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Using Gamification to Design Learning Management System (LMS): A Systematic Literature Review

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ABSTRACT

This systematic literature review explores the integration of gamification elements in designing Learning Management System (LMS). Even though Learning Management Systems (LMS) are widespread in education, a lot of the systems have major design flaws involving student motivation that may impact adversely on academic outcomes. One potential solution that has been mentioned is the concept of Gamification — which refers to conveying game design elements, such as points scoring and competing with others, through non-game environments like education. The review aggregates findings from 36 studies collected between the years of 2019 to 2024 concerning how elements of gamification in LMS sparks student engagement, motivation and learning results. The study enforces PRISMA guidelines to ensure comprehensive coverage and ensuring individual empirical studies on gamification strategies with their alignment to theories of education. Furthermore, the study reviewed the most common gamification elements and suggested design elements in relation to gamification and its impact on language learning if implemented in the Learning Management System (LMS). The results suggest that points, levels, badges, and leaderboards are commonly used elements in gamifying lessons. The review also found that flexibility, scalability, mobile-readiness, user experience, collaborative aspects, as well as feedback and ethical implications are among top considerations of design elements to consider with respect to gamifying e-learning systems. However, while gamification might improve engagement, whether this will lead to better long-term learning outcomes has yet to be determined.

1. Introduction

Over the last few years, Learning Management Systems (LMS) have become an essential part of modern education systems that provide a digital platform for interaction between students and

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instructors allowing access to course materials along with opportunities in collaborative learning. According to Haddaway *et al.,* [24] LMS platforms have "revolutionized education by offering instructors and students a way to interact in a digital environment." Despite the proliferation of LMS platforms, concern remains around student engagement and motivation leading to poorer learning outcomes. While effective, traditional LMS designs often prioritize administration tasks that are not as able to keep student interest [49]. This is often a source of disengagement for students and can result in lower grades, as well as plummeting retention. To tackle these issues, educators and developers have begun implementing gamification, the application of elements from game design like points, badges, leader boards or quests to improve learning.

In literature, Gamification is considered as “process of incorporating game-like elements in to learning experiences” [33,34]. Evidence from research has shown that the combination of game-based elements into educational settings can potentially increase motivation among students, ignite student participation and even bolster learning outcomes [7]. Taken from games, gamification builds into an educational context that opens pathways for students to gain a stronger sense of accomplishment and competence; two fundamental aspects identified as necessary by major motivational theories like Self-Determination Theory [37].

1.1 Prior Reviews Sub Section Header

This section summarizes reviews of relevant literature reviews on the gamification elements related to the topic of this research. A study done by Anderson *et al.,* [2] reviewed 45 research involving research samples from primary, secondary and tertiary educational institutions across various sample sizes; ranging from small classroom to larger mass lecture found that gamification generally improves student motivation and engagement but also found challenges of maintaining the balance between educational goals and gaming elements. The study further suggested that an alignment between game mechanics and educational objectives should be clear for successful intrinsic motivation increment among students.

Furthermore, Smith *et al.,* [70] reviewed 50 studies and synthesized findings on the design of gamified eLearning systems and able to identify key frameworks such as MDA (Mechanics, Dynamics and Aesthetics) when integrating game elements into study environment [71]. The study pointed out that careful design is crucial in balancing both extrinsic and intrinsic motivation together with personalization and the alignment of game elements to learning outcomes. Similarly, Harper *et al.,* [28] conducted a review which included 30 studies which cover larger and more variety of sample sizes found that a balance of both extrinsic and intrinsic reward is vital for maintaining students’ engagement in a gamified learning system.

Martinez *et al.,* [51] conducted a meta-analysis study, synthesizing studies that utilize quantitative data from experimental and quasi-experimental studies published between 2015 to 2020 that focuses on the impact of gamification on students learning outcomes. The research found moderate positive effects of gamification towards study goals. Albeit managed to find that game elements like points, badges and leaderboards have favourable outcomes on students’ engagement and performances, the researchers of this study suggested a long-term impacts of gamification on learning. On a more recent review, Lee *et al.,* [46] reviewed and analysed 55 studies on the application of game elements in eLearning and summarized that the integration of game elements such as avatars, leaderboards and storytelling significantly enhances learner motivation but also emphasized that excessive competition and focus rewards could give adverse and negative effects on collaborative learning. Thus, the review suggested a combination of individual and group-based game elements for a better outcome.

On the spectrum of game-integrated platform, Patel *et al.,* [57] conducted a systematic literature review focused on identifying specific gamified learning platforms and tools such as Duolingo and Khan Academy and its impact on learners' engagement. The review included 45 studies and found that gamification in online platforms significantly boost engagement, particularly on features like progress tracking and rewards. Nonetheless, the review also suggested that the design of gamification should be tailored individually to suit different learner demographics. Particularly, this research aims to investigate the following objective, utilizing the following research questions.

RO: to examine and identify the elements and approach of gamification, and subsequently to design a prototype of Learning Management System (LMS) based on gamification approach for language learning.

