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A systematic review of catching and comparing the most valuable gamification elements used in online learning

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Abstract: Learning through games has exploded worldwide. Many students enjoy learning through gaming programs, and its effects on curricula and instruction have recently increased. Saleem et al. (2022) recommended further research to investigate the most valuable elements of gamified online learning empirically. Thus, this study systematically explored the gamified elements employed in online learning literature, focusing on identifying the most practical and valuable elements and aiming to provide insights that contribute to the existing knowledge of gaming techniques in online education.

Keywords: *Gamification elements, Online learning, Systematic review.*

1. Introduction

The structure of this work is as follows. The next section offers an overview of related research and summarizes the outcomes of systematic reviews regarding gamified elements in academic settings. This is followed by a section that outlines the research design, encompassing the process of identifying relevant literature, semiautomatic filtering, and the methods used for analysis. Next, we discuss the results of the research questions and then conclude with a section presenting the implications, prospects for future research, recommendations for educators, and limitations inherent to the work.

2. Purpose of the Study

Different studies have explored gaming elements by comparing two types of games and investigating students' perceptions of game elements, personalization of gamification elements, and the impact of infusing game elements and gamification in learning. However, no studies have compared the most valuable elements of gamified learning.

2.1. Research Questions

This study explored the following research questions:

- RQ1: What are the most valuable differences between other elements in gamified online learning?
- RQ2: What are the most valuable elements' similarities with other elements in gamified online learning?
- RQ3: How are the most valuable elements and other elements similar?
- RQ4: How are the most valuable elements and other elements different?
- RQ5: What are the other most valuable elements of the system concepts?
- RQ6: What advantages do the most valuable components possess in the context of gamified online learning?

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2.2. Overview of Related Research

Pakinee and Puritat (2021) outlined the pros and cons of game elements that can impact students' performance—for example, game elements help students better engage with the course—and suggested designing game elements based on personality traits. Equally important, Palaniappan and Noor (2022) focused on gamification's effect on learners' academic performance to identify the relationship between their self-directed learning (SDL) levels and their gamification experience in a learning environment infused with gamification through competitions to earn points, leaderboard ranks, and Python programming badges. The study concluded that self-management, motivation, and self-monitoring were all at elevated levels. Acosta-Medina et al. (2021) evaluated students' preferences for the gamified didactic tool city using the quantitative method and structural equation models. Their results indicated the need to create a more informed decision-making process for video game designers, pedagogues, and educational managers who design games, including and excluding individual elements. Their findings also showed that the tool improved students' knowledge and that they enjoyed using it.

Moreover, Gachkova et al.'s (2020) study focused on structural gamification. It comprises four cyclic stages: learning, evaluation, rewarding, and ranking. The gamified elements are level, story, history, challenge, team, frame, game progress, status (avatar) bonus, badge, reward, hidden treasures, combo, and leaderboard to motivate learners. They used software plug-ins for gamification in the learning management system Moodle. Their findings show that students had positive opinions about the developed plug-ins.

Bennani et al. (2020) illustrated the gamification objectives of motivation, attendance, and progress of e-learners. Their study aimed to propose a representation of adaptive gamification domain knowledge into an ontology and adapt a criteria-based evaluation approach to evaluate AGE-Learn ontology. Those criteria are clarity, consistency, coherence, conciseness, and correctness. Gamification elements in their study include badges, leaderboards, levels, points, virtual goods, dynamic mechanics, and components. The platform used in their study is "ClassQuizz."

Furthermore, Acosta-Medina et al.'s (2020) study mapped gamification patterns in teaching and learning processes. Their results indicated that engagement, motivation, and performance are the principal benefits of gamification in classroom learning. In their study, gamified elements included a point-scoring system, badges, and a leaderboard. The gamification elements in their study were divided into three figures based on the 99 documents analyzed, as follows:

- Components used:
- Gifts (14%)
- Unlocking (16%)
- Mission (17%)
- Avatar (21%)
- Progress Bar (31%)
- Levels (44%)
- Badges (51%)
- Leaderboard (n=53)
- Points (n=62)
- Mechanics used:
- Competition (n=39)
- Collection (n=13)
- Cooperation (n=32)
- Challenges (n=38)
- Rewards (n=35)
- Time (n=35)

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- Feedback (n=38)
- Dynamic used:
- Emotion (n=14)
- Restrictions (n=17)
- Relation (n=23)
- Narrative (n=25)
- Progression (n=37)

Acosta-Medina et al. recommended considering search engines like Google Scholar to improve the scope of the investigation, which this current study utilized.

In addition, Behl et al. (2022) focused on integrating gamification elements in the learning process by evaluating the Kahoot platform application of gamification. Their findings encourage using Kahoot, which combines gamification elements to improve student achievement. Their analysis of 301 student respondents shows that the constructs of gamification elements are competitiveness, challenge, and enjoyment. Their results show that competitiveness and enjoyment are affected by continued use through perceived usefulness. This enjoyment also affects individual impact by the satisfaction construct, and satisfaction affects individual impact. Behl et al. provide recommendations for lecturers using Kahoot in learning.

Furthermore, Xiao and Hew (2023) examined how gamification stimulated learner engagement through virtual points and badges. They revealed that not all students were motivated by tangible rewards designed to enhance their intrinsic motivation, behavioral and cognitive engagement, and learning performance in online learning, such as online gamified flipped classes. On the other hand, the study found that students who received tangible rewards performed better in intrinsic motivation, behavioral engagement, cognitive engagement, and final exam performance than those who received intangible rewards. This study has several implications for teachers planning to use tangible rewards in game-based courses.

Pesek et al. (2020) focused on using the Troubadour gamified platform for ear training and the benefits of its gamification elements. Their study used experimental groups, and the results showed increased student performance on exams, corroborating the platform's claim that its users experienced higher levels of engagement.

Handayani et al. (2021) discussed gamification in online learning for active students using rankings, points, badges, and leaderboards. Their study, which employed a mixed-methods approach, demonstrated the benefits of gamification in a learning management system. Students reported positive feedback during their weekly review activities. Badges, leaderboards, and awarding points encouraged students' performance in class and increased their active participation, whereas leaderboards motivated students to participate in online classes. Handayani et al. encouraged researchers to examine other gamification elements (e.g., avatars, progress bars, and levels) to evaluate improvements in active student learning.

Bouchrika et al.'s (2021) empirical study explored how gamification affects students' motivation to learn and their interactivity level with e-learning technologies over ten months. They concluded that gamification is valuable and increases users' interactivity and engagement. The elements used on the platform to determine this result were scores, stars, and leaderboards.

Furthermore, Gündüz and Akkoyunlu (2020) used gamification in an e-learning environment to measure the effects of interactive data, participation, and achievement. Utilizing a mixed-method approach that included both quantitative and qualitative data, they showed that the experimental group had higher interaction data, participation, and achievement scores than the control group. The authors encouraged the use of gamification with low-participation students. Their study used the following game elements: points, levels, badges, achievement collection, weekly and general leaderboards, time mediation, and statistical graphs.

