

Gamification in e-learning: A Systematic Review of Benefits, Challenges, and Future Possibilities

Pingalan Gejandran, Norazilawati Abdullah

Faculty of Human Development, Universiti Pendidikan Sultan Idris, Malaysia

pingalangajendran@gmail.com

Abstract. Gamification strategies have been used increasingly in e-learning environments for improved engagement and effectiveness of learners. The aim of this systematic review is to identify the benefits and challenges of gamification of e-learning systems. Additionally, it has also objective to examine the impact of gamification on the effectiveness of learning in e-learning systems. Therefore, this systematic review explores the advantages of incorporating game elements into e-learning systems, addresses the challenges encountered during this integration, and discusses the future research opportunities presented in recent studies. A total of 37 studies published in the past decade, between 2014 and 2023, were reviewed in this paper. The findings revealed that gamification had improved student motivation and engagement levels. Moreover, from a design perspective, teachers believe that there is a need to enhance the design elements of gamified e-learning systems to better align the gamified elements with the intended learning objectives. Overall, this review provided significant insights into current research on gamification in e-learning and highlighted the need for further comprehensive research in the area.

Keywords: Gamification, e-learning, student engagement, interactive learning, gamified learning environment

1. Introduction

In the modern digitalisation era, rapid technological advancements are observed, significantly transforming different areas of work and life. The educational system is also largely influenced by these technologies. Resultantly, web usage and e-learning technologies have been largely incorporated into the educational sectors (Oliveira et al., 2021). E-learning is a cost-effective approach as it allows individuals, particularly students, to obtain required data with just one click. Therefore, to enhance the productivity of dynamic learning and blended education, many schools' management has been increasingly drawn to the modern gamification approach, prompting them to incorporate this technique into their curriculum. Saleem et al. (2022) have emphasised using gamified technology to improve student's learning outcomes. Gamification methods include procedures, mechanisms, and strategies that help users determine how to include the basics of a game in a non-game setting (Burlacu et al., 2023; Poondej & Lerdpornkulrat, 2020). Various gamification styles have been introduced within the educational sector context in the past few years due to positive and effective outcomes. Thus, gamification has become a hot discussion topic in the education field.

The utilisation of gamification in the educational sector presents various advantages and disadvantages. For instance, gamification has changed education outcomes by providing an effective and enjoyable learning environment for students, leading to improved student engagement (Bouchrika et al., 2021). In contrast, the excessive use of gamification techniques might lead to technostress (Hassan et al., 2021). After a student completes a game, it is unlikely for them to repeat it, highlighting the need for continuous innovation in gamification techniques.

E-learning has become a typical approach in different education sectors by encouraging critical thinking and personalised learning among students. Therefore, continuous technological developments are driving various innovations in e-learning. In this regard, gamification has also emerged as an effective solution to engage students and improve their learning outcomes (Bennani et al., 2022). Additionally, the gamification technique has advantages and disadvantages, prompting the educational sector to make critical decisions. Nevertheless, few past studies focused on the association between gamification and e-learning, particularly emphasising a game-based learning environment. Similarly, almost no recent systematic literature review (SLR) has been undertaken to determine the benefits and challenges experienced in the gamification of e-learning systems. Hence, the knowledge effectiveness of the overall concept has been impacted.

The present study has both theoretical and practical value. A significant body of recent systematic research has been conducted in this domain. A recent study reviewed the application of gamification elements from the e-learning perspective and explored the benefits, drawbacks, and effectiveness of the process (Saleem et al., 2022). Another study (Bennani et al., 2022) explored the scope of artificial intelligence (AI) and adaptive gamification in the field of personalisation and e-learning. One study explored the benefits and challenges of using gamification in the distance learning during COVID-19 (Alzahrani & Alhalafawy, 2022). Another study has also examined the effects and challenges of gamification in e-learning environment (Alzahrani & Alhalafawy, 2023; Harini, 2023; Jarnac de Freitas & Mira da Silva, 2023). The most recent study by Khaldi et al. (2023) primarily focused on assessing the effectiveness of gamification in student outcomes in e-learning. Nevertheless, none of these studies comprehensively addresses all four dimensions, namely challenges, benefits, game element implementation, and future research scope in the domain. The current paper addresses this focused gap (See Table 1).

This study has been effective in improving the knowledge and literature on the domain of e-learning gamification. Thus, the present study has proven effective in overcoming these gaps. Thus, based on the research problem, the following research objectives were formulated for this study:

- To examine the characteristics of the research published in the domain of gamification of e-learning.
- To explore the benefits and challenges experienced in the gamification of e-learning systems.

- To examine the impact of gamification on the effectiveness of learning in e-learning systems
- To summarise the future research recommendations presented in the reviewed research.

Aligned with the research objectives, it also presents different benefits and challenges of gamification within the e-learning context. Hence, future researchers are encouraged to add to this domain to rapidly promote the gamification concept within the educational sector. Besides, the evidence presented in this study has the potential to effectively encourage educational institutions' management across various sectors to incorporate gamification in e-learning. This integration aims to enhance student engagement and foster a more conducive learning environment. Nevertheless, continuous innovation in the gamification approach is crucial to prevent repetitive games, which might impact the students' learning interests. Thus, game developers can focus on promoting innovations in this regard for a better future of gamification within the context of e-learning systems.

Table 1. Recent Works Comparison

Reference	Focus on Challenges of Gamification	Focus on the Benefits of Gamification	Focus on the Effectiveness of Gamification	Focus on Future Research Opportunities
(Saleem et al., 2022)	✓	✓	✓	
(Bennani et al., 2022)			✓	✓
(Alzahrani & Alhalafawy, 2022)	✓	✓		
(Khaldi et al., 2023)			✓	
<i>This Study</i>	✓	✓	✓	✓

2. Methodology

The primary aim of this research is to determine the characteristics of research within the context of gamification of e-learning. It also focuses on determining the benefits and challenges experienced in the gamification of e-learning systems. Therefore, an effective research methodology is crucial to fulfilling these research objectives. The most suitable research methodology for this study is an SLR, which includes results analysis from various past studies. The SLR is an effective approach to examining other authors' findings and data on particular research questions. Besides, the SLR differs from the typical literature review as it involves effective inclusion and exclusion criteria for selecting studies to conduct a literature review. In contrast, evidence is provided from a "high-level summary" of the associated field in the literature review (Granić & Marangunić, 2019). Hassan et al. (2021) utilised the SLR technique to determine adaptive gamification in e-learning by focusing on artificial intelligence and its future challenges. Inspired by this study, an SLR approach was also utilised in the present study.