RQ1: What are the core elements of gamification to design a prototype of Learning Management System (LMS) based on gamification approach, drawn from contemporary literature?

RQ2: How to design and approach Learning Management System (LMS) based on gamification approach for language learning, drawn from contemporary literature?

In this regard, one of the ways to help the researcher in addressing the issues are by conducting a systematic literature review (SLR) focusing on investigating recent research works between 2019 and 2024 concerning the design and development of LMS platforms incorporated with gamification elements. More specifically, this review investigates how gamification can be applied to overcome several issues plaguing LMS especially inter-related with student engagement and learning outcomes. In this study, the researcher systematically reviewed literature to understand the design principles and terms of gamified LMS platforms based on research that focused wholly or in part on describing or proposing models for designing or evaluating game-based activities with Learning Management Systems (LMS), essentially: what specialty games are designed by.

The review also adheres to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, to ensure a comprehensive presentation of the literature, with PRISMA application of detailed reporting style.

1.2 Gamification Background

Essentially, gamification is the inclusion of game design elements, mechanics and principles in non-game contexts, and is common in educational environments. Slightly over the past decade, it has grown to be an effective strategy for positive interaction, motivation and improved learning outcomes. Gamification adds game-based features like points, badges, leaderboards, achievements, and challenges, encouraging a spirit of competition, accomplishment, and mastery [15]. Gamification tries to benefit from the inherent alluring nature of games to allow an experience which is engrossing and entertaining that leads to expected attitudes-behaviour even more significantly in digital learning environments [1].

As numerous research suggested, gamification is aimed to clarify how to improve real-life learning situations [78], and in this context, create dynamic interaction between users to maximize the learning content. Online education is often organized around a Learning Management System (LMS), which has since developed mechanisms that incorporate gamification features with the goal of increasing students' engagement, motivation and academic achievement [8]. These LMS incorporate elements of gamification, including, the use of challenges, rewards, levels, leader boards,

points and badges to make the learning experience more appealing and interesting, and expectedly, boost retention and performance of the students [64,65]. The proper use of gamification in LMS makes learners effectively create clear goals, immediate feedback, opportunities for iterative practice, and a just-in-time sense of progression, all of which have been shown as important drivers of motivation and engagement [13].

One of the most important theoretical bases for the gamification literature is Self-Determination Theory (SDT), according to which motivation is affected by the fulfilment of three essential psychological needs: Autonomy, Competence, and Relatedness which was first founded by Ryan *et al.,* [63]. Learners derive autonomy in gamified systems through the ability to make choices and control their learning path, competence through challenges and rewards and relatedness through social interactions and community-building features, as hinted by Caponetto *et al.,* [8]. When these needs are satisfied, it will allow learners to act based on intrinsic motivation which in turn improves engagement and perseverance [63].

According to Hamari *et al.,* [26], gamification should not distract from the learning topics and thus game elements should be incorporated with the learning objectives. Conversely, when overused or poorly designed, gamification features may produce undesired effects, such as superficial engagement or wound extrinsic motivation that harm long-term learning, according to Seaborn *et al.,* [64]. As such, research shows that an even balance between both intrinsic and extrinsic motivators is necessary for a successful gamification experience during an education [33].

Further research on gamification suggested that generic designs for gamification do not perform similarly across the board [6]. And as far as creating an effective gamification experience, one that will drive the right results, tailoring it to your users' preferences, needs, etc., is an absolute must. Additionally, considering the game-based learning implications resulting from gamification, further long-term research studies of the use of gamification in various approaches to education for the development of deeper learning and critical thinking are also required [2]. Thus, the gamification elements implemented in most Learning Management Systems (LMS) should be carefully executed to ensure a balance between entertainment and learning objectives.

2. Methodology

This systematic review focused on the years between 2019 and 2024, while also concentrating on how LMS were designed, as well as how gamification was applied in education rather than as system tools. In addition, collected studies required to have focus on frameworks and strategies of integration of gamification in LMS, presenting empirical results or theoretical models that relate to LMS or with gamification. We further excluded studies that were before 2019, studies that cover subjects not used in the education material, studies that did not provide empirical data or theoretical frameworks. The sources of information for the literature search used for this review are Scopus, Web of Science, Springer, ResearchGate, Google Scholar and IEEE Xplore– all together provide a large set of relevant academic sources in a wide range of scientific disciplines. These databases were chosen to guarantee the incorporation of rigorous, peer-reviewed information relevant to the research subject.

To obtain as many relevant papers as possible, the search strategy was to use a combination of keywords, including "Learning Management System," "LMS," "gamification," "educational gamification," "gamified learning" and "learning frameworks". The search was restricted to peer-reviewed journals, conference proceedings and book chapters published in English. This method of inclusion and exchange was to identify the latest research and consolidate all high-quality and academic sources into the review. The first search yielded 478 papers after duplicates had been

removed. Following the filtration of eligibility criteria, 123 articles entered the stage of full-text review. After more in-depth review, 36 studies were finally included in the synthesis. These studies were eligible because they discussed gamification in LMS application and effectiveness, empirical evidence and presented conclusions about the use of gamification approaches.