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Bennani et al. (2022) reviewed the literature on adaptive gamification in e-learning and highlighted its scope and future challenges for realizing adaptive gamification applications. They discussed the mechanics and dynamics of gamification to produce enjoyment related to learners' personalities, needs, values, and motivations and the need to provide an intelligent adaptive gamification environment.

Toimah et al. (2021) examined a gamification model framework and its use in e-learning for higher education. They explored gamification activities at universities, clarified the differences between the techniques and methods of mechanics and game dynamics, and described the incorporation of gamification characteristics into e-learning to demonstrate its possible practical use in this domain.

In addition, Bernik (2021) assessed the gamification framework for e-learning systems in higher education by analyzing the scientific literature to create a conceptual model. Specifically, Bernik explained the concept of gamification, listed current models, and proposed a conceptual eRIOOS model, which is a situation for establishing an experimental, gamified system based on which scientific research is conducted. The conceptual model aims to improve and apply computer game elements in the online education system aimed at higher education and establishes standard elements from computer games that can be integrated into educational e-courses at higher education institutions. The model has a logical reason for applying two levels of complexity—three separate e-courses from two university institutions—to a conceptual eRIOOS tool. Bernik's findings confirmed that the conceptual model is suitable for creating model e-courses on an Internet technology (IT) teaching orientation in higher education institutions.

Manzano-León et al. (2021) conducted a systematic literature review on gamification in education. The authors examined the available evidence regarding the influence of educational gamification on students' motivation and academic performance; one of them is the most used game element.

Khaitova (2021) explored the history of gamification and its role in the educational process in Canada, Russia, Sweden, and the United States and described the potential of gamification programs and platforms that use gamification elements to design educational resources.

Razali et al. (2020) evaluated gamification's impact on students' intrinsic and extrinsic motivation using gamification elements in quiz applications. The results showed moderate student motivation after the game application was used. The significant gamification elements of the application were points, difficulty levels, and avatar constructs. The findings showed that these features significantly influenced students' intrinsic motivation from a point construct.

Moreover, Eliyas and Ranjana (2022) examined E-next learning. It uses rewards for accomplishments and challenges with badges, leaderboards, or vouchers for how the projects and goals are measured. Saleem et al. (2022) noted that the most popular gamification elements used in e-learning and the most effective for students are points, leaderboards, badges, and levels, concluding that elements used to teach learning are points, levels, stages, badges, leaderboards, awards, rewards, progress bars, stories, and comments. Saleem et al. (2022) pointed out that instructive designers need to develop the use of appropriate gamification elements. Designers should pay attention to the scientific content and caution in using the elements of play in the educational process to give the desired result and make sure that students understand the game's rules, which must be familiar to most learners; the short duration and simplicity of the game and the clarity of its laws will encourage both students and teachers at different levels of education to gain familiarity with the concept of gamification.

Özhan et al. (2020) mentioned how gamification can be more sustainable for different users using a Science Level Up platform. Park and Kim (2021) examined whether gamified online learning was sustainable. Alshammari (2020) evaluated the effect of gamification on elementary school students' motivation and learning outcomes using a game system including elements (points, time pressure, levels, badges, rewards, feedback, and leaderboards), and the results were significant.

Khaldi et al. (2023) conducted a systematic literature review on gamifying e-learning systems in higher education. Their findings indicated that PBL components (points, badges, and leaderboards), levels, and feedback are the most frequently employed elements. The authors also noticed a growing adoption of more intricate features such as challenges and storytelling. Selecting the ideal blend of game

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elements remains a formidable task for gamification designers and professionals, as there is a shortage of established design strategies and no universally practical approach, regardless of the specific gamification context.

Equally important, Alsubhi et al. (2020) explored the extensive use of various elements in gamified e-learning activities. They identified multiple game elements well suited for incorporating into e-learning activities to enhance students' learning outcomes. The authors introduced a conceptual framework for engagement that outlines strategies for leveraging game elements in e-learning to engage students effectively. This framework is intended to serve as a valuable resource for developers and educators aiming to create compelling e-learning systems based on foundational principles.

Mustafa and Karimi's (2021) systematic literature review examined gamified online learning users' experience. Their findings showed a significant beneficial effect of game elements on user experience: points, leaderboards, levels, badges, and progress bars.

Finally, Li et al. (2022) used gamification to facilitate L2 English students' self-regulation of e-learning. They adopted a gamified e-learning system, the Oxford Achiever (OA), as a research tool and environment, which aims to "gamify" students' learning experiences by incorporating gaming elements such as challenges, level-up mechanisms, a point system, leaderboards, dashboards, trophies, and avatars. This system offers targeted practice and personalized feedback explicitly tailored for young learners. Initially, the students underwent an online placement pretest to assess their original English proficiency, which helped to establish a personalized learning plan, assign suitable tasks, build self-assurance, and empower them to monitor their progress throughout the course. The system encompassed a variety of practice exercises, including reading, writing, listening, speaking, grammar, and vocabulary, organized across 36 difficulty levels. Additionally, students received a learning analytics report as part of an e-portfolio, designed to facilitate self-reflection on their performance and help them identify areas for future improvement.

3. Method

Bennani et al. (2022) noted that a literature review is necessary for determining the approaches and future challenges of the subject; examining academic sources; giving an overview of existing knowledge; and selecting, analyzing, and evaluating publications relevant to the research subject. A literature review is an excellent way to summarize previous studies because it involves the collection of research results related to a particular subject, discovering gaps, and classifying them to determine the researcher's priorities for future research. This method can compare and determine the strength of the most valuable gamification elements in online learning.

The current study used a qualitative approach to collect data and a systematic literature review as its research methodology. It was based on a content analysis of 27 articles published from 2020 to 2024 obtained through a Google Scholar search. The primary keyword was "gamification element." The studies' titles, abstracts, and conclusions were reviewed to confirm whether the papers related to the gamified learning elements. Articles were eliminated using the following criteria:

- Studies related to gamified elements but not focused on the education field
- Studies not offered in English
- Studies not available in full text (no direct access)
- Preview-only content
- Paid articles

3.1. Google Scholar

The Google Scholar search engine includes academic journals from journal websites, libraries, Science Direct Web, and Research Gate. It was chosen because it is one of the most popular indexing websites and has many viewable PDF files, which enables the discovery of a broad range of studies. The search for "elements used in gamified online learning" shows that from 2020-2024, there were about

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17,200 articles. The first five pages of the search results for articles containing "elements used in gamified online learning" were reviewed because they were related to the subject.