2.1. Inclusion and Exclusion Criteria

Effective inclusion and exclusion criteria for this research were defined to collect the required data for analysis. According to Handayani et al. (2020), a period of more than five years is effective for collecting the data for an SLR. Thus, for the present study, a period of ten years, from 2014 to 2023, was selected for data collection. Moreover, journal articles and conference papers for the present study were considered based on Behl et al. (2022). The study helped in the effective selection of papers on gamification and e-learning systems. The past literature review conducted in the context of gamification focused on qualitative and quantitative papers. Hence, the same approach was utilised for the present

study, and the primary focus was on the quantitative and qualitative papers on the gamification of e-learning systems. The exclusion criteria ensured that no paper older than 2014 was included in this study to maintain research effectiveness. Additionally, no chapter, book, past SLR, or other grey material and journal materials were selected for this study to ensure its effectiveness.

2.2. Data Collection

Different online databases were selected in this study to collect the required data. The primary databases selected for this study included IEEE, Scopus, and WoS. The significance and efficiency of these databases, commonly used in various studies, including those employing the SLR technique, have been emphasised. Nevertheless, an effective list of keywords was developed to collect the required data. The keywords included in this list are “Gamification in online education,” “Gamification challenges for students,” “Gamification challenges for teachers,” “E-learning,” “Gamification elements in education,” “Effectiveness of gamification in e-learning,” and “Effectiveness of gamification in education.” These keywords were put in the selected online databases, and different papers and articles were collected based on the inclusion and exclusion criteria. The list of these papers, including their abstracts, methodologies, keywords, and nature, was prepared on an Excel sheet. After careful analysis, a sample of 37 conference papers and journal articles out of 110 articles were selected for the present SLR.

2.3. Data Analysis

Effective analysis techniques and tools were utilised in this study. After the required data was collected, Excel and Vosviewer were used to analyse the collected data to fulfil the proposed research objectives.

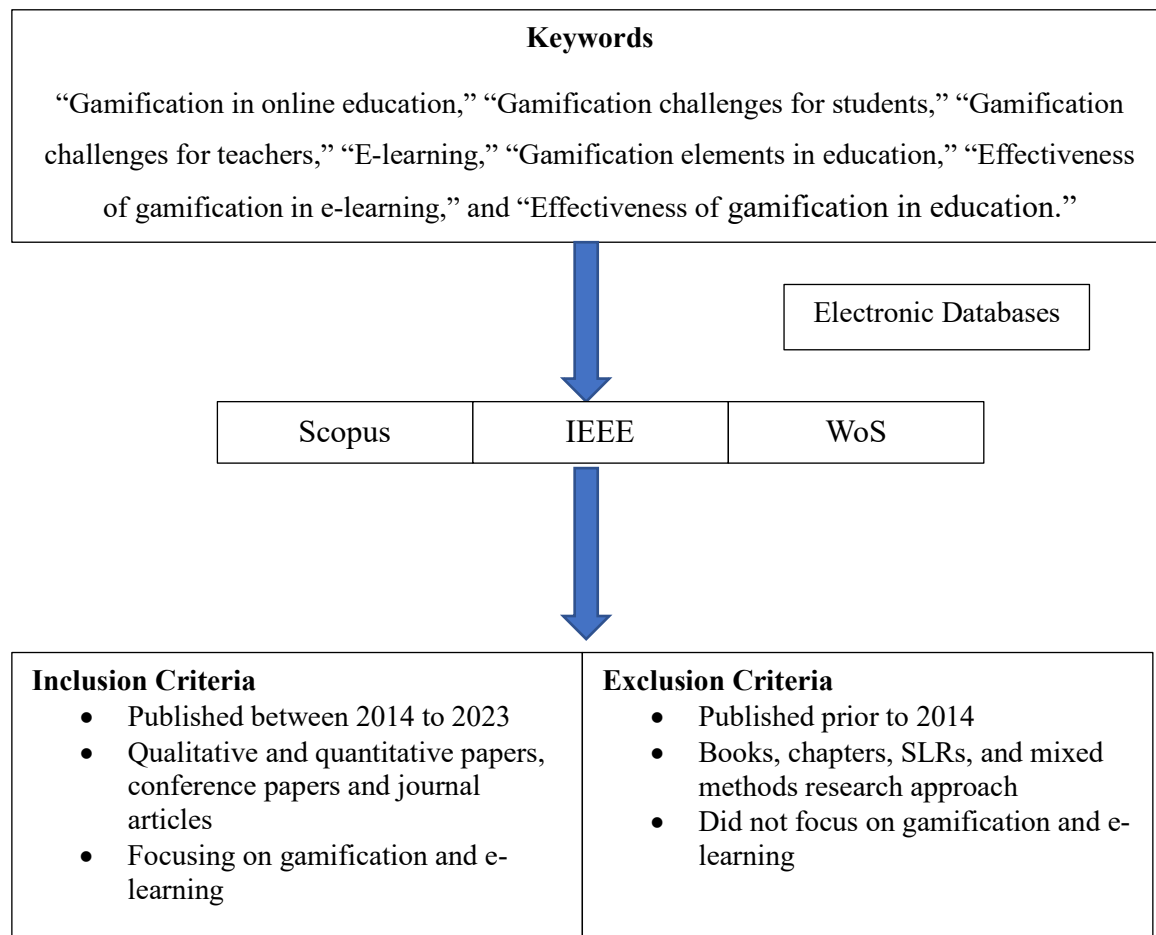


Fig.1: Methodological Summary

3. Results

3.1. Paper Characteristics

The researcher reviewed the characteristics of the 37 papers included in this review. First, the researcher classified the papers based on years. As discussed in the methodology section, the researcher extracted papers from the past ten years, beginning from 2014 to 2023. Figure 2 maps the number of papers for each year. The maximum number of papers extracted was from 2020 and onwards.

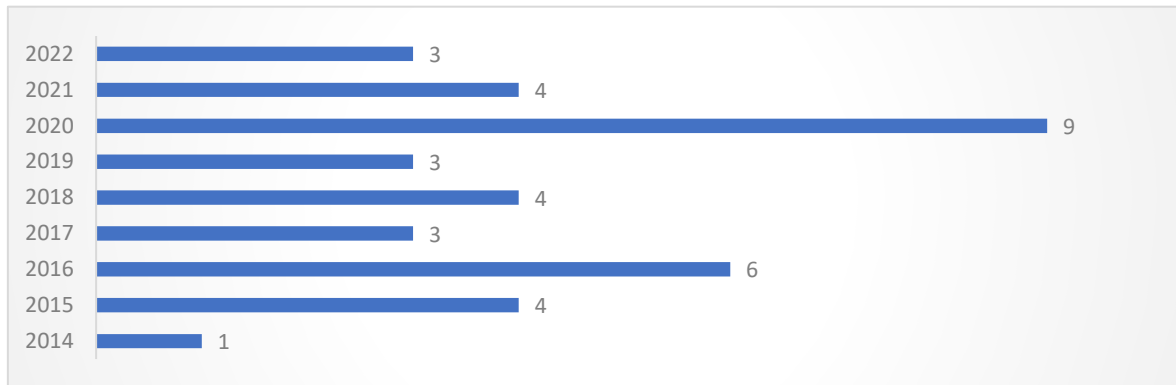


Fig.2: Classification of Years

Both conference proceedings and journal articles were included in this study. Nevertheless, most of those papers included were journal articles (76%), whereas the rest were conference proceedings (24%) (See Figure 3). The number of papers from each journal or conference is listed in Table 2.