2.1 Data Collection Process

Data from the selected studies were obtained using a form designed to extract essential details of study. Which included the study title, authors and year of publication, in addition to the study design and aim. This structured process was chosen to ensure consistency in our data collection process, while also allowing us to synthesize cross-cutting trends and key insights across the included studies. The PRISMA flow diagram as shown in Figure 1 below illustrates the study selection process.

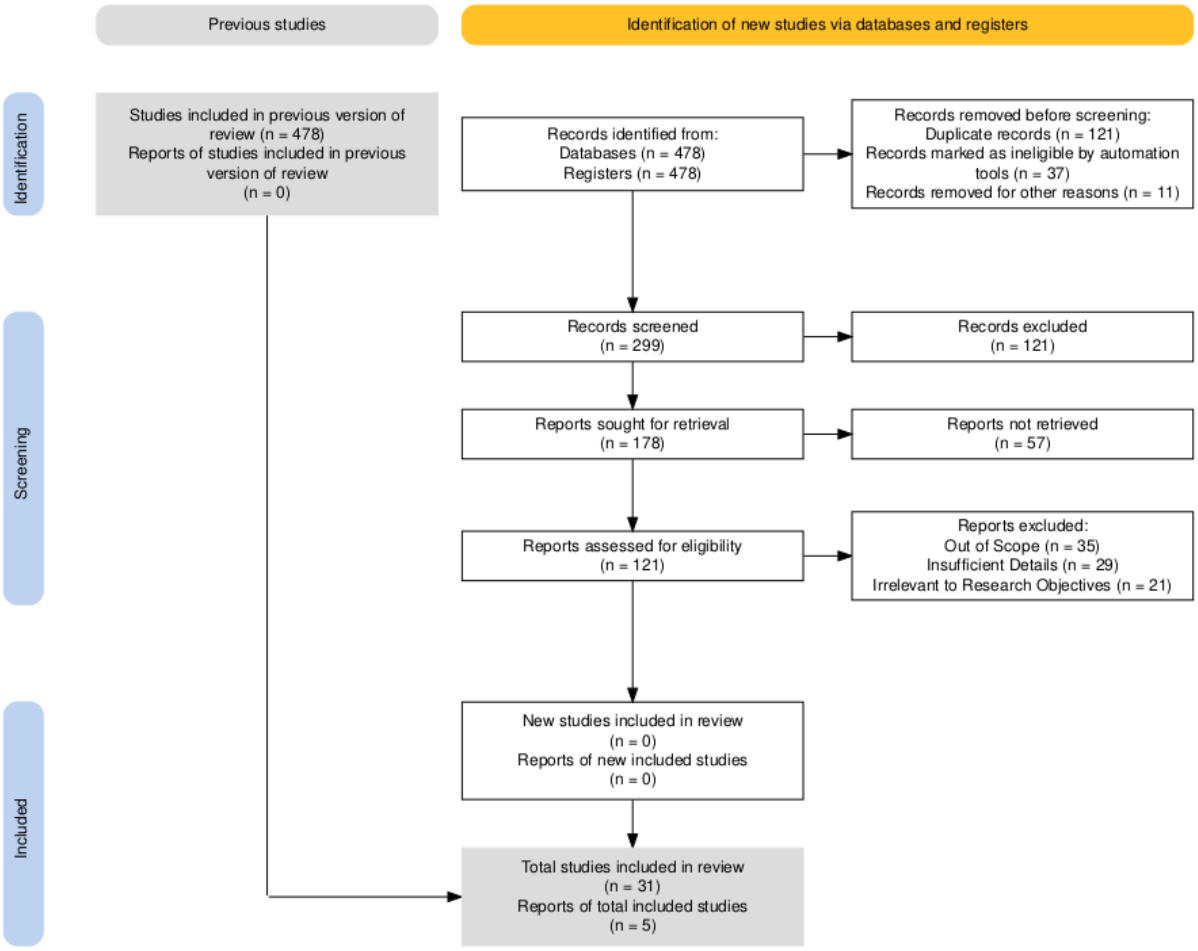

Fig. 1. PRISMA flow diagram

In this section, the researcher showed the main results found from 36 studies selected through PRISMA method related to the use of gamification in design and development of Learning Management Systems (LMS) that influence students' engagement, motivational level and students' experience for learning outcomes within the LMS platforms. The review also discusses issues and constraints embedding gamification in LMSs.

3. Results

Results show a total of 36 studies were included, out of which the majority (75%) was empirical studies, and the remaining research was from theoretical or framework-based publications. Most of these studies were conducted in higher education, though there was a small number that centered on secondary and corporate learning. The studies came from North America, Europe and Asia, with a large representation of US- and UK-based researchers. The findings reveal that there is a field for further investigation on the topic of gamification related to education, although with difficulties involving institutional and technological issues.