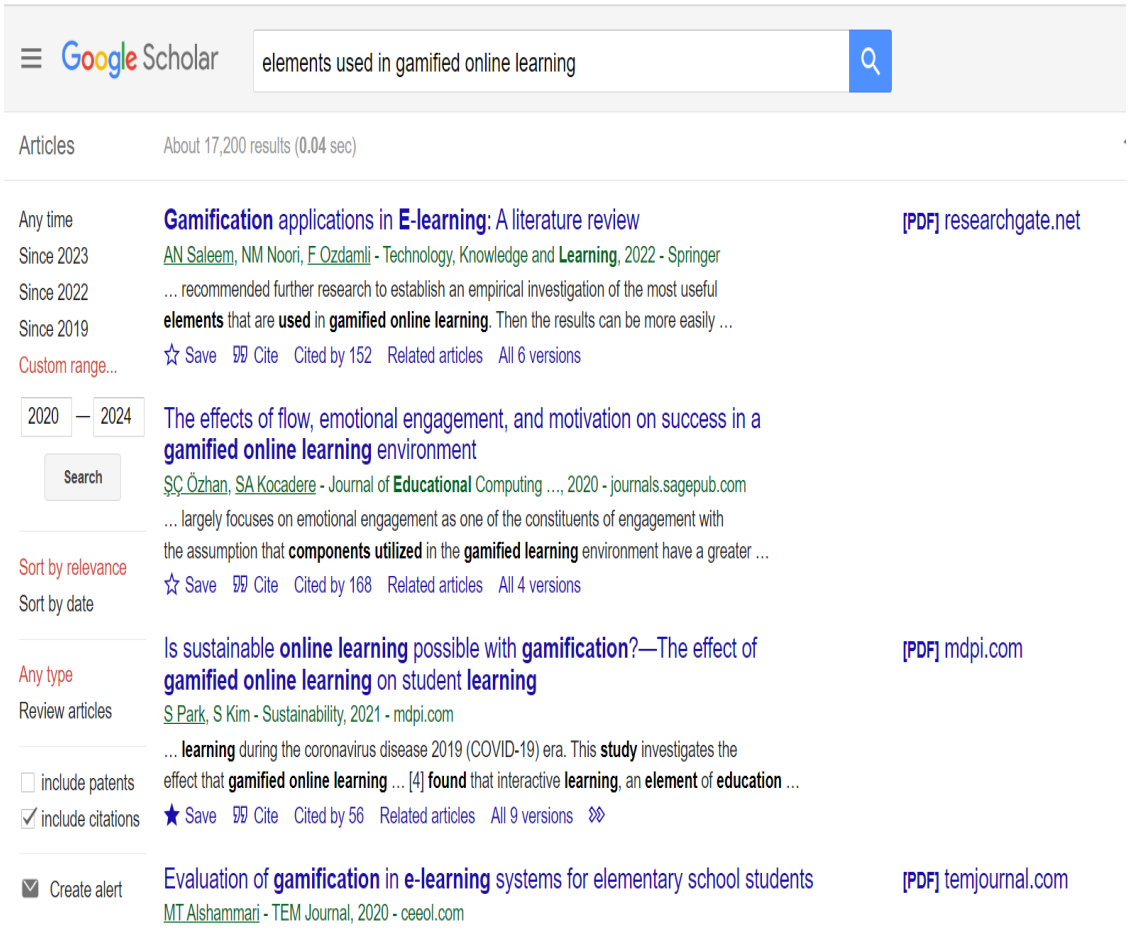

Figure 1.
Google scholar search results.

3.2. Data Collection and Analysis

3.2.1. Review Process

The review process is shown in Figure 2, and Figure 3 shows the manual filtering process after the review process.

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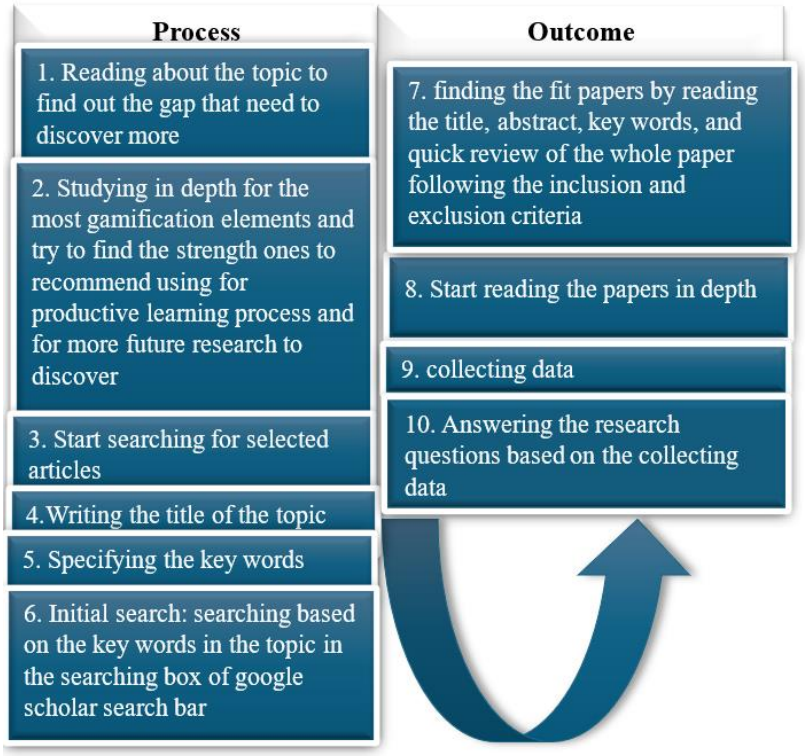

Figure 2.
Review process.

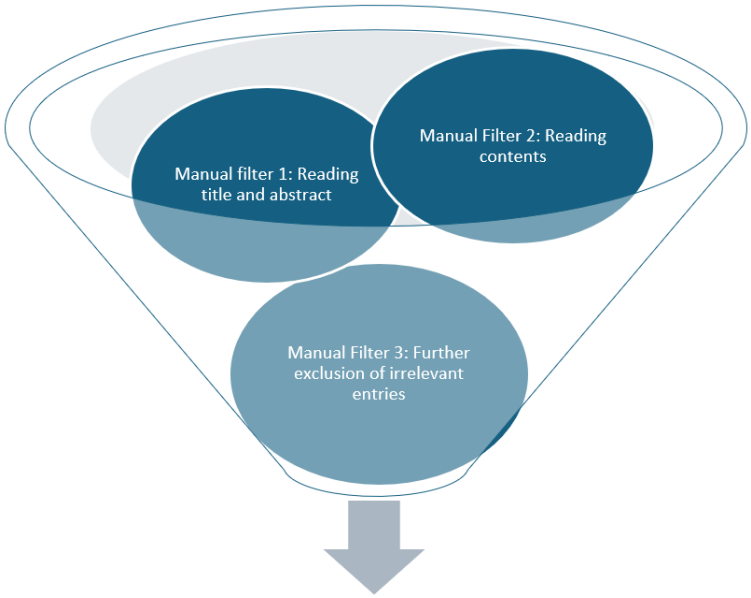

Figure 3.
Manual filtering process.

Table 1 for a summary of the 27 articles chosen for further review are presented in "Appendix".

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4. Findings

This review uses a qualitative approach to collect data by examining studies and synthesizing the literature on gamification elements in online learning to answer the following research questions:

- RQ1: What are the most valuable differences between other elements in gamified online learning?
- RQ2: What are the most valuable elements' similarities with other elements in gamified online learning?
- RQ3: How are the most valuable elements and other elements similar?
- RQ4: How are the most valuable elements and other elements different?
- RQ5: What are the other most valuable elements of the system concepts?
- RQ6: What advantages do the most valuable components possess in the context of gamified online learning?