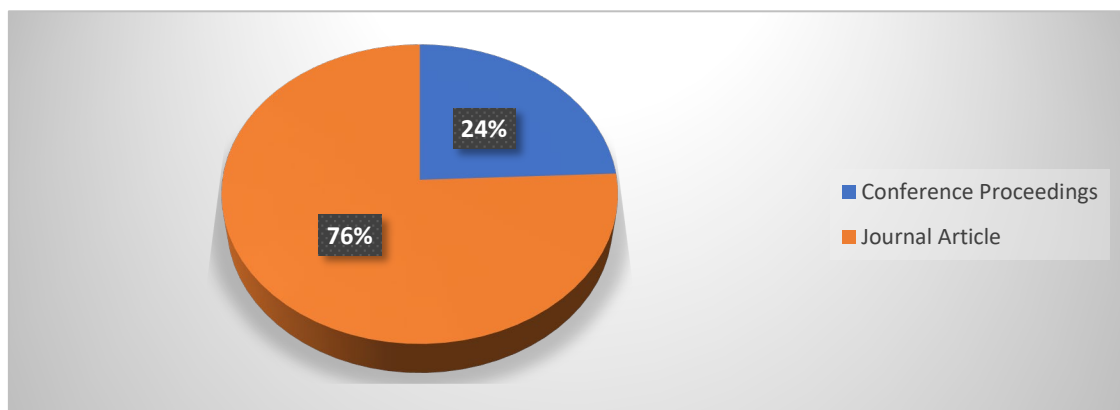


Fig.3: Classification of Papers

Table 2. Conference/Journal-Based Distribution

Conference/Journal Name	Number of Papers
2016 8th International Symposium on Telecommunications (IST)	1
2016 International Symposium on Computers in Education (SHIE)	1
2017 IEEE International Systems Engineering Symposium (ISSE)	1
2018 10th International Conference on Information Technology and Electrical Engineering (ICITEE)	1
Applied Sciences	1
BMC Medical Education	1
Central European Conference on Information and Intelligent Systems	1

Cureus	1
Education and Information Technologies	1
EDULEARN16 Proceedings	1
E-learning and Digital Media	1
Electronic Journal of e-Learning	1
European Conference on e-Learning	1
Heliyon	1
ICERI2016 Proceedings	1
Intelligent and Interactive Computing: Proceedings of IIC 2018	1
Interactive Learning Environments	1
Interactive Technology and Smart Education	1
International Journal of Advanced Computer Science and Applications	1
International Journal of Emerging Technologies in Learning	1
International Journal of Evaluation and Research in Education	1
Journal of Educational Technology & Society	1
Journal of Theoretical & Applied Information Technology	1
Procedia-Social and Behavioral Sciences	1
Research and Practice in Technology-Enhanced Learning	1
Research in Learning Technology	1
Smart Learning Environments	1
The International Journal of Engineering Education	1
World Journal on Educational Technology: Current Issues	1
International Journal of Innovation, Management, and Technology	2
Computers & Education	3
Sustainability	3

Most of the papers included in this study were from developing countries. Table 3 shows that there were four papers from China, four from Indonesia, three each from Malaysia, Thailand, and Germany, and two each from Brazil, The Netherlands, Portugal, Spain, Turkey, and the United States of America (USA). Additionally, one paper each was contributed from several countries, including Saudi Arabia, Iran, Croatia, Korea, and various European countries.

Table 3. Country-Based Distribution

Country Name	Number of Papers
Croatia	1
Iran	1
Romania	1
Slovenia	1
Algeria	1
Korea	1
Poland	1

Saudi Arabia	1
Brazil	2
Netherlands	2
Portugal	2
Spain	2
Turkey	2
USA	2
Malaysia	3
Germany	3
Thailand	3
Indonesia	4
China	4

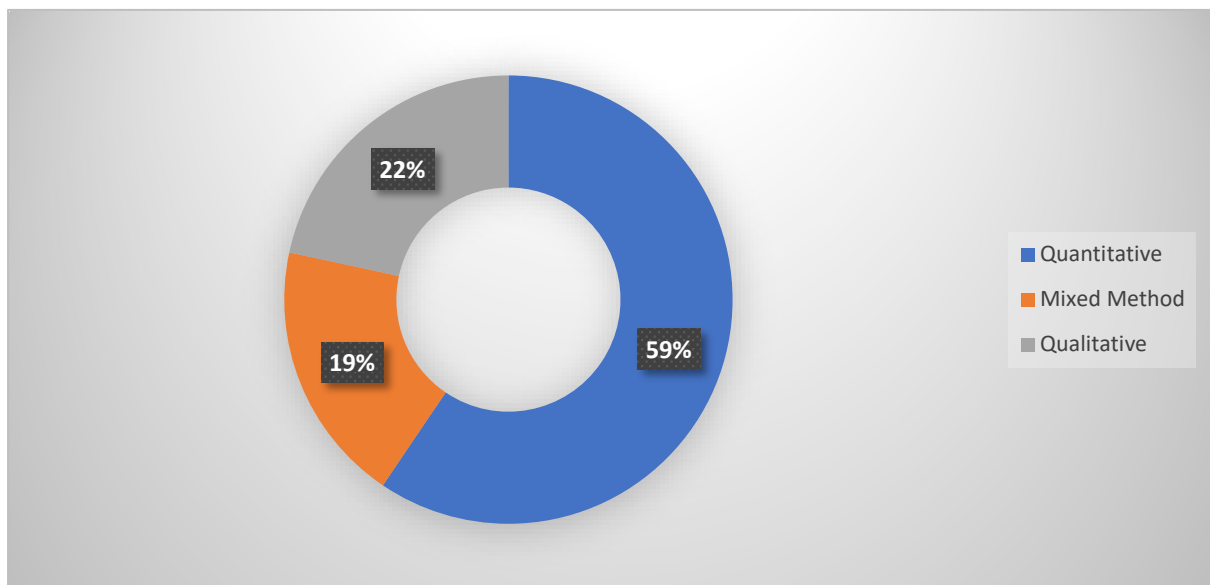


Fig.4: Method-Based Distribution

Most of the studies included in this review were quantitative. Figure 4 shows that 59% of the research was quantitative, 22% was qualitative, and 19% was based on mixed-method research.