3.1 Theoretical Underpinnings

Table 1 summarizes the theoretical underpinning of Key Learning Theory for the Design and Development principles of Learning Management System (LMS). Among the major theories found were Self-Determination Theory (SDT), Constructivist Leaning Theory (CLT), and Second Language Acquisition (SLA) Theories. Each learning theories are incorporated into every instructional system of the LMS platform so the constrained by unfamiliar technologies and its connection to learning theories are diminished. And then the design features in the LMS, such as points (game thinking), quests and peer assisted learning cater to different learner psychological or cognitive needs. The table further illustrates how these features related to students' motivation, engagement and even learning through concepts such as autonomous learning [63] or active knowledge construction. To facilitate the implementation of proven learning theories within LMS platforms, a table is presented to further contextualize and interlink both theoretical principles by promoting better educational learning outcomes with more adaptative, interactive learning experiences.

Learning theories have long helped us design and develop Learning Management Systems (LMS) with the ways in which digital tools can supplement, if not improve learning. It is to structure LMSs in a well and understood psychological and pedagogical principles, hence addressing the variety of learning that people require. In the realm of students engaging with LMS platforms, several theoretical frameworks are used to explain students' behaviour that goes equally when gamification is also a part of the system. The most well-known theories include Self-Determination Theory (SDT), Constructivist Learning Theory, and Second Language Acquisition (SLA) Theories; each has something to offer for the design of LMS.

Self-Determination Theory (SDT) plays a central role in the description of student motivation within gamified environments. Ryan *et al.,* [63] suggested that according to their Self-Determination Theory, autonomy, competence and relatedness are the three essential psychological needs innate within each individual. These needs can be met by LMS designs that employ some aspects of gamification, offering attributes which serve to provide the students with greater control over their learning (autonomy), feedback and challenges to help them become more proficient in the content (competence) and collaboration opportunities as well as interaction with peers.

This supports the motivation within an LMS by incorporating that into a system of points, badges and leaderboards. Students see physical results and thus gain a sense of competence, for instance when they receive points or badges. Leaderboards sometimes competitive, leaderboard can promote relatedness concept if presented as a team or groups achievements. Klock *et al.,* [37] found that "points such as badges, and scores on leaderboard in class were really useful to get people engaged" because they provide structured feedback on how students perform in class.

The Constructivist Learning Theory posits that learners construct their own knowledge, that they are not passive recipients or in a "blank state" but rather build on past experiences and participate

in problem solving [60]. This theory underlines the need to put students in environments that promote active learning when designing an LMS platform. Quests and challenges align well in this approach because they feed very well into other constructivist principles: by performing the quests, learners need to take their theory-based knowledge and apply it within relevant use-cases (students would have encountered while questing) which culminates in directly transfer that theoretical knowledge requiring them understanding of when or why do students deploy certain solutions over others.

One theory which suits well with this principle is the Input Hypothesis theory by Krashen and Stephen [40] that claims intermediate language learners learn new skills from exposure to just comprehensible input a little bit beyond their current proficiency level. Adaptive challenges which get steadily tougher as language skills improve in a gamified LMS can help replace dry rote memorization tasks with meaningful practice. Moreover, Vygotsky's Sociocultural Theory emphasizes the role of social interaction in learning via scaffolding by a more knowledgeable peer or an adult [75]. Group quests or peer feedback systems based on collaborative gamification elements align with this theory by placing student learning in the perspective of interaction with others. In language learning, this can enable peer-assisted learning for transitioning learners to assist their peers in a learner community that advances their academic.

Meanwhile, Behaviorist Theories of Learning suggest that feedback is an essential factor for the development of skill and this process requires immediate reinforcement [69]. In accordance, immediate and targeted feedback after submission on assignments or quizzes will aid learners in self-analysis where they can identify areas to work upon. For example, in a gamified LMS students might get immediate feedback following some exercises and will be able to know where their strengths lie.

Using these learning theories to inform, we need LMS services designed in such a way that they cater not only the knowledge dissemination but also provide better motivations and engagements at the next level. Overall, a good LMS must utilize all these theories as backbone when designing the platform to promote an attractive and purposeful learning ecosystem. As Lopez *et al.,* [49] identified, “the movement in the direction of gamified LMS systems can convert ordinary task-primarily based structures into dynamic learning environments that nurture intrinsic and extrinsic motivation. Educators can have a more comprehensive, supportive learning experience that caters to a variety of learner types and needs by building LMS platforms based on these theories.