4.1. What Are the Most Valuable Differences Between Other Elements in Gamified Online Learning? (RQ1)

Pakinee and Puritat (2021) illustrated that every game has game elements and features designed to keep students engaged with the system. Some game designs have more elements than others. The basic principle of successful design is that the design must be deliberate. We conducted a feasibility study using gamification in learning to explore motivation, significant choices, structures, progress maps, and potential conflicts. It is imperative to provide two critical aspects in gamified system design: a) system requirements and b) learning outcomes.

For example, Palaniappan and Noor (2022) used Moodle version 3.1, which included all lecture materials for learners to access and complete. Formative assessments (quizzes and tests) were performed using gamification elements in this study. Learners had to complete the learning management system (LMS) course to earn their respective badges, which are visible in the learners' user profiles in the course section. The leaderboard ranking was analyzed by extracting quiz scores from the LMS. Ranking placement was based on the highest scores and the earliest submission criteria.

Gachkova et al. (2020) used a plug-in for specific game elements, which offers different options than Moodle for the leaderboard and avatar. In the plug-in, users can create a new course or be added to the existing non-magnified e-course. Also, the software allows users to choose an avatar (image), a title (Mr., Mrs.), a particular name, and a brief description. The screen and figure will not only show the current leaderboard learner ranking with achieved level and obtained points, but also allow users to see their place in the leaderboard learner ranking (e.g. Bugs Bunny is in third position), the current level of the course for the learner, earned points for all learners, their current game progress, and the action logs for which the learner has earned the points.

Razali et al. (2020) found that all gamification mechanics, including points, rewards, difficulty levels, and avatars, significantly relate to students' intrinsic and extrinsic motivation. Notably, the predictors related to these points demonstrated that their presence could enhance students' intrinsic motivation, particularly in teaching and learning, through the Quizizz application. This relationship underscores the importance of aligning educational gamification development with mechanics, dynamics, and motivational aspects to ensure effectiveness. These findings serve as a valuable foundation for making informed decisions about incorporating game elements into game design to boost learners' motivation. Aligning education gamification development with mechanics, dynamics, and motivational aspects can assist educators in creatively integrating gamification into their teaching methods to cater to students' motivational behaviors. This focus on students' needs emphasizes the essential role of educational gamification in fostering students' motivation for learning.

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4.2. What Are the Most Valuable Elements' Similarities with Other Elements in Gamified Online Learning? (RQ2)

The most suitable and feasible approach is a gamified learning environment infused with various game elements such as points, scores, ranks, and leaderboards. Pakinee and Puritat (2021) suggested avatars, profile challenges, points, levels, progress, and leaderboards as options, while Palaniappan and Noor (2022) suggested points, leaderboard ranks, and Python programmer badges.

Gachkova et al. (2020) implemented plug-ins for gamification and a model platform with diverse learning materials and exercises that can be used in the gamification process to realize different gamified elements. For instance,

> Story History-Label, Page, File; Game Rules-Label, Page, File; Challenges-Page, File, Folder, URL, Book, Lesson, Assessment, Choice, Quiz, Glossary, Workshop, Wiki, Database, Forum, Chat, External tool survey; and Hidden Treasure Badge, File, Folder URL, Book, Lesson, Glossary Form, External tool; Reward-Page, File, Folder, URL, Book, Lesson, Glossary, Forum, External Tool; Combo-Label, Page, File, Folder, Glossary, Database, Book, Lesson, Chat, External Tool, Badges-Badges; and **S**ocializing-Form, Chat. Only an avatar and a leaderboard are missing and cannot be realized from the existing model elements. Two plug-ins are designed and developed to cover these missing game elements. (Gachkova et al., 2020, p. 4–5)

Acosta-Medina et al. (2020) concluded that the most studied elements of gamification are components (n=73), points (n=62), leaderboards (n=53), and badges (n=51). Behl et al.'s (2022) analysis showed that the beneficial elements that can be supported in the gamification application are avatars, feedback, ratings, points, levels, competition encouragement, challenge elements, awarding and badges, assignments in groups, use of time limits, search rankings in the virtual world, and reputation through using the Kahoot application as a gamification platform. The elements include using names, giving feedback points, ranking through the podium, encouraging competitions, and using time limits for student achievement. Manzano-León et al. (2021) highlighted that the most valuable and frequently utilized gamification elements—points, medals, and rankings—are aligned with the popular points, badges, and leaderboards (PBL) triad. Furthermore, the incorporation of narrative elements enhances immersion and engagement. The authors noted that points, badges, rankings, and rewards play a leading role in educational gamification. Consequently, incorporating narratives and challenges into educational gamification design has gained prominence.

Saleem et al.'s (2022) literature review highlighted the most valuable gamified elements used in 15 studies. Valuable game elements included badges, points, progressions, memes, certificates, leaderboards, competition, levels, narrative, challenge, rewards, constraints, teams, win state, scores, trophies, experience, rewards, reaction, ranking, feedback, goals, unlocking content, and avatars.

4.3. How Are the Most Valuable Elements and Other Elements Similar? (RQ3)

Before addressing RQ3, RQ4, and RQ5, it is crucial to emphasize the findings of Khaldi et al. (2023), which noted the lack of comprehensive information on how instructors and designers incorporate diverse game elements. Among the reviewed papers, the authors listed the game elements used to gamify their learning systems while pointing out that no study provided a rationale for choosing or integrating specific game elements into gamified learning systems. This deficiency was also observed in the present review. As Pakinee and Puritat (2021) observed, this might be because every game element cannot be adjusted to every context, and each element requires time and effort to be implemented.

Gündüz et al.'s (2020) study on the effectiveness of gamification in flipped learning showed a statistically significant difference in that the experimental group spent twice as much time on the gamified website as the control group. Their results showed that the experimental group wrote more than ten times the number of blogs to earn points, significantly increasing these students' total scores. Students in the experimental group reported being more motivated to enter the leaderboard.

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According to our review, a consensus has emerged across most studies regarding the most valuable and commonly employed gamification elements, including points, badges, levels, challenges, leaderboards, and rewards. This alignment is notable despite the variations in each gamified platform. Commonalities are rooted in outcomes, which vary according to the design system and specific requirements. For example, points and levels have been found to boost users' motivation. In contrast, leaderboards play a role in sustaining users' engagement with the learning process and allowing them to celebrate their achievements.

Toimah et al. (2021) highlighted each game's simple and straightforward similarity–gamification pair. Similarly, Saleem et al. (2022) illustrated some similarities in gamification elements:

- Elements give learners essential motivation.
- Elements increase students' dedication to educational activities.
- Elements may increase psychological requirements.
- Elements encourage learners to achieve their social self-determination and competitiveness needs.
- Elements enhance students' intrinsic and extrinsic motivation.
- Elements boost inspiration and teaching experiences, interaction, and efficiency among students.
- Elements, especially the leaderboard and badge, lead to students' engagement in learning.