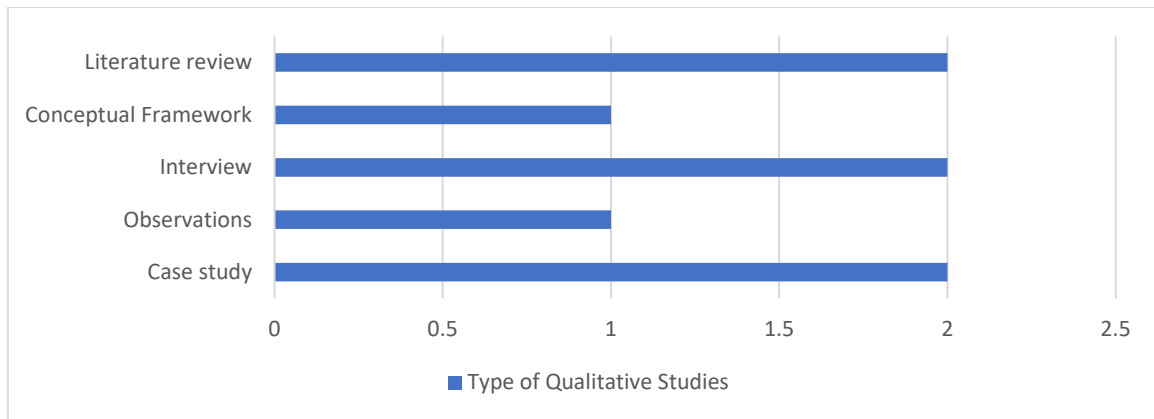


Fig.5: Quantitative Studies Distribution on Type

A total of 22 quantitative studies were included in this review. According to Figure 5, among the quantitative studies, 11 utilised the survey technique, while four studies employed descriptive analysis or quasi-experimental analysis. Two studies utilised the ANOVA technique for conducting regression analysis, and one study employed social network analysis and principal component analysis.

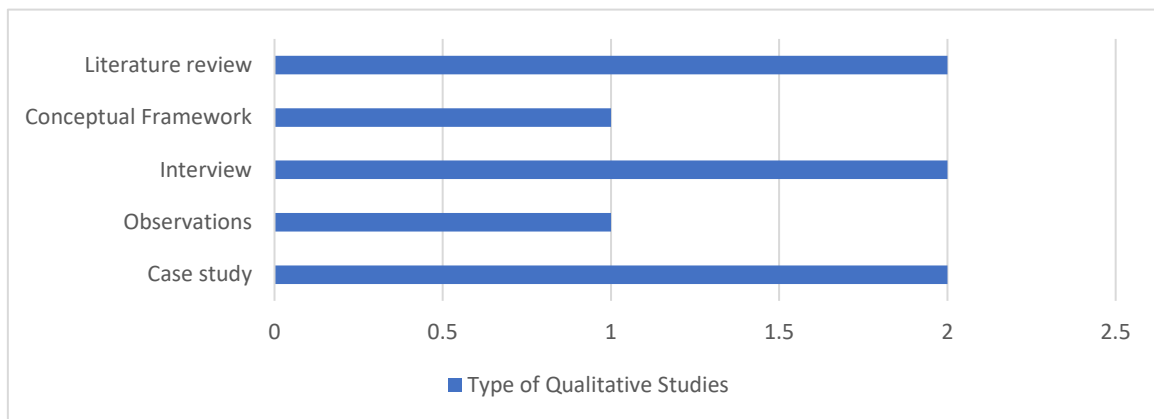


Fig.6: Type of Qualitative Studies

Eight qualitative studies were included in this review, out of which one study each utilised observations and conceptual framework presentation. Additionally, two studies each employed case studies, interviews, and literature analysis-based thematic strategies.

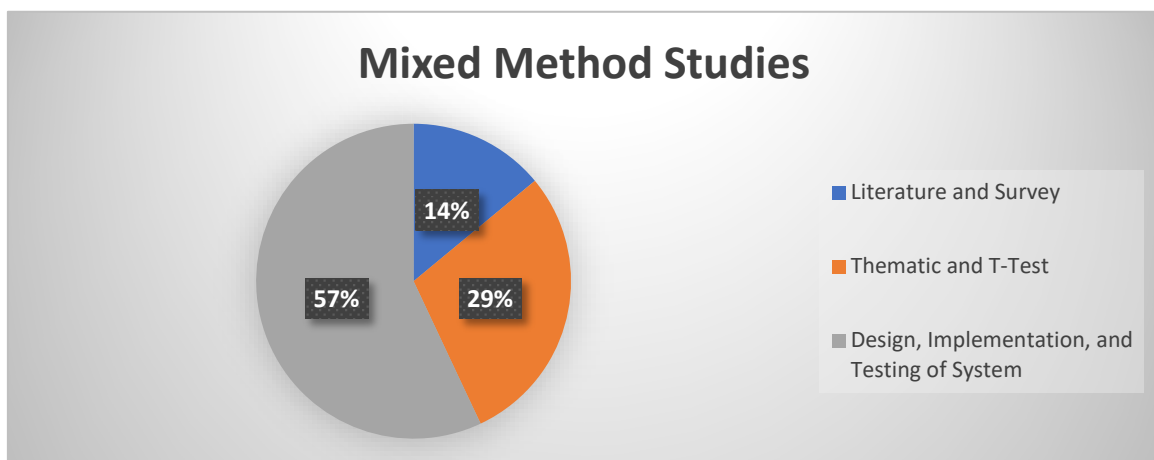


Fig.7: Mixed Method Studies Distribution on Type

Out of the included papers, seven utilised mixed-method research. One study (14%) combined a literature review with a survey, while two studies (29%) employed thematic analysis of interviews and t-tests. Researchers designed, implemented and tested a gamification strategy for e-learning systems in four studies. Moreover, a total of 118 authors were included in the reported research.

Notably, the study also employed a correlation map for analysing titles, abstracts, and keywords, resulting in the formation of three distinct clusters on the map. One cluster focused on teaching and its related concepts. The other cluster focused on the learning process and its related concepts, and the third cluster was concerned with gamification elements, the learner, and the implementation of such elements. These three clusters assisted in forming the study's major themes. These themes include the causes of using gamification elements in e-learning and the benefits and challenges of gamification for both teachers and learners. One extra theme was formulated to fulfil the research objective to indicate future research directions on gamification.