Table 1
Theoretical underpinnings of Learning Theory and LMS design features

Learning Theory	Key Concepts	LMS Game Design Features	Relationship to Gamification
Self-Determination Theory (SDT) Ryan *et al.,* (2000) [63]	Autonomy, Competence, Relatedness	Points, Badges, Leaderboards Progress Tracking Customizable Learning Paths	Increases motivation and engagement by fulfilling students' needs for control, achievement, and social connection
Constructivist Learning Theory Piaget (1977) [60]	Active Learning Knowledge Construction	Quests and Challenges Project-Based Learning Real-World Simulations Progress Visualization	Encourages problem-solving and critical thinking by enabling students to build on previous knowledge through interactive tasks
Second Language Acquisition (SLA) Theories Vygotskiĭ *et al.,* [75]	Comprehensible Input Interaction Feedback	Adaptive Difficulty Levels Peer Interaction and Collaborative Tools Instant Feedback on Tasks	Supports language learning by providing appropriate challenge levels (Krashen, 1982) and fostering social learning

Sociocultural Theory Vygotskiĭ *et al.,* [75]	Social Interaction Scaffolding	Peer-assisted Learning Group Quests and Collaboration Tools	Enhances learning by promoting collaboration and peer-supported learning, helping students to engage with complex material through social interaction.
Behaviorist Theories Skinner [69]	Reinforcement Repetition	Quizzes with Immediate Feedback Badges and Rewards	Reinforces correct behavior and learning through immediate feedback, which strengthens skill development

3.2 Gamification Elements and Its Impact to Language Learning

The following Table 2 outlines the summary of gamification elements commonly used in language classes and its relation to students' engagement and learning outcomes. It provides an overview of every major element, as well as the detailed usages in the course (or learning design) and how those game-like features can be used to motivate students towards engaging within a class or other types of learning. The table illustrates how these recommendations are already used in literature and serves as a reminder to educators or LMS developers. The table below provides a summary of the gamification element and impact on it:

Points provide a reward mechanism that acknowledges the completion of tasks or activities. The motivational effects of this gamification feature have been well documented in the literature for rewarding students' efforts with concrete rewards to trigger the student's sense of accomplishment and feeling of competence [37]. Similar works from Hamari *et al.,* [26] also discuss the research on points and the importance of points as an intrinsic game mechanic in gamification that is crucial to define engaging experiences. This summarizes previous generalization that translate points system to serve as feedback and support competitive atmosphere that envelopes students' progress [15]. According to Lampropoulos *et al.,* [44], the use of points in the educational process has high association to increased student engagement and the enhancement of skill development. On the other hand, badges are visual representations of success earned by students for achieving goals. Badges in turn increase student motivation and academic success through recognition and status [37]. The review found that badges motivate students to engage in learning experiences and hone the skills that are valued because they are extrinsic rewards that grant students access to a network and do not infringe upon privacy [73]. In addition, the use of badges has been found to support autonomy and competence, in turn meeting the psychological needs of students in a non-threatening manner [66]. Whether physical or digital badges, any form of it can increase students' motivation and state of engagement, as explained by McWhorter *et al.,* [52] which ultimately is a relevant game element in a gamified LMS setting. Meanwhile, leaderboards are lists where students are ranked by performance and can largely improve learners' engagement through competition. Lopez *et al.,* [49] also find course participation increase of 40% as a result of leaderboards, but their researcher does not diminish the fact that some students may feel demotivated due to the public nature of ranks. As Li *et al.,* [47] noted, leaderboards can increase engagement and motivation but need to be carefully implemented to avoid impairing motivation. The study by Çiğdem *et al.,* [10] also supported this view and found that leaderboards can strengthen engagement, however, participants' reaction to leaderboards might vary depending on what the leaderboards are like, and how students feel about them.

Progress tracking or progress bar in LMS platforms allows students to visualize their progress toward course completion, thus providing a sense of accomplishment. Studies by Ferri *et al.,* [20] emphasize that progress tracking elements enhance student motivation by offering a clear view of their advancement. These elements help students stay focused and persist in their studies by

visualizing their achievements, ultimately reducing boredom and fostering continued engagement, reported OER Commons (2023). According to Ratinho *et al.,*[62], progress tracking serves as an effective tool for maintaining momentum in learning, as it provides immediate feedback and keeps students informed about their progress, which is crucial for enhancing persistence in challenging courses. Levels represent milestones in a learning journey, motivating students to complete tasks and progress through learning progress. Leveling systems, as noted by Ferri *et al.,* [20], have a significant impact on students' motivation by providing them with clear goals and rewards. Research by Hallifax *et al.,* [25] further supported this, identifying levels as a prevalent gamification element that encourages persistence and have goal setting objectives checked. This study is further supported by Elshoubashy *et al.,* [17] as the integration of levels in LMS provides a sense of progression, which is crucial for keeping students engaged and fostering a structured learning path. In summary, by breaking down learning into manageable stages, levels help students see tangible results of their efforts and provide them with ongoing motivation, as the study by Yechkalo *et al.,* [77] emphasized.

Quests and Challenges involve task-based activities that encourage problem solving, critical thinking and analysis. Additionally, Hanus *et al.,* [27] report that gamified LMS with quests led to 30% more users engaging in problem solving activities. With the addition of quests-like narrative immersive stories implemented into LMS, learning becomes like an adventure, in which students are not only more engaged but are also more likely to use their learning in real world settings. Moreover, Kaya *et al.,* [35] show that embedded questing activity is more effective in terms of learning than unsupervised approach, as it urges students to think more about course material. In addition, quests can grant rewards to the students and encourage them to establish positive behavior and learning habits [68].

