gamification mechanics in a gamified MOOC platform. | Chang and Wei (2021) |

The empirical evidence uncovered by most studies on the impact of gamification on human psychology, particularly related to motivation and engagement, is considered necessary for identifying the average duration of interventions in the analyzed papers. It was also found that most intervention studies were conducted over a period of several weeks or months, specifically

4 weeks, 20 weeks, and 10 months. Only one longitudinal study, conducted over three years, explored the influence of gamification on students' motivation and psychological engagement.

1. Theoretical approach

This analysis is used to identify elements of game design that are aligned with existing learning theories. Theoretical analysis is technical; in a study, it helps compile research instruments. Following the same pattern, this analysis aims to address the research problem regarding the theoretical approach underlying gamification research. [Table 3](#) contains learning theory data that can be implemented in gamification approaches. The data showed that 29 papers implicitly mentioned their theoretical foundations, while the rest had no theoretical content. [Yazid et al. \(2024\)](#) conduct experimental studies in an educational environment that incorporates online gamification, utilizing the principles of learning theory in the online learning process.¹⁵ Instead, reputation point theory, used by *eBay* and [Amazon.com](#), was adopted to increase system reliability and learner engagement in massive open online learning (MOOC).

Tabel 4
Learning theories/models applied in gamification studies

| No | Learning Theories/Models | Studies |
|----|-----------------------------|--|
| 1 | Flow theory | Huang and Hew (2023) ; Jaguš et al. (2023) ; Jurgelaitis et al. (2024) ; Rachels and Rockinson- Szapkiw (2023) |
| 2 | Self-determination theory | Aldemir et al. (2023) ; Baydas and Cicek (2024) ; Ding et al. (2022) ; Ding et al. (2023) ; Huang and Hew (2023) ; Huang et al. (2024) ; Jurgelaitis et al. (2024) ; Kuo and Chuang (2016) ; Lo and Hew (2023) ; Lopez and Tucker (2024) ; Mekler et al. (2022) ; Tsay et al. (2023) ; van Roy and Zaman (2023) ; Zainuddin (2023) |
| 3 | Cognitive evaluation theory | Kyewski and Krämer (2023) ; Lopez and Tucker (2024) |

¹⁵ Azin Yazdi, Amir Karimi, and Stylianos Mystakidis, "Gamification in Online Education: A Visual Bibliometric Network Analysis," *Information (Switzerland)* 15, no. 2 (2024).

| | | |
|----|---|--|
| 4 | Goal-setting theory | Groening and Binnewies (2024); Huang and Hew (2023); Huang et al. (2024) |
| 5 | Social comparison theory | Huang and Hew (2023); Huang et al. (2024) |
| 6 | Theory of reasoned action | Adukaite et al. (2022) |
| 7 | Cognitive load theory | Landers and Armstrong (2022); Wu (2023) |
| 8 | Theory-driven gamification design model: goal, access, feedback, challenge, and collaboration | Huang and Hew (2023); Huang et al. (2024) |
| 9 | Behaviour reinforcement theory | Huang and Hew (2023); Huang et al. (2024) |
| 10 | Information systems success model/information systems theory | Aparicio et al. (2024) |
| 11 | Rational choice theory | Barata et al. (2022) |
| 12 | Eisenkraft's 7E instructional Model | Göksün and Gürsoy (2024) |
| 13 | Taxation theory | Buckley and Doyle (2022) |
| 14 | Unified Modelling Language | Jurgelaitis et al. (2024) |
| 15 | Presence pedagogy model | Doumanis et al. (2024) |
| 16 | Social development theory: zone of proximal development and scaffolding | Davis et al. (2023); Rachels and Rockinson-Szapkiw (2023) |
| 17 | Merrill's first principles of instruction design theory | Lo and Hew (2023) |
| 18 | Landers' theory of gamified learning | Ortiz-Rojas et al. (2024) |
| 19 | Felder-Silverman learning style model | Hassan et al. (2024) |
| 20 | Fogg's behaviour model | Jurgelaitis et al. (2024) |

Because the gamification learning process aligns with established learning concepts, most of the research analyzed employs self-determination theory (SDT) as the underlying theoretical framework. According to [Liu, Honggang Wang, Ying Wang, Haoyue \(2025\)](#), SDT is the most commonly

used psychological theory in gamification¹⁶ research. SDT was identified as the leading theoretical framework in these 14 gamification studies. SDT offers introductory provisions that support students' sense of autonomy, competence, and connectedness, because these three innate psychological needs are supported by internal motivational factors.¹⁷ This study emphasizes that satisfying three innate psychological needs of students will support students' intrinsic motivation. The higher this need is satisfied, the greater the inherent motivation that exists in gaming activities. [Bull et al. \(2020\)](#) provide empirical evidence based on SDT that uses various elements of game design to motivate learners and meet their needs for autonomy, competence, and connectedness (Fig. 2).¹⁸