3.2. Causes of Gamification of e-Learning

One of the primary causes of using gamification elements in an e-learning environment is to provide students with a set of customised opportunities that can be exploited to fit their abilities, study style, and interests (Jianu & Vasilateanu, 2017). Motivations of utilising e-learning systems powered with gamification elements include improved curriculum, increased students' attention by providing interactive and entertaining learning opportunities and providing an integrated, adaptive, and goal-oriented learning experience (O'Connell et al., 2020; Pankiewicz, 2016; Poondej & Lerdpornkulrat, 2020; Prasetyo Aji & Napitupulu, 2018; Urh et al., 2015; Zainuddin et al., 2020). Encouragement of the teaching staff to incorporate gaming elements in e-learning is mostly due to the belief that it can allow better student-teacher interaction, foster a flexible learning and teaching environment, and make the overall learning process more engaging, fun and productive (Al-Azawi et al., 2016; Alsadoon et al., 2022; Bachtiar et al., 2018; Bicen & Kocakoyun, 2018; Bovermann & Bastiaens, 2020; Jianu & Vasilateanu, 2017; Welbers et al., 2019).

In the past, gamification critics have claimed that employment of gamification elements in teaching can lead to positive outcomes for both teachers and students due to the instant feedback mechanisms, goal orientation, visualisation of rewards upon success, and provision of a visualisable learning chart in real-time (Bouchrika et al., 2021). These experiences allow the game elements to make the e-learning experiences highly interactive, inspiring students to perform better and increasing engagement behaviour (Bouchrika et al., 2021). Studies have repeatedly highlighted that the purpose of using gamification in e-learning or learning environments, in general, is to provide continuous feedback to help their skill development (De-Marcos et al., 2014), increase individual participation (Pankiewicz, 2016; Urh et al., 2015), encourage improved information transfer, and ensure a high level of teaching effectiveness (Jong & Shang, 2015; Mahmud et al., 2020; Molinero-Polo et al., 2016; Pakinee & Puritat, 2021; Sánchez-Mena & Martí-Parreño, 2017; Sánchez-Mena et al., 2016).

Additionally, this theme identifies and maps the keywords of the content from the reviewed research. It clarifies that the fundamental motivation for using game elements in non-game contexts, such as education, lies in the fact that the flow, immersion, and level of involvement required in games contribute to enhancing the performance levels of all stakeholders involved by fostering motivation and engagement. The reviewed research demonstrates that gamification effectively motivates students to engage in learning tasks, even when they may be tedious, by adding an element of fun and entertainment to the learning process (Pakinee & Puritat, 2021; Poondej & Lerdpornkulrat, 2020; Prasetyo Aji & Napitupulu, 2018; Roosta et al., 2016; Sánchez-Mena & Martí-Parreño, 2017; Sánchez-Mena et al., 2016).

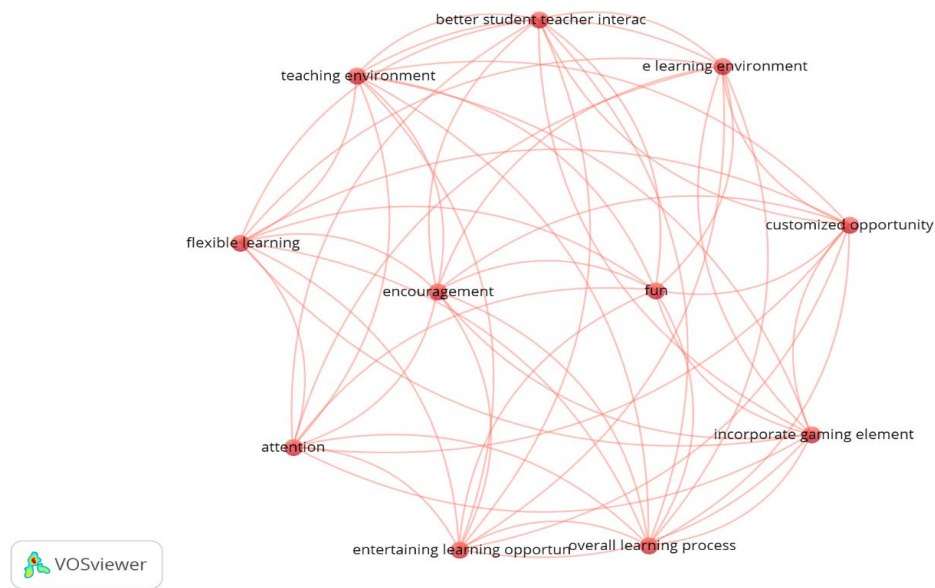


Fig.8: Word Map (Cause of Using Elements of Gamification)

3.3. Benefits of Gamification of e-Learning

The e-learning industry has been revolutionised due to gamification, which has led to simplified teaching and learning processes and an easier life for teachers and students (Alsadoon et al., 2022; Bachtiar et al., 2018). Gamification has introduced an interactive and engaging aspect to e-learning, making it enjoyable and capturing students' attention and motivation (Ab Rahman et al., 2019). Furthermore, these systems can effectively track the student's progress in real-time and enable teachers to provide feedback, tailor teaching resources and mechanisms, and improve the overall curriculum according to students' needs (Jong & Shang, 2015; Mahmud et al., 2020; Sánchez-Mena & Martí-Parreño, 2017). Moreover, a personalised learning experience can be created for each student in these systems, making it easier to provide targeted support (Marisa et al., 2020; O'Connell et al., 2020). The reviewed research has recognised the benefits of gamification for teachers and students, which are reported in this theme. Figure 9 displays two major clusters, which show that the benefits are divided across teachers and students.

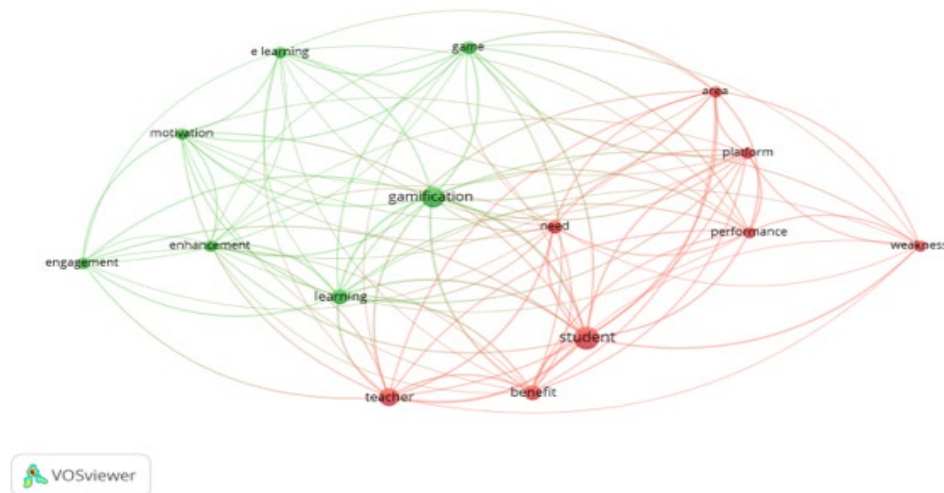


Fig.9: Word Map (Benefits of Using Gamification)