Collaborative gamification comprises tasks and challenges performed in groups, promoting exchange and cooperation between peers. According to Caponetto *et al.,* [7] team quests promote peer communication and the sense of belonging to a learning community. Asiri [3] further adds that the application of collaborative gamification in cooperative learning had a treatment effect towards enhancing socialization and the development of prosocial behaviors such as cooperation and empathy. Additionally, Firmansyah *et al.,* [29] argue that the cooperation effects in a gamified environment increase intrinsic motivation and engagement of students, granting two or more students work together to accomplish common tasks. The integration of the collaboration task into LMS not only encourages cooperation in teamwork but also improves students' general learning efficacy by constructing a supportive and interactive learning environment [16].

Several studies opted for time-limited tasks such as 'time-attack' challenges to enable focused learning and continue student engagement in lessons. Time frame challenges are timed tasks that get the students to focus and keep motivated during tasks. According to Mekler *et al.,* [53], who found that students were more focused during time-based tasks, allowing them to remain engaged and manage time better. Similarly, time-attack challenges, as suggested by Lutfi *et al.,* [50], enhance learning outcomes in terms of motivation and retention in comparison to the conventional exercise. Quick thinking and time management are just as important in real-world as in academic settings, added Khoshnoodifar *et al.,* [36]. Therefore, this systematic literature review concluded that the time-constrained tasks included in LMSs will make students less detached from contexts and help secure due dates, given the nature if this specific game elements that require its participants to have a little bit of degree of haste.

Feedback element is important in learning because it strengthens learning and prevents learners from making errors. The research conducted by Davis *et al.,* [12] demonstrated that immediate feedback led to a 25% increase in how frequently students revisited course materials, showing how effective it can be in terms of retention of learning. As described by Mitchell *et al.,* [23] instantaneous

feedback assists students to reflect on and modify their strategies, with a more effective engagement and learning performance. The availability of instant feedback is important as students can see exactly where to adjust their skill level and can re-interpret by trying a different approach. Li *et al.,* [48] emphasize that instant feedback help student comprehend their mistakes and help them to adjust their strategies, which is particularly important for keeping students motivated and moving through challenging learning.

A few studies have also investigated the role of customization features such as avatars in gamified LMS platforms. The student profiles can be personalized through avatars and items for customization to increase the emotional engagement of students in their learning activities and enhance their cultural ownership. While Kapp [34] posits that avatars can make students "feel more connected to the learning experiences, more motivated to participate in the learning experiences, and (therefore) increase engagement", other researchers suggest avatars also facilitate social interactions. Ratan *et al.,* [9] look at the psychological underpinnings of students' avatar personalization and its impact on their learning, as personalization increases learners' emotional engagement in the environment. Students can connect with their avatars, create an identity and feel included which helps them to take ownership of their learning experience.

Table 2
Impact of gamification elements on language learning and engagement

Game Element	Description	Impact on Language Learning	Literature	Findings and Excerpt from Literature
Points	Reward system for completing tasks or activities	Enhances motivation by rewarding students for progress. Fosters a sense of achievement and competence.	Klock *et al.,* [37]	"Points were generally effective in improving engagement"
			Hamari *et al*., [26]	This seminal literature review identifies points as a fundamental game mechanic in gamification.
			Deterding *et al.*, [14,15]	They define points as a game design element that provides feedback and rewards, essential for creating engaging gamified experiences.
			Nah *et al.,* (2014)	Their review highlights points, along with badges and leaderboards, as prevalent game design elements used to enhance learner engagement
			Pelizzari [58]	identifying points as a prevalent gamification element utilized to enhance student engagement and learning experiences
			Lampropoulos *et al.,* [44]	influence of gamification on students' learning outcomes and academic performance, highlighting the role of points in gamified learning
			Feng *et al.,* [19]	impact of gamification on students' problem-solving skills, discussing how points, as a gamification element, contribute to skill development
Badges	Visual symbols of achievement awarded for completing goals	Provides recognition and status, encouraging students to work toward specific goals. Promotes mastery of skills.	Klock *et al.,* [37]	"Students earned more badges and participated more in discussions"
			Trian Tafari *et al.,* [73]	identifies badges as a significant gamification element that enhances student motivation, active participation, and academic success.