4.4. How Are the Most Valuable Elements and Other Elements Different? (RQ4)

Each game element positively affects the big five personality traits: extraversion, neuroticism, conscientiousness, agreeableness, and imagination (Pakinee & Puritat, 2021). The authors mapped the positive effects of game elements for each personality. Their findings show that extraversion positively affects points, levels, and leaderboards, but neuroticism has no effect. Conscientiousness has a positive effect on levels and progress. Agreeableness has a positive effect on challenge elements, and imagination/openness has a positive effect on avatars.

Bennani et al.'s (2020) study mentioned that one size of gamification is not suitable for all learners, which means that students do not interact with gamification elements or a gamification environment in the same way. That leads to personalized gamification based on each student's learning preferences and background, which affects learner management, motivation, and learning results. The study highlighted that a learner in adapted gamification has different changing aspects like personalities, needs, values, and motivations. Xiao and Hew's (2023) findings showed that tangible rewards are better than intangible rewards in gamified learning. Therefore, instructors should link tangible rewards to a performance standard and set a challenging redemption goal.

According to Khaitova (2021), gamification elements are "a set of tools that create a feeling of the games" (p. 214). Gamification elements include points, levels, badges, ratings, avatars, awards, and missions. However, they are not limited to that: it is how the elements are organized and structured and the game's goals by game designers who must have practical skills. Saleem et al.'s (2022) review found other gamification elements used in e-learning:

- More enjoyable gaming experiences involve a modern design for each game. All students are more engaged in learning, and it stimulates students to be more effective in using badges to achieve a leading location in the boarding.
- Leaderboards, levels, and badges have an affirmative impact on the involvement of learners.
- The gamified elements can be a beneficial motivator if employed as a reliable communication technique.
- Bonuses challenge pupils to encourage global encouragement effectively.
- The gamification principle gives students significant outward motivation but not internal motivation.

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Saleem et al.'s (2022) findings also showed different implementations of the most used elements in learning:

- Points are for the award and pinch users, managing specific conducts, and increasing the number of users who complete exercises. If aspects promote competition, they should not be viewed as outcomes; on the other hand, if the goal is to give feedback to a user, each achievement should not be demonstrated to other people.
- Badge is the visual representation of the individual and the most frequent game component of gamification strategies. It is linked to intrinsic motivation in education; it has been used as an accomplishment identifier and cultural symbol to provide social effectiveness in activities. It has five codes: confidence booster, fun, self-estimate, feedback, and systematic and continuous.
- The leaderboard shows the students' rankings and scores and awards the best students with prizes. It creates competition among students and is a positive security move in a gamified teaching setting. The leaderboard encourages social contrast among students but may also have the opposite effect on them. The issues associated with the leaderboard are four symbols: teams, competition, participants, and reputation.
- The level shows users performed an aim. It is a threshold stage to level up users according to their sharing.
- Rewards are used to replicate the activity; the principle of rewards is points systems or related ideas. It increases students' motivation. It encourages students to stay in the current or more advanced condition.
- Feedback encourages specific activities; it helps students to offer insight into their objectives and follow their success.
- Challenges reflect tasks for users, offer awards, and provide users with a way to show their success. For example, symbols are challenging team skills, feedback, reinforcement, self-assessment, collective intelligence, timing, challenge-type repetitiveness, engagement, emotion arousal, distraction, competitive collaboration, and frequency.

Özhan et al. (2020) illustrated the structure of gamification applied to "science level up" as follows: apply scientific knowledge to various missions to select the content to learn and earn, then reward users to a higher level to obtain a science quotient (SQ) ranked on the leaderboard. Alshammari (2020) noted that any effect in the experiment found could be related to the game elements in the system—points, time pressure, levels, badges, rewards, feedback, and leaderboards—and not to specific ones, whereas other studies found conflicting results on the learning experience through incorporating one to three elements. Based on Alshmmari's finding, different game elements could motivate students to learn, thus enhancing their learning outcomes.

Mustafa and Karimi (2021) found that only certain combinations of game elements were ineffective. While some studies have introduced two game elements, others have incorporated three, four, or even seven. According to their findings, no consistent criterion guided the combination of these game elements, suggesting a random selection process. Their review also indicated that the success of gamification extends beyond merely linking game components to a well-established learning framework. Additionally, they highlighted the lack of a comprehensive understanding of the individual and combined impacts of specific designs game elements. Consequently, they emphasized the necessity for further research to comprehend how effectively game elements influence users' online learning experiences and engagement and how best to implement these elements.

Mustafa and Karimi's (2021) literature review also uncovered the implementation of game features (e.g., leaderboards, badges, points, and progress on online platforms) to enhance users' experiences. Although gamification can significantly enhance the learning process results, multiple studies have shown that it is not guaranteed. Similarly, integrating several game elements may not necessarily lead to improved academic performance. Consequently, there is a pressing need for an innovative approach

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that effectively utilizes game elements to enhance the online learners' user experience. Their study identified significant correlations between gamification, student motivation, and user engagement.

Moreover, their analysis revealed that points, leaderboards, levels, badges, and progress bars were the most frequently introduced elements, often accompanied by challenges, feedback, and rewards. Therefore, they suggested that gamification has the potential to inspire learning. Although these results suggest that gamification can enhance learning experiences, the unequivocal beneficial impact of gamification on learning outcomes remains uncertain and requires further investigation.

4.5. What Are the Other Most Valuable Elements of the System Concepts? (RQ5)

Before discussing these findings, it is crucial to underscore the discoveries made in Khaldi et al.'s (2023) literature review. Their research highlighted that when it comes to the utilization of gamification theory, a considerable proportion of applied gamification research is not grounded in theory and does not incorporate gamification frameworks in the development of gamified learning systems. While some experimental studies have tried to integrate psychological and educational theories from the existing literature into gamification approaches, the resulting systems remain ambiguous, lacking a clear rationale for selecting specific game elements over others.

Mustafa and Karimi's (2021) literature review of current trends found that game elements are classified into dynamics, mechanics, and components. Dynamics include the components of the game system that need consideration and management. Mechanics include the essential processes to drive action for players to engage. Components include specific instantiations of mechanics and dynamics.

Gachkova et al. (2020) implemented plug-ins for an existing gamified system. Their findings showed that the game elements in the system did not overburden the learning process but instead helped students effectively achieve their educational goals. Students (74%) agreed that gamification training motivates them, and getting points for each activity encourages them to be more active in learning. Students (79%) agreed that the leaderboard element encourages them to learn faster and get better grades, and 58% agreed that the Avatar element encourages them to be more active during training. Approximately 80% of students approved of the proposal, and 74%–95% agreed that the gamification design made the course more accessible than a standard-designed course. Some students reported difficulties navigating the gamification course (26%), while others reported having no problems (37%). Most students reported using more interactive learning resources in the gamification course (73%) than in the standard course, and 5% used more interactive learning resources in the gamification course than in the standard course. A few also stated that the gamification course encouraged communication and collaboration with other students (11%).