The review revealed that one of the key benefits of gamification for students is that it allows them to receive immediate real-time feedback on their performance. These systems include different features such as progress bars, reports, and charts that motivate the students to enhance their performance (Bovermann & Bastiaens, 2020). Moreover, the students can identify the areas that need more focus by highlighting the weaknesses and allowing them to personalise their learning path based on performance data recommendations (Bovermann & Bastiaens, 2020; de Marcos Ortega et al., 2017; Pankiewicz, 2016; Roosta et al., 2016). Furthermore, the game-like elements or gamified e-learning system allow the students to gain a healthy sense of competition, be motivated to work harder, and obtained better results than their records and peers (Rahayu et al., 2022; Roosta et al., 2016; Zainuddin et al., 2020). The complex and dry topics of various subjects can be made more enjoyable, accessible, and comprehensible through gamified e-learning environments, which, in turn, leads to increased comprehension and retention (Ab Rahman et al., 2019; Bouchrika et al., 2021; Pakinee & Puritat, 2021; Rahayu et al., 2022; Zainuddin et al., 2020). The interactive elements also allow the learners to improve their focus and help them reinforce their learning (Kyewski & Krämer, 2018; Poondej & Lerdpornkulrat, 2020). Many gamified platforms require learners to collaborate and work in teams, leading to enhancing collaborative learning skills, which are dire in the real-world environment. Furthermore, the gamified learning process progresses in a manner that mimics the increasing difficulty of game levels, which allows the students to increasingly challenge themselves, become problem solvers, think critically, and be creative (Rahayu et al., 2022; Sánchez-Mena & Martí-Parreño, 2017; Urh et al., 2015; Welbers et al., 2019).

Table 4 summarises the benefits of gamification of e-learning for teachers. Gamification is an effective tool for teachers to capture students' interest and attention. Gamification creates a more engaging and enjoyable learning experience by incorporating game-like elements, which helps the students to stay focused and motivated (Jong & Shang, 2015; Mahmud et al., 2020; Sánchez-Mena & Martí-Parreño, 2017). Moreover, gamification enables an interactive and collaborative environment that fosters collaboration among teaching staff and encourages effective communication with students (Roosta et al., 2016; Sánchez-Mena et al., 2016). Active learning and high levels of engagement lead to better grades, higher knowledge retention, and increased motivation to learn (Jong & Shang, 2015; Sánchez-Mena & Martí-Parreño, 2017; Sánchez-Mena et al., 2016). Gamified e-learning platforms also empower teachers to gain a better understanding of the areas in which their students may be struggling by providing deeper insights into individual performance and the overall performance of the class (Roosta et al., 2016; Sánchez-Mena et al., 2016). This information enables a teacher to plan their future lectures and devise strategies widely targeted to support the individuals that may require it. These platforms often have features that enable the free flow of communication between teachers and their students (Roosta et al., 2016; Sánchez-Mena et al., 2016). Such features enabled students to ask more questions compared to a traditional classroom, receive personalised feedback on their learning progress, and allow the teacher to focus on the enhancement of the course material on the areas that the class might be struggling as a group (Roosta et al., 2016; Sánchez-Mena et al., 2016). Furthermore, the automation of various tasks, such as grading, allows the teachers to have additional free time to focus on their student's needs on the individual level (Pakinee & Puritat, 2021; Sánchez-Mena et al., 2016).

Table 4. Benefits of E-Learning Gamification to Teachers

Benefit	Summary	References
Enhancement of student attention, motivation, and engagement	The teachers can capture students' attention better as gamification brings out the fun in the learning and teaching process	(Pakinee & Puritat, 2021; Sánchez-Mena & Martí-Parreño, 2017; Sánchez-Mena et al., 2016)
Enhancement of student outcomes	The findings of the reviewed studies emphasised that active learning, engagement levels, instant feedback, and reinforcement of taught knowledge enhance overall student performance outcomes and improve teaching quality.	(Pakinee & Puritat, 2021; Sánchez-Mena & Martí-Parreño, 2017; Sánchez-Mena et al., 2016)
Progress tracking and improved assessment	The gamified e-learning platforms use real-time data to track students' progress and allow teachers to assess students' performance and adjust their course strategies. Moreover, the teachers can understand students' strengths and weaknesses individually and as a whole and identify areas that need additional support.	(Jong & Shang, 2015; Molinero-Polo et al., 2016; Sánchez-Mena & Martí-Parreño, 2017)
Enhanced student-teacher communication	Communication between teachers and students is facilitated and allows the open flow of feedback between the two stakeholders in the learning process.	(Roosta et al., 2016; Sánchez-Mena et al., 2016)
Reduction of workload	Automation of tasks such as grading and assessment can allow teachers to focus better on acting as students' facilitators and reduces workload.	(Pakinee & Puritat, 2021; Sánchez-Mena & Martí-Parreño, 2017; Sánchez-Mena et al., 2016)
Increased collaboration	Collaboration is encouraged among the teaching staff as gamification opens up venues for sharing resources, best practices, and student progress reports.	(Jong & Shang, 2015; Molinero-Polo et al., 2016; Sánchez-Mena & Martí-Parreño, 2017)

3.4. Challenges of Gamification of e-Learning

While gamification of e-learning has gained popularity in the past few years, potential challenges associated with this technology should be acknowledged. Figure 9 illustrates three clusters within the challenges identified in the reviewed literature. Table 5 also presents these challenges, which are classified as teacher challenges, learner challenges, or challenges faced by both stakeholders. From a technological perspective, one significant challenge is to align the learning objectives with game elements when the learning systems are gamified. The game elements must be relevant to the content and learning objectives to ensure that they do not distract the learner from the basic outcomes required from a course. In addition, the game elements must be designed and developed to motivate the learner to complete their learning tasks and activities (de Marcos-Ortega et al., 2020; Strmecki et al., 2015). Furthermore, another challenge lies in designing game elements in an accessible and inclusive way to accommodate the diverse needs of learners within a single consolidated system. A generally reported

challenge in reviewed literature is the evaluation of the effectiveness that gamification has introduced in the e-learning phenomena. The effectiveness measurement must consider students' motivation, engagement, and learning outcome levels, which can be difficult to capture (Bernik et al., 2015). It is reported that measurement of the impact that game elements have on learning outcomes is difficult (Doney, 2019; Park & Kim, 2021). Data security and privacy are also critical challenges in the gamification of e-learning (Kyewski & Krämer, 2018; Sánchez-Mena & Martí-Parreño, 2017; Seidlein et al., 2020; Zainuddin et al., 2020).