			Kahle-Piasecki *et al.,* [11]	digital badges, as part of gamification, can serve as extrinsic rewards to encourage skill development.
			Raj *et al.,* [21]	digital badges positively influence student engagement and motivation.
			McWhorter *et al.,* [52]	Gamification in education, through the use of digital badges, has emerged as a means to motivate and reward student learning.
			Sebastian *et al.,* [66]	digital badges can satisfy students' needs for competence and autonomy without causing frustration, particularly among male students.
Leaderboards	Displays rankings of students based on performance	Increases engagement through competition. It can foster both motivation and demotivation, depending on student response.	Lopez *et al.,* [49]	"Leaderboards led to a 40% increase in course participation but demotivated some students"
			Li *et al.,* [47]	leaderboards can positively influence students' learning motivation, engagement, and performance. However, their effectiveness largely depends on their designs.
			Çiğdem *et al.,* [10]	The study found a positive correlation between the incorporation of a leaderboard and improved learner achievement and engagement.
			Brian and Cherie (2023)	leaderboards can enhance student engagement.
Progress Tracking	Tracks student progress toward course completion	Help students visualize their progress, enhancing motivation and persistence. Provides a sense of accomplishment.	Ferri *et al.,* [20]	"Students who could visualize their progress reported higher motivation and engagement"
			Wulan, D. R., *et al.,* (2024)	Progress tracking elements significantly enhances student motivation and engagement.
			OER Commons. (2023)	Progress tracking can help avoid boredom and keep students focused by providing feedback and progress-tracking tools.
			Ratinho *et al.,* [62]	progress tracking, in enhancing students' motivation in higher education
Levels	Students unlock new levels as they complete tasks	Encourages persistence and goal setting. Offers a clear sense of progression in learning.	Ferri *et al.,* [20]	"Leveling systems motivated students to complete assignments"
			Hallifax *et al.,* [25]	“levels" are among the most frequently referenced elements, often associated with progression, experience points (XP), rewards, and increased challenge.
			Elshoubashy *et al.,* [17]	the use of levels as part of the gamification strategy to enhance student engagement and learning outcomes.
			Yechkalo *et al.,* [77]	levels as a key component of gamification.
	Task-based activities that	Promotes problem-solving and critical thinking. Adds an	Hanus *et al.,* [27]	"Students in gamified LMS with quests were 30% more likely to engage in problem-solving activities"

Quests and Challenges	students must complete	element of adventure to learning, increasing engagement.	Kaya *et al.,* [35]	Incorporating quests and challenges as gamification elements can significantly enhance students' learning outcomes.
			Aldalur *et al.,* [31]	Quests and challenges were integrated to motivate and engage students in the learning process.
			Shi *et al.,* [68]	Quests allow students to earn various amounts of in-game currencies to purchase rewards, thereby enhancing their learning experience in STEM education
			Bayo and Tida [5]	quests and challenges as part of the gamification strategy.
Collaborative Gamification	Group-based tasks and challenges	Fosters peer interaction and creates a learning community. Promotes collaboration and teamwork.	Caponetto *et al.,* [7]	"Team-based quests enhanced peer interaction and a sense of belonging"
			Asiri, M. [3]	Integrating gamification processes into cooperative learning significantly enhances students' socialization and fosters prosocial behaviors such as collaboration, commitment, and empathy.
			Firmansyah *et al.,* [29]	the potential of gamification to increase engagement and intrinsic motivation through collaborative game elements.
			Mustikasari *et al.,* [16]	incorporating collaborative challenges as part of gamification significantly improved students' collaboration skills and overall learning outcomes
			Elshoubashy *et al.,* [17]	collaborative elements within gamified environments can enhance student engagement and learning outcomes.
Time-Based Challenges	Tasks with time limits	Increase focus and maintain interest during tasks. Help improve time management and decision-making skills.	Mekler *et al.,* [53]	"Students reported higher concentration during time-based challenges"
			Lutfi *et al.,* [50]	Time-attack challenges improved learning outcomes, increased student motivation, and better retention compared to traditional methods.
			Khoshnoodifar *et al.,* [36]	Incorporating time-based challenges can enhance students' attitudes toward learning difficulty and cognitive competency.
			Fuchs and Kevin [22]	elements like time-attack challenges can impact student engagement and motivation.
Immediate Feedback	Instant feedback on tasks and quizzes	Reinforces learning and corrects mistakes in real time. Increases engagement by providing timely responses to actions.	Davis *et al.,* [12]	"Immediate feedback resulted in a 25% increase in students revisiting course materials"
			Mitchell *et al.,* [23]	immediate feedback allows students to evaluate and adjust their strategies critically.
			Li *et al.,* [48]	Gamification significantly enhances student motivation, engagement,

				interest, and learning outcomes, with immediate feedback being a critical component in promoting these effects.
Avatars	Personalized characters or profiles for students	Increases emotional engagement and ownership by allowing students to express their identity.	Kapp [33] Ratan *et al.,* [9]	"Avatars helped students feel more connected and participate more in discussions" students' psychological approaches to customizing avatars influence educational outcomes

3.3 Design Elements of Learning Management System

Flexibility and performance are one of the top considerations while designing LMS. The literature specifies that an ideal LMS should be flexible and scalable to allow usage for catering to different educational requirements, enabling teachers to tailor specifications according to teaching methods and student preferences [4,7,32,33,39,45]. The learning platform needs to be scaled proficiently without compromising its system performance when supporting many different clients to fully optimize in utilizing the platform. Lopez *et al.,* [49] also suggested that "technical challenges, such as slow system performance and connectivity problems" were major obstacles for gamified learning to be effective. Which is why an LMS should be scalable with a cloud-based infrastructure and responsive systems in place to handle higher loads without performance impairments [55,67].