The second common concept in gamer research is flow *theory*, proposed by [Karolija, N \(2025\)](#), people who are immersed in challenging activities such as playing games can experience 'flow' when they reach peak performance. In line with this, flow theory can contribute to sustaining active engagement and an effective learning process. In another study, it was found that when elements of play are incorporated into gaming activities, they have the potential to bring individuals into a state of flow, as long as the challenge is equal to the individual's skill level.¹⁹ It also means that game factors can enhance a more enjoyable and engaging gaming experience, as well as highlight the learning experience within the game.

The concept of goal setting has been used in several studies. For example, [Groening and Binnewies \(2019\)](#) suggest that digital achievement retains a goal-setting function aligned with goal-setting theory, hypothesizing that

¹⁶ Honggang Liu, Ying Wang, and Haoyue Wang, "Exploring the Mediating Roles of Motivation and Boredom in Basic Psychological Needs and Behavioural Engagement in English Learning: A Self-Determination Theory Perspective," *BMC Psychology* 13, no. 1 (2025).

¹⁷ Isabel Buil, Sara Catalán, and Eva Martínez, "Understanding Applicants' Reactions to Gamified Recruitment," *Journal of Business Research* 110 (2020): 41–50, <https://www.sciencedirect.com/science/article/pii/S0148296319308082>.

¹⁸ Buil, Catalán, and Martínez, "Understanding Applicants' Reactions to Gamified Recruitment."

¹⁹ Nenad Korolija, "Fine Grain Algorithm Parallelization on a Hybrid Control-Flow and Dataflow Processor," *Journal of Big Data* 12, no. 1 (2025), <https://doi.org/10.1186/s40537-024-01021-5>.

setting difficult goals will focus users on higher levels of motivation and improved abilities.²⁰ Game-based learning also explores learning theories that justify the critical role of scaffolding, individualized learning, and social interaction. The concept of scaffolding is following the Zone of Proximal Development of [Vygotsky](#) (1978) and the principles outlined in SDT, which states that the learning process can be enhanced through motivational support when students interact with more expert peers. Several articles have proposed learning models gamifikasi.²¹ For example, [Ioannou \(2019\)](#) introduced a game-filled learning design model that utilizes interactive tables to build capacity and reinforce a more enjoyable and engaging player experience, further accentuating the gamer's learning experience.

[Huang and Hew \(2018\)](#) also developed a theory-based game design model that posits five key motivational elements in game design, which can be implemented through badges and leaderboards.²²

2. Gaming platforms and apps

Following one of the research instruments, the following is a summary of the analysis conducted to recognize the platforms and applications used in gamer research. It was found that most of the 46 papers analyzed described research that utilized existing platforms from various sources.

In addition, several studies have described the integration of game-based factors into learning management systems (LMS) as a positive reinforcement strategy to motivate and engage students in game-based learning. For example, with gamification integration using Web 2.0 tools, these technology solutions offer new functionality for MOOCs (Coursera, Udacity, and edX),²³

²⁰ Groening and Binnewies, “Achievement Unlocked! - The Impact of Digital Achievements as a Gamification Element on Motivation and Performance.”

²¹ Lev Semyonovic Vygotsky, “Lev Semyonovic Vygotsky Kesadaran Dalam Masyarakat” (1930).

²² Biyun Huang and Khe Foon Hew, “Implementing a Theory-Driven Gamification Model in Higher Education Flipped Courses: Effects on out-of-Class Activity Completion and Quality of Artifacts,” *Computers & Education* 125 (2018): 254–272, <https://www.sciencedirect.com/science/article/pii/S0360131518301611>.

²³ Manuela Aparicio et al., “Gamification: A Key Determinant of Massive Open Online Course (MOOC) Success,” *Information & Management* 56, no. 1 (2019): 39–54, <https://www.sciencedirect.com/science/article/pii/S0378720616304062>.