Students face numerous challenges in the gamification of e-learning. Research has uncovered that gamification elements have not effectively and efficiently improved students' talents, skills, desire for achievement, and motivation levels due to inefficiently designed game elements that fail to inspire and motivate students (Kyewski & Krämer, 2018). Therefore, although learning can become more enjoyable through gamification, game elements should not distract students from their learning goals, and the right balance between learning and fun must be ensured. An appropriate design is considered a leading cause of gamification failure. Most of the gamified e-learning systems failed to meet each student's needs and ensure uniformity of usage satisfaction (Urh et al., 2015). Previous research has reported that gamification is not well-received by all students. Some find it motivating, while others can deduce such activities as more distracting since individual needs are not appropriately catered to the game elements. In the opinion of gamification critics, gamification, instead of removing distractions, can lead to the addition of distractions during education. It may also increase the need for competitiveness and intensify the perception of a lack of prior knowledge in students (Sánchez-Mena et al., 2016; Sánchez-Mena & Martí-Parreño, 2017) due to ineffective design and an inability to align learning objectives with gamified elements.

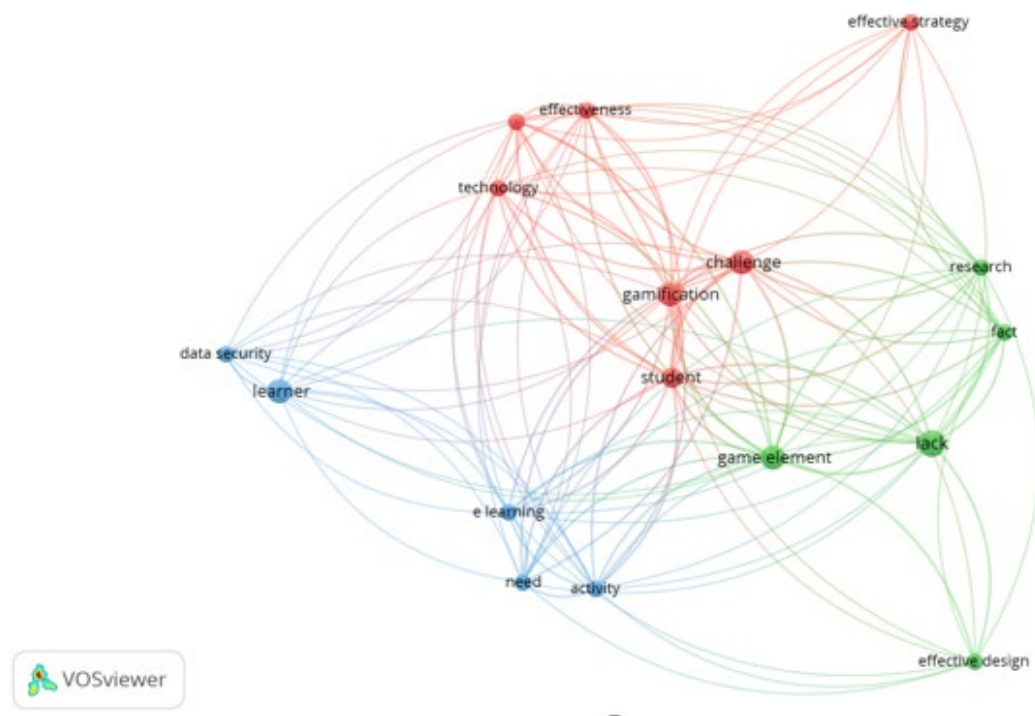


Fig.10: Word Map (Challenges of Using Gamification)

In terms of teachers' perspectives, it has been reported that the major challenges in e-learning gamification stem from the difficulty of effectively integrating game elements and instructional design (Zainuddin et al., 2020). Teachers must work hard to devise strategies that enable seamless integration of gamification within the existing curriculum to ensure that the learning experience can be intensified and enhanced. In order to develop effective strategies for gamification, teachers must develop an understanding of the game design and learning content and objectives. Therefore, teachers are required to invest significant resources and time to implement effective gamification strategies. Due to research indicating uncertainty regarding the effectiveness of gamification, many teachers refrained from utilising e-learning and gamification prior to the pandemic. Another challenge faced by teachers is the management of student engagement. Although gamification acts as a powerful tool that increases engagement, it can be overwhelmingly distracting for students with a lower attention span. Therefore, teachers must closely monitor the student data to capture engagement levels and harvest the strategies if necessary (Fajri et al., 2021; Gokbulut, 2020). Resistance to change is another significant challenge teachers face in the gamification of learning programmes. The reasons include the lack of technological familiarity and a belief that the traditional teaching mechanisms are more effective and superior to any solution involving technology (Doney, 2019; Kyewski & Krämer, 2018; O'Connell et al., 2020; Pakinee & Puritat, 2021; Park & Kim, 2021; Sánchez-Mena & Martí-Parreño, 2017; Seidlein et al., 2020; Zainuddin et al., 2020).

Table 5. Challenges of Gamification

Challenge	Stakeholder	References
Lack of effective design that aligns game elements to learning objectives	Learners	Strmecki et al. (2015), Urh et al. (2015), (de Marcos-Ortega et al., 2020; Kyewski & Krämer, 2018; Strmecki et al., 2015)), de Marcos-Ortega et al. (2020)
Lack of balance between learning and enjoyment	Learners	Sánchez-Mena et al. (2016), Sánchez-Mena and Martí-Parreño (2017),
Lack of addressing individual needs	Learners	Jong and Shang (2015), (Jong & Shang, 2015; Zainuddin et al., 2020)
Lack of efficient evaluation of the effectiveness	Teachers and Learners	(Bernik et al., 2015; Doney, 2019; Park & Kim, 2021)
Data security and privacy	Teachers and learners	(Kyewski & Krämer, 2018; Sánchez-Mena & Martí-Parreño, 2017; Seidlein et al., 2020; Zainuddin et al., 2020)
Development of effective strategies for gamification	Teachers	(Fajri et al., 2021; Gokbulut, 2020)
Change resistance	Teachers	(Doney, 2019; Kyewski & Krämer, 2018; O'Connell et al., 2020; Pakinee & Puritat, 2021; Park & Kim, 2021; Sánchez-Mena & Martí-Parreño, 2017; Seidlein et al., 2020; Zainuddin et al., 2020)

3.5. Future Research in Gamification of e-Learning

An important part of the review was to extract the future research recommendations presented in the reviewed research, which will be addressed in the current section. The table below summarises the primary findings and future recommendations of each included paper.