Gachkova et al.'s (2020) findings showed that all students agreed that game elements on the platform were presented clearly and that they fully understood what was expected from them. Some students agreed that this training method met their educational needs (33%), whereas others were uncertain whether the gamification course developed their learning skills (21%). Overall, students were satisfied with the functionality of the plug-ins. The students also recommended improving the functionality of the developed plug-ins, such as adding hints and badges, removing the fusion of colors in the level chart (if related to the progress bar), merging the progress bar and level circle functionalities, and improving the point accumulation algorithm.

Bennani et al.'s (2022) literature review summarized essential points regarding adapting gamification elements:

- The associations between gamification mechanisms, dynamics, and user characteristics are the matters and challenges of the adaptive gamification approach since no model gamification system combines game elements.
- Approving gamification to improve the commitment to track the effects of different gamification elements on different users and regulate the gamification mechanisms fitting to the features observed is recommended.

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- Sometimes, game elements not personalized to learners' needs fail to inspire and demotivate them. Consequently, it is crucial to tailor game elements according to individual learners' needs. Thus, Bennani et al. proposed adapting relevant game elements for learners based on their characteristics and engagement learning experiences.
- The gamification elements should be modified rather than only adjusting the game mechanics and dynamic values according to user profiles to achieve user interaction, enjoyment, and efficiency when using the established application.
- Gamification focuses on the educational domain and offers game elements tailored to the user and the environment.
- The effectiveness of gamification applications depends on the context of implementing the gamification concept.
- The constraints of the conventional "one-size-fits-all" method to gamification principles stem from its failure to account for users' needs, objectives, and values. This approach cannot address users' personality traits or the diverse motivations that influence diverse user types.
- Gaming designs need to be user-centered and support multiple users by considering various aspects such as personalities, needs, values, and motivations.
- Personalized gamification can clarify the elements of adaptive gamification, reduce challenges, and enhance the creation of adaptive gamification design patterns.
- The approach determines the principal elements and challenges to designing adaptive gamification applications.
- It is meaningful to capture data from an individual's interaction with an application (i.e., real-time data collection) to investigate the relationship between individuals' characteristics and their preferences for game features while considering the preferences of individuals in nature. It could change over time and affect an application's long-term effectiveness.

Toimah et al. (2021) pointed out that a game is a system. Players are bound by an artificial conflict defined by specific rules that produce quantifiable outcomes. Thus, the game is a system characterized by laws that contrast with the game. Games lead to free exploratory activities. Therefore, gamification connects to games' rule-based and goal-adjusted nature, leading to game buildings hidden in natural environments. Gamification distinguishes the game from serious games developed for a specific purpose and not for entertainment.

Bernik (2021) created a conceptual gamified eRIOOS model based on the playful elements of the Octalysis system and the guidelines in the literature. Bernik noted that when a system is designed effectively, it can foster a sense of comfort in the student, potentially leading to a flow state with an optimal learning process. The ultimate objective is to attain a state of flow in which the student learns at an accelerated pace while simultaneously diminishing feelings of fatigue and stress that can occur in a uniformly structured e-course. Bernik showed a notable example of the computer game elements included in the eRIOOS model and how elements are connected and organized within the intended platform for learning. For example, the system's hidden elements continued activities and external links, including a knowledge test quiz, part of the story mission, and multimedia. Another element, "Leveling up within e-course," contains level, badge, and XP points.

Furthermore, Bernik (2021) discussed how the conceptual eRIOOS model facilitates student comprehension by providing a more insightful graphical user interface, reaching deeper meaning through stories and practical examples, solving problems associated with teaching units and problems connected to the accompanying bonus content, facilitating interactions with other system users (teachers and students), being transparent about the course obligations and other course participants' achievements, revealing concealed components within the system, engaging in competition with other system users, and presenting a structured order through features (e.g., top list and system levels). Providing the freedom to select from various educational materials, offering abundant visual or auditory

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guidance on the learning process, and fostering a sense of comfort, enjoyment, and autonomy over the learning journey all contribute to achieving a state of flow, which, in turn, facilitates rapid learning.

Manzano-León et al.'s (2021) systematic literature review of gamification in education noted that the design game system falls behind PBL (points, badges, leaderboards). The study of the MDE system (mechanics, dynamics, aesthetics) by Hunicke et al. (2004) is a system methodology used in the video game design process. The system establishes the relationship between rules-mechanics, game-dynamics system, and fun-aesthetics, which helps to divide the gamification elements into the following, quoted from Manzano- León et al. (2021):

- Mechanics: actions and control mechanisms offered to players within the context of a game. Examples include drawing cards, gambling, trading, attacks, competition, and cooperation.
- Dynamics: behaviors to be performed while mechanics are being executed. Examples include socializing, bluffing, reflection, status, and attention.
- Aesthetics: desirable emotional responses players evoke when interacting with a game system. It is divided into sensation, fantasy, narrative, challenge, companionship, discovery, expression, and entertainment. (p. 2)

Alsubhi et al. (2020) analyzed several game design elements in the context of LMS tools. In the frameworks examined for gamified e-learning platform activities, there was variability in the number of game elements utilized. Some frameworks employed only a single game element, whereas others incorporated nine or more. The diversity in the number of game elements employed reflects the flexibility and adaptability of gamification strategies in different contexts and applications. Using the Moodle tool, they identified various elements associated with improved motivation and performance, including achievements, points, levels, quests, teams, content unlocking, progress bars, leaderboards, badges, boss fights, challenges, competition, cooperation, feedback, rewards, win states, constraints, emotions, narratives, progression, and relationships. Alsubhi et al. found that some elements (e.g., points, badges, avatars, themes, music, and leaderboards) are linked to enhanced engagement outcomes when tools such as Socrative, Quizizz, and iSpring are used. However, the Moodle tool enhanced engagement using badges only. This study highlighted the diverse game elements that can be effectively integrated into various educational platforms to improve student motivation, performance, and engagement.

According to Alsubhi et al. (2020), researchers have encountered variations in the terminology of game elements from various sources or frameworks. Consequently, they decided to base their comparisons on the descriptions of these elements rather than on their titles. This approach ensures consistency and accuracy during the comparison process. For example, if some sources referred to a particular game element as a "progress bar," while others called it "progression" but described them similarly, the researchers chose the terminology that appeared most frequently. In this case, they selected "progress bar" because it was more commonly used to represent the same concept. The researchers also encountered situations where different frameworks used generic terms (e.g., "voting") while others had more specific elements (e.g., "likes," "dislikes," and "shares"). To simplify the comparison and avoid a lengthy list of individual social media feature elements, researchers used the more generic term "voting" to encompass these concepts. Additionally, some researchers have aimed to standardize the terminology and descriptions of game elements to facilitate a more consistent and meaningful comparison between various sources or frameworks.

Alsubhi et al. (2020) designed a conceptual engagement framework for gamifying e-learning platform activities. The author listed points, leaderboards, dashboards, and progress bars incorporated with e-learning activities. Levels-content unlocking was incorporated with course learning material whereas badges, timer, and team were incorporated with course assessment. Avatar was incorporated under course discussion and all under e-learning activities and engagement, whether behavioral, emotional, or cognitive. The primary goal of this framework is to guide e-learning system developers and enable them to make informed decisions regarding the inclusion of specific game elements in their learning modules or activities. By incorporating these elements, the developers seek to enhance user

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motivation and engagement within the e-learning environment. This approach creates a more effective and engaging student learning experience, improving learning outcomes.