²⁴Wikis, Moodle, or institutional ²⁵LMSs. [Buckley and Doyle \(2017\)](#) employed the National Budget Forecasting Project as a game-based learning intervention to promote student engagement, independent learning, and facilitate the development of social and cognitive skills.²⁶

We also found that some studies developed their gamification platforms to prioritize user-centric needs and help deliver impactful online experiences for diverse users. These platforms aim to improve students' learning performance and engagement participation in online discussions using EchoLu's gamification tools, and their involvement in online post-lecture questions.²⁷

3. The education level of the participants and the elements of the game used

Most of the 46 studies analyzed involved adult learners or higher education students, including one class of 158 graduate students in their third year of study for a business degree and 262 undergraduate students at a large university on the East Coast of the United States. Only a few gamification studies have been conducted in primary or secondary schools. In this study, we found only five studies conducted at the primary school level and five studies at the secondary school level.

The terms' game elements' and 'mechanics' have been used frequently in gamification research. We believe that identifying the key components of the game used in game-based learning and instruction is essential. Therefore, this section concisely summarizes the most common game principles in the 46 studies analyzed. (See the appendix for a list of game elements.) identified in the articles reviewed) This analysis can serve as a reference point for

²⁴ Aris Triwahyu, Aris Syaifuddin, and Yerry Soepriyanto, "Gamification Developments in Education," *Scholaria: Journal of Education and Culture* 14 (May 21, 2024): 177–186.

²⁵ Kyewski and Krämer, "To Gamify or Not to Gamify? An Experimental Field Study of the Influence of Badges on Motivation, Activity, and Performance in an Online Learning Course."

²⁶ Patrick Buckley and Elaine Doyle, "Individualising Gamification: An Investigation of the Impact of Learning Styles and Personality Traits on the Efficacy of Gamification Using a Prediction Market," *Computers & Education* 106 (2017): 43–55, <https://www.sciencedirect.com/science/article/pii/S036013151630238X>.

²⁷ Bouchrika et al., "Exploring the Impact of Gamification on Student Engagement and Involvement with E-Learning Systems."

readers and researchers on the types of game elements that can and should be implemented in their research, and can provide a guide for a directed debate.

Meanwhile, students in almost all the articles identified the leaderboard as the most interesting element of the game. [Aldemir, Celik, and Kaplan \(2018\)](#) reported that most participants preferred a leaderboard that motivated them to engage in the game.²⁸

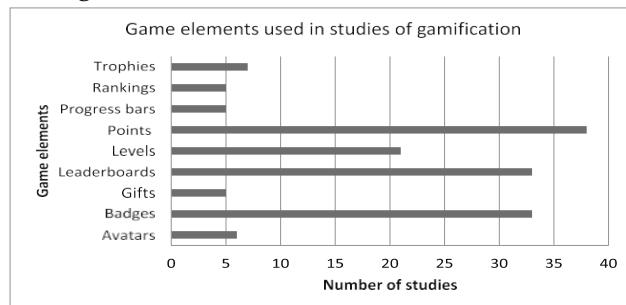


Fig. 1. Summary of the most commonly used game mechanisms in education.

Reverse classroom instruction and blended learning while in the classroom.²⁹ They also propose that the idea of leaderboards creates a more competitive environment and greater motivation to learn. In another study, the gamification of courses using leaderboards resulted in significantly better learning, motivation, and engagement performance. The study also reported that team leaderboards were considered the third most engaging gamification method, after virtual rewards and points. This element fosters a strong social connection among students through competitions and the comparison of points and scores on the leaderboard. Based on these findings, we recommend that future researchers implement other game principles in game-based learning research, not just points, badges, and leaderboards.

²⁸ Tugce Aldemir, Berkan Celik, and Goknur Kaplan, "A Qualitative Investigation of Student Perceptions of Game Elements in a Gamified Course," *Computers in Human Behavior* 78 (2018): 235–254, <https://www.sciencedirect.com/science/article/pii/S0747563217305745>.

²⁹ Zamzami Zainuddin, "Students' Learning Performance and Perceived Motivation in Gamified Flipped-Class Instruction," *Computers & Education* 126 (July 1, 2018).

4. The impact of *games* on learning

The idea of gamification makes the learning process more engaging and encourages students to work more actively through digital means, such as earning badges and achieving top positions on leaderboards. The gamification component is believed to be effective in increasing student motivation and improving their learning experience, engagement, and performance. Some studies have shown that the addition of game mechanics (such as badges, levels, and leaderboards) has a positive impact on student engagement. However, critics argue that this only creates extrinsic motivations, not intrinsic motivations. Intrinsic motivation; that is, learners complete tasks to earn badges, not for the satisfaction of gaining new knowledge and skills. This, they argue, cannot sustain long-term engagement.