Table 6.Future Directions

Reference	Summary of Paper	Future Recommendation for Research
(Al-Azawi et al., 2016)	The study compared educational gamification and game-based learning mechanisms, which were found to increase engagement and improve learning.	This study suggested that game elements can help provide effective and low-cost solutions to increase learning and teaching effectiveness. Therefore, more research must be carried out in this regard.
(Alsadoon et al., 2022)	In this study, the researcher used quantitative mechanisms to test the impact of gamification in an e-learning environment on achievement, motivation, and satisfaction levels of computer science learning in students. The findings show a positive impact on satisfaction and motivation but no significant impact on achievement levels.	The researchers suggested future experimental studies in a blended learning environment where both e-learning and in-class strategies are used in a gamified learning environment.
Bernik et al. (2015), Jong and Shang (2015), Bele et al. (2016), Jianu and Vasilateanu (2017), Bachtiar et al. (2018), Bicen and Kocakoyun (2018), Gokbulut (2020), Seidlein et al. (2020)	An e-learning system that used gamified elements was developed and tested in each of these studies. The findings revealed that the system can help students achieve higher satisfaction and motivation.	Future research must be conducted to improve user experience in gamified e-learning systems. Moreover, it is suggested that gamification elements must be aligned with learning goals to enhance student satisfaction and achievement.
Reference	Summary of Paper	Future Recommendation for Research
(Bovermann & Bastiaens, 2020)	The motivation for using gamification and learning was tested. All types of users and learning impacted each other at least once.	It is suggested that comprehensive reserves must be driven for the impact of various gamification user types and gamification mechanisms in an online and distant learning context. Research must be conducted

		regarding the effectiveness of gamification on online learning mechanisms.
(De-Marcos et al., 2014; de Marcos-Ortega et al., 2020; de Marcos Ortega et al., 2017; Molinero-Polo et al., 2016)	These studies tested the social components of gamification to find the impact of gamification on the learning experience, which revealed that chances of success increase with gamification.	This study showed that social gamification could improve academic performance. Therefore, future research requires a deeper understanding of how the motivational affordance of students can impact academic achievement and performance. Future researchers must empirically test the impact of gamification on learning outcomes. Integration of virtual environments was also suggested.
Strmecki et al. (2015), Urh et al. (2015), Ab Rahman et al. (2019)	The studies' main objective was to test the gamified design elements in e-learning for their ability to motivate and engage.	Conduct testing on different modules to see the impact on student achievement. Moreover, the personalisation of the learning process is the major future direction in this domain and can lead to the integration of artificial intelligence.
(Bouchrika et al., 2021; Doney, 2019; Poondej & Lerdpornkulrat, 2020; Welbers et al., 2019; Zainuddin et al., 2020))	This set of studies aimed to show that the performance and perceived engagement levels are different in gamified e-learning environments.	It is suggested that future studies should consider the influence of student/player demographics on the overall effectiveness of gamification in e-learning. Moreover, challenges for e-learning and gamification adoption were suggested to be addressed in future research.
(Prasetyo Aji & Napitupulu, 2018; Sánchez-Mena & Martí-Parreño, 2017; Sánchez-Mena et al., 2016), Sánchez-Mena and Martí-Parreño (2017), Prasetyo Aji and Napitupulu (2018)	These studies tested the teachers' perspectives regarding the impact of gamification on their courses.	The results of the studies indicated the need to pay attention to the design elements of gamification to ensure that they can effectively capture students' attention and motivation. Moreover, it was found that teachers believe that gamification does not improve student achievement. Therefore, future research needs to be conducted from this perspective.

Reference	Summary of Paper	Future Recommendation for Research
Pankiewicz (2016), Roosta et al. (2016), Kyewski and Krämer (2018), Mahmud et al. (2020), (Bachtiar et al., 2018; Bele et al., 2016; Bernik et al., 2015; Bicen & Kocakoyun, 2018; Fajri et al., 2021; Gokbulut, 2020; Jianu & Vasilateanu, 2017; Jong & Shang, 2015; Kyewski & Krämer, 2018; Mahmud et al., 2020; Oliveira et al., 2022; Pankiewicz, 2016; Roosta et al., 2016; Seidlein et al., 2020)	The role of the feedback mechanism enabled by gamified e-learning systems was tested on various student outcomes in these studies. Moreover, the personalisation of the learning process is also focused. The findings show the positive impact of personalisation and feedback on student engagement, motivation, and experience.	Future researchers must focus on creating a superior user experience for the students to ensure that their achievement levels can also be significantly impacted by the overall gamified learning systems in online and distance education. Learners' intrinsic and extrinsic motivation factors must be examined for their impact on student outcomes in gamified e-learning systems.
(Marisa et al., 2020; O'Connell et al., 2020; Pakinee & Puritat, 2021; Park & Kim, 2021; Rahayu et al., 2022)	The crux of this group of studies was the impact of gamified e-learning mechanisms on learning effectiveness during the pandemic. Most findings showed that gamification reduced stressors and enticed the students to be engaged in learning activities.	The future stream of research in this domain must be focused on the sustainable achievement of student performance and achievement.

In summary, the above table shows that most researchers focused on the need to conduct detailed research on the impact of gamification in e-learning on student achievement, as it is a debated phenomenon to date. In summary, there is a need to address the ongoing debate and discussion surrounding the effectiveness of gamified e-learning environments and their impact on learning outcomes for students and teachers. Therefore, future research must actively address the potential benefits and limitations of gamification in e-learning and aim to maximise student achievement, as COVID-19 has uncovered the dire importance of online and distance learning mechanisms.

4. Conclusion

This review analysed the benefits of gamified e-learning environment, the challenges faced in this process, and the effectiveness of using game elements in e-learning environments. Moreover, the

research also aimed to summarise the future research direction suggested in this review. For this purpose, the researcher applied an SLR strategy to extract literature from the past decade. The study's findings highlight several benefits of gamification for students and teachers. The benefits included feedback provision, increased engagement, retention and memorisation, collaborative learning, and the development of problem-solving skills in the students. Moreover, the benefits for teachers included enhancing student attention, motivation, engagement, student outcomes, progress tracking, enhanced assessment, better communication between teachers and students, reduced workload, and enhanced collaboration between teaching staff. The major challenges identified include a lack of effective design strategy to align game elements with the learning objectives of each module, insufficient design elements catering to the individual needs of students, an imbalance between learning and enjoyment, concerns regarding data security and privacy, the necessity for effective gamification strategies, and resistance to change. The study recommends that the teachers should enable the gamification for their teaching environments as it can help them to effectively deliver the content they are teaching. There is a need to address the ongoing debate and discussion surrounding the effectiveness of gamified e-learning environments and their impact on learning outcomes for students and teachers. Additionally, the policy makers should provide the necessary resources required for enabling the gamification in the e-learning environments.

This study has several limitations. The study's first limitation is that the literature review is conducted on articles published between 2014 and 2023. Future researchers are recommended to increase the research time frame and understand how the useful elements of gamification have been utilised in learning environments over the years. Moreover, the current study explored all three types of research methodologies, which are quantitative, qualitative, and mixed-method research. This choice has limited the study in terms of conducting a meta-analysis. Therefore, future research can consider conducting a meta-analysis to provide a comprehensive and meaningful perspective on the ongoing debate regarding the impact of gamification in learning on student achievement. Future research should consider the recommendations of numerous recent studies that highlight the importance of further exploring the impact of gamification on student achievement. While the positive influence on motivation and engagement is well established, there is an ongoing debate regarding its effect on achievement levels.

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