Li et al.'s (2022) case study on using gamification to facilitate student self-regulation in e-learning found that all active users consistently cited gaming elements as their primary motivation for using OA systems. One student shared that he aims to progress to the next level quickly, so he consistently uses OA to earn more stars. Users actively participating in the system also emphasized that the leaderboard improved their performance in subsequent exercises. One active user highlighted the low-pressure environment within the OA, which permits users to fail multiple times and make repeated attempts; this is a crucial aspect of gaming as it provides room for failure without adverse consequences. Three students preferred the gamified system for its various social benefits, including friendly competition with classmates and siblings, meeting parental expectations, and receiving rewards. They reported developing a self-regulated learning process while using OA, stimulating learning motivation and agency. Students identified progress through levels and earning badges based on precise and personalized learning goals. Three participants wanted to accumulate more points and achieve higher rankings on the leaderboard, which drove them to complete more OA exercises.

Furthermore, students have acknowledged that the visualization features of gamified e-learning systems, such as the dashboard, progress bar, and hints, aid them in monitoring their learning progress. One student stated that she appreciates checking the dashboard to assess her distribution of English competence. Students developed management strategies to enhance their self-monitoring, including control, time management, scaffolding, and regulation. Immediate feedback, hints, and guidance were also recognized as valuable tools for reducing frustration and anxiety. Finally, students engaged in reflective practices concerning their learning performance in OA. One student shared how she identified her English learning weaknesses through the performance radar map and adjusted her learning time and energy to strengthen these areas. Some students demonstrated a more explicit articulation of their thought processes regarding effective English learning using the OA platform (Li et al., (2022).

Eliyas and Ranjana (2022) noted that gamification is a challenging task that involves a combination of mechanics and story design. Learners' needs must be carefully considered in learning materials with strict time constraints (e.g., video games). The game comprised visual presentations and video tutorials incorporating quizzes, problem-solving exercises, and various activities. Recognition of achievements and overcoming challenges can be achieved through badges, leaderboards, or vouchers as project and goal evaluation metrics. In developing a gamified learning experience, gaming elements are integrated into algorithm visualization techniques. The evolution of these techniques can be summarized as follows: static in the early 1980s, animated/dynamic from the 1980s to the 1990s, interactive from the 1990s to the 2010s, and gamefic from the later part of 2010. Learners' ultimate objective is to sort unordered elements without errors successfully. One quantifiable outcome of gamification elements is that learners can make unlimited attempts to complete a level. They can progress to more advanced levels upon completing one level, thereby mastering an algorithm. Learners employ a trial-and-error method to assess and enhance their learning proficiency (Eliyas & Ranjana, 2022).

4.6. What Advantages Do the Most Valuable Components Possess in the Context of Gamified Online Learning? (RQ6)

Pakinee and Puritat (2021) pointed out the strengths of designing activities that motivate students to engage and participate while working in their homes. Another study by Palaniappan and Noor (2022) noted that the strength of designing gaming in learning must be focused on motivation, participation, and engagement to improve learning achievement and play an essential role in cognitive development. Gachkova et al. (2020) claimed that the strength of gamified online learning is the focus on learning, evaluation, reward, and ranking.

In the teaching and learning process, Acosta-Medina et al. (2020) pointed out that gamification must be motivating but not addictive. Gaming includes elements such as leaderboard, challenges, competition, and cooperation, but those elements, if not designed and used correctly, can lead to

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negative results. However, some other gamified elements, such as narrative points, levels, badges, progress bars, and feedback, lead to positive user results. Handayani et al. (2021) noted that one of the strengths can be connecting gamification elements with educational theory. Their study connected rating/points with active learning theory by showing a clear relationship between participants' efforts and performance. Badges are also connected as rewards for activities. The leaderboard is connected to active learning by inspiring students to maintain their performance.

According to Bouchrika et al. (2021), the scores element is considered the most important essential element in gamification, serving as a virtual incentive given in return for conducting a particular test. How to use the scores differs from one platform to another. For example, in this study, their platform used the scores for such activities for users to earn points for posting new questions (5 points) and an answer (2 points). If their answer was selected as best, they earned 15 points; if their questions/answers were voted up, they earned 1 point; and if their questions/answers were voted down, they lost a point. Stars are awarded for users who earn a specific number of points. The leaderboard page lists the top-scoring students with their awards so visitors can view, compare, and recognize their achievements. Bouchrika et al. noted that different studies mentioned leaderboards' tremendous impact on students' motivations and engagement. Furthermore, there are diverse types of leaderboards, such as for every course level, for all courses at the university, and for the top ten students on the university website.

Manzano-León et al. (2021) made a good point that gamification is a process that needs to increase extrinsic and intrinsic motivation and encourage learners to be involved in task activities. Extrinsic and intrinsic motivations are related to self-determination theory. This concept involves three psychological requirements: autonomy, the degree to which an individual's actions stem from their interests; competence, the sense of capability and accomplishment in performing a task to a particular standard; and connection with others, the feeling of capability and accomplishment in executing a task to a specific level. Using the SDL theory, players feel autonomy, control their actions, and believe they can achieve the game's tasks. With that, gamification needs to consider player types. Manzano-León et al. (2021) noted that Marczewski (2015) formulated the theory of the RAMP model; the fundamental triggers for intrinsic motivation are fourfold: connectedness, independence, expertise, and purpose.

Khaldi et al.'s (2023) literature review found gamification elements that are most used in higher education:

- The most common elements are PBL elements—points, badges, leaderboards, levels, and feedback.
- It involves the increasing use of game design with deeper game elements. Examples include difficulties, options, minimal risk, setbacks, role-playing, or storytelling. Challenge is the most popular.

According to Alsubhi et al. (2020), the final game elements identified for developing their conceptual engagement framework were as follows: points, levels, badges, leaderboards, dashboards, progress bars, avatars, teams, content unlocking, and timers. These game elements are typically used in various gamification and educational settings to enhance user engagement and motivation. The authors noted three recommendations provided by users:

- Allowing users the freedom to choose their assessment levels increases their engagement. This recommendation suggests that customization and choice in the learning process can motivate.
- Supporting diverse materials, such as videos and animations, on e-learning platforms can prevent boredom. Providing diverse and engaging content can help maintain students' interest.
- Encouraging users to use Wiki questions to avoid boredom and allowing users to create questions among themselves to increase their competition and collaboration are encouraged.
  These recommendations focus on enhancing the e-learning experience by offering flexibility, engaging content, and interactive features to improve students' motivation and learning outcomes.