Games can be a powerful motivator, but only if used as part of a strong engagement strategy. Several studies have reported that the use of game principles as external incentives or rewards successfully increases students' extrinsic motivation³⁰. From a pedagogical perspective, it is believed that extrinsic gift-giving is likely to undermine intrinsic motivation.³¹ Meanwhile, some authors have claimed that gamification affects extrinsic and intrinsic motivations³². Since the principles of the game are inherently enjoyable for the players, these values are usually related to intrinsic motivation. Thus, positive values created by engaging, motivating, and maintaining user behavior in the game-based learning process are considered inherent motivation.³³

³⁰ Buckley and Doyle, "Individualising Gamification: An Investigation of the Impact of Learning Styles and Personality Traits on the Efficacy of Gamification Using a Prediction Market."

³¹ Elisa D Mekler et al., "Towards Understanding the Effects of Individual Gamification Elements on Intrinsic Motivation and Performance," *Computers in Human Behavior* 71 (2017): 525–534, <https://www.sciencedirect.com/science/article/pii/S0747563215301229>.

³² Asta Adukaite et al., "Teacher Perceptions on the Use of Digital Gamified Learning in Tourism Education: The Case of South African Secondary Schools," *Computers & Education* 111 (2017): 172–190, <https://www.sciencedirect.com/science/article/pii/S036013151730091X>.

³³ Kuo and Chuang, "How Gamification Motivates Visits and Engagement for Online Academic Dissemination – An Empirical Study."

We believe that intrinsic and extrinsic motivation play a crucial role in driving student learning engagement through gamified learning approaches, which aim to meet three fundamental needs: competence, autonomy, and connectedness. It should not be said that extrinsic motivation is always negative. SDT, although rarely discussed and elaborated on in major studies on gamification, clearly outlines four types of extrinsic motivation: external regulation, introjection, identification, and integration. Integrated regulation is intrinsic in nature; The desire to be self-aware guides individual behavior. This implies that good gamification design seeks to understand and align learning objectives with students' intrinsic motivations. With extrinsic rewards and intrinsically satisfying designs, the players (students) embark on their mastery journey, which requires elements such as desires, incentives, challenges, bonuses, and feedback to create learning engagement.

The values of involvement and motivation are consistently positively correlated with students' academic achievement. The more engaged a student is, the more likely they are to participate and the greater the intrinsic motivation they have. The findings of this analysis indicate that involvement in the teaching-learning process leads to positive student behavior.

Conclusion

Gamification is a new approach that utilizes game mechanics as a driver to motivate, engage, and enhance the user experience. It is a rapidly growing phenomenon that has proven to provide an engaging and enthralling solution in the context of education and learning. The initial framework was based on fundamental psychological theories, including SDT and intrinsic and extrinsic motivation. This paper presents a systematic literature review to identify high-quality empirical studies in the field of gamification in education over four years from 2020 to mid-2024. This paper focuses on the methodological approaches adopted in research, the underlying theoretical models, gamification platforms, the search for the most frequently used trends, participant preferences, and the most commonly used elements of games in education. The learning outcomes and impact categories identified were student engagement and motivation, academic achievement, and social relationships.

The traditional method of delivering material in the classroom, using chalk and lectures, seems to be growing increasingly outdated. Today, student learning has expanded beyond the traditional brick-and-mortar classroom. In the digital age, making global connections is as easy as clicking a button or using simple voice commands, allowing people to access a wide range of information from various digital sources quickly. Continuous technological advancements will require students to enhance their learning. Therefore, teachers or instructors should be trained in a variety of contemporary methods and instructional pedagogy, not limited to gamification, such as flipped classrooms, blended learning, adaptive learning, inquiry-based learning, and more; the latest trends in digitalization (augmented reality and virtual reality, artificial intelligence and big data, emotion sensors, learning analytics, massive open online courses, brilliant desks). This way, teachers can apply the proper instruction and technology at the right time and in the right place. In addition, the application of various digital pedagogies in a single learning or interdisciplinary approach is also needed to expand the impact of that learning (e.g., combining gamification with a reverse classroom approach or inquiry-based learning).

Meanwhile, we believe that effective teaching strategies are designed not to make learning difficult, but rather to make students feel comfortable and ensure that they experience enjoyment and enthusiasm while learning. The most effective teaching methods are those that can motivate and engage students in learning. In this review study, gamification instruction was shown to achieve positive results.

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