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5. Discussions and Conclusion

This review aligns with the findings of Khaldi et al. (2023), affirming that experimental studies often lack clarity in adapting psychological and educational theories to gamification, resulting in unclear systems with no clear rationale for choosing specific game elements. Thus, the identified gamification approaches may not significantly assist designers and practitioners in effectively gamifying their learning systems. This review aims to guide practitioners (e.g., teachers and designers) in choosing appropriate elements that align with their psychological and educational theories and objectives. Moreover, it underscores the importance of future studies assessing the impact of individual game design elements and the resulting behavioral changes. It is recommended that future studies emphasize the pedagogical aspects of learning systems and incorporate storytelling with the most valuable elements highlighted in this review. Comparative studies of gamification elements and psychological theories considering diverse environments and cultural aspects are warranted. Subsequent research should concentrate on designing game models and approaches within game design systems.

Manzano-León et al. (2021) highlighted the most valuable and frequently utilized gamification elements: points, medals, and rankings. Incorporating narrative elements enhances student immersion and engagement, which, coupled with challenges, is gaining prominence in the design of educational gamification.

This literature review found that the most significant differences between other elements are each game's elements and system feature with mechanics, dynamics, and motivational aspects. This literature review found that the most valuable similarity is a gamified learning environment. Moreover, every game element cannot be adjusted to every context, and each element requires time and effort to be implemented. Despite this, elements have similarities in outcomes. In addition, each game's elements are different in their effects on five personalities: extraversion, neuroticism, conscientiousness, agreeableness, and imagination. Each game element is different in its implementation and the gamification structure applied. This literature review found that the most valuable elements of the system concepts are dynamics, mechanics, and components. The advantages of the components in gamified online learning are engagement, motivation, and participation; focusing on learning, evaluation, reward, and ranking; and connecting gamification elements with educational theory. This literature review found that the valuable game elements are badges, points, progressions, memes, certificates, leaderboards, competitions, levels, narratives, challenges, rewards, constraints, teams, win state, scores, trophies, experience, rewards, reactions, rankings, feedback, goals, unlocking content, and avatars.

Recommendations for future studies include implementing the most effective gamified elements in diverse locations and systems over an extended period to observe and understand the depths of similarities and differences comprehensively. Randomized controlled trials or experimental studies with more extensive and diverse sample populations are recommended to enhance the research reliability. Further rigorous investigations are warranted to evaluate the potential adverse effects of specific game elements on online learners' user experience and engagement. Such approaches will contribute to better considering the specific game elements that should be excluded in the design of gamified online learning platforms. Search engine databases, such as PubMed, Science Direct, Scopus, and JSTOR, are recommended to broaden the scope of inquiry.

Storytelling and its challenges are fundamental to gamification. Finally, game designers and teachers should include a storytelling game using the most common and practical elements.

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Table 2.
The most common game elements used in online learning.

Points 
Badges 
Leaderboard 
Levels 
Rewards 
Challenges 
Feedback 

Note: Information obtained from articles reviewed in this systematic review paper.

This study compared the most valuable gamification elements used in online learning and explored the similarities and differences between various studies. Additionally, it sheds light on how these variances and commonalities can be elucidated by emphasizing the robustness of the most valuable elements recognized in the game system. These findings contribute to the expanding body of literature on gamified online learning.

This study employed a systematic literature review as its research methodology and analyzed the contents of 27 articles published from 2020 to 2024 obtained through a Google Scholar search focusing on gamification elements in online learning. This study assessed published studies on gamification elements in online learning, explored their similarities and differences, and elucidated their advantages. This review identified the most valuable elements in the system concepts identified in the literature, and points, badges, leaderboards, levels, feedback, and challenges emerged as the most frequently employed game elements in online learning.

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Appendix

Table 1.
Summary of systematic reviews on elements used in gamified online learning in an educational context.

Authors	Article search 2020-2024	The focus of the study
Acosta-Medina et al. (2020)	Page 3	Gamification, learning, and teaching
Acosta-Medina et al. (2021)	Page 2	Gamification, preference for use, e-learning, virtual learning environments, structural equation modeling
Alshammari (2020)	Page 4	Gamification, e-learning-evaluation-motivation-and learning outcome
Alsubhi et al. (2020)	Page 1	E-learning activities, gamification, game elements, engagement
Behl et al. (2022)	Page 3	Evaluation of continued use of Kahoot as a gamification-based learning platform
Bennani et al. (2020)	Page 3	Knowledge representation, ontology, e-learning, adaptive gamification, personalized gamification
Bennani et al. (2022)	Page 4	Adaptive gamification in e-learning, artificial intelligence, e-learning, gamification, and machine learning
Bernik (2021)	Page 4	Creating a conceptual gamification model to standardize the elements of computer games that can be used in educational e-courses at higher education institutions
Bouchrika et al. (2021)	Page 4	Exploring the impact of gamification on student engagement and involvement with e-learning systems
Eliyas & Ranjana (2022)	Page 5	E-learning, gamification, motivation, engagement, advantages of gamification
Gachkova et al. (2020)	Page 2	Gamification of courses in the e-learning environment; structural gamification
Gündüz & Akkoyunlu (2020)	Page 4	Effectiveness of gamification in flipped learning
Handayani et al. (2021)	Page 4	Learning management system, gamification, active learning, rating, points, badges, leaderboard
Khaitova (2021)	Page 5	The history of gamification in education, its current state, and the practice of introducing game elements into education in different countries
Khaldi et al. (2023)	Page 1	Gamification of e-learning in higher education; e-learning; digital learning environments; tertiary education
Li et al. (2022)	Page 2	Gamification; gamified e-learning; L2 English learning; self-regulated learning
Manzano-León et al. (2021)	Page 5	Distribution of gamification across various periods, educational levels, variables, and the most employed game elements; advantages of integrating

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Authors	Article search 2020-2024	The focus of the study
		gamification into the classroom setting
Mustafa & Karimi (2021)	Page 1	Enhancing gamified online learning user experience; current trends; adherence, affordance, application, education, engagement, game-based elements, gamefic design, gamification, innovation, intervention, literature review motivation, novelty, pedagogy, performance, platform, technology
Özhan et al. (2020)	Page 1	Gamified online learning environment; gamified settings; flow and emotional engagement; game elements; motivation; sustainable learning
Pakinee & Puritat (2021)	Page 2	Designing a gamified e-learning environment for undergraduates; big five personality traits; enterprise resource planning, gamification, significant five factors
Palaniappan & Noor (2022)	Page 2	Gamification strategy to support self-directed learning; non-major computer science learners; online learning environment; programming language
Park & Kim (2021)		Gamified online learning; sustainable online learning
Pesek et al. (2020)	Page 3	Troubadour: a gamified e-learning platform for ear training
Razali et al. (2020)	Page 5	Gamification Elements in Quizizz Applications: Evaluating the impact on Intrinsic and Extrinsic Students Motivation.
Saleem et al. (2022)	Page 1	Gamification applications in e-learning; literature review of gamification elements; advantages and challenges
Toimah et al. (2021)	Page 4	Gamification model framework and its use in e-learning in higher education
Xiao & Hew (2023)	Page 3	Intangible rewards versus tangible rewards in gamified online learning; behavioral engagement; cognitive engagement; student motivation

Note: Information obtained from a Google Scholar keyword search for "elements used in gamified learning."

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