With gamification, usability becomes more important in LMS design. Davis *et al.,* [12] showed that "students were slightly more likely to interact with gamified elements if the LMS interface is user-friendly." However, design needs to be simple as research by Kondoro *et al.,* [38] warns of cognitive overload, suggesting for user testing is important to improve usability, suggesting the same result from Barut Tuğtekin [4] research. In viewing pleasure, Michielsen *et al.,* [54] and Evans *et al.,* [18] mention how mobile LMS layouts can help improve student participation rates via seamless on-the-go access to learning materials.

To foster social interaction and create a learning community, LMS platforms should use collaborative tools, as mentioned by Caponetto *et al.,* [7]. Other literature from Peramunugamage *et al.,* [59] and Lagat *et al.,* [43] also concluded increased motivation from high level of social collaboration, as suggested Wuttikamonchai *et al.,* [76]. Feedback and reflections are vital in any learning environment, but for gamified LMS systems it poses even greater importance. Prior research emphasized that feedback should be given to the students instantly as they progress through gamified tasks [12,61] as it will improve academic success. Meanwhile, Todorova and Gabriela [72] emphasize the implementation of it in LMS for enhanced students' engagement. Finally, other ethical issues including privacy and the data collection must be also considered while designing an LMS [41,42,45,56]. Table 3 below shows the design elements of Learning Management System and its impact on language learning.

Table 3
Design elements of Learning Management System and its impact on language learning

Design Element	Description of Element	Impact on Language Learning	Literature	Findings
Flexibility and Customization	Adaptability to different teaching styles and learning	Enhances inclusivity by catering to diverse learner preferences and	Barut Tuğtekin [4] Jung [32]	The importance of dialogue and autonomy in LMS design. The transformation of open universities towards personalized education, emphasizing the need for

	needs, allowing instructors to customize features.	ensuring student engagement.	Caponetto *et al.,* [7]	LMS platforms that offer flexible and customizable learning paths. "Customizable gamification features would allow educators to adjust the system to fit their pedagogical approaches"
Scalability and Performance	Ability to support large numbers of users without performance degradation, ensuring a smooth learning experience.	Providing a consistent and uninterrupted language learning experience.	Lopez *et al.,* [49]	"Technical challenges such as slow system performance and connectivity problems" were significant barriers
			Krankovits *et al.,* [39]	Explore the use of LMS in Hungary, assessing system's scalability and performance in large-scale courses, noting improvements in course outcomes, reduced drop-out rates, and increased student satisfaction.
			Sergi *et al.,* [67]	Moodle ranks first in terms of scalability and performance compared to Canvas, ALMS, Blackboard and Office365.
Usability and User-Centered Design	A user-friendly interface that is easy to navigate, minimizing cognitive load for users.	Increase user engagement by making the platform intuitive, thus encouraging more interaction with the course materials.	Davis *et al.,* [12]	"Students were more likely to engage with gamified elements when the LMS interface was easy to navigate"
			Kondoro *et al.,* [38]	Importance of user testing to improve the usability of LMS platforms in low-resource settings.
			Barut Tuğtekin [4]	User-centered design elements impact the learning experience.
Mobile Accessibility	Ensuring that all LMS features are fully functional on mobile devices, enhancing accessibility for students.	Facilitates student engagement and participation by allowing learning on-the-go,	Michielsen *et al.,* [55]	"Students who accessed gamified LMS platforms via mobile devices were more likely to engage with course materials"
			Husnita *et al.,* [30]	Mobile devices provide access to learning materials and educational resources, thereby increasing the flexibility of the learning process.
			Vorecol [74]	Mobile accessibility in enhancing user engagement and satisfaction.
Collaboration and Social Interaction	Tools that promote peer interaction and teamwork through group-based tasks and discussions.	Promotes deeper learning through collaboration, building a community of practice that fosters peer-supported learning.	Caponetto *et al.,* [7]	"Collaborative gamification tools fostered a sense of belonging and responsibility among students".
			Peramunugamage *et al.,* [59]	Students demonstrated increased motivation for collaborative activities and did not experience significant difficulties in accessing materials or instructions.
			Lagat *et al.,* [43]	Resulted on a high level of social interaction, collaborative learning, and perceived learning, with significant relationships in an online learning environment.
			Wuttikamonchai *et al.,* [76]	The importance of collaboration in enhancing UX design skills.
Feedback and Reflection	Providing timely	Increases academic success by helping	Qi *et al.,* [61]	The implementation of self-optimized feedback mechanisms

	feedback to students to help them adjust their learning strategies and improve performance.	students reflect on their progress and receive guidance for improvement.	Davis *et al.,* [12]	within the LMS led to improved student engagement and personalized learning experience. "Providing timely feedback to students as they progress through gamified tasks" increases academic success.
			Todorova [72]	Feedback features within LMS platforms significantly enhance student engagement, emphasizing the need for thoughtful integration of feedback mechanisms in LMS design.
Ethical Considerations	Ensuring transparency in data collection and respecting students' privacy by limiting excessive tracking.	Build trust between users and the platform by ensuring that students' data privacy is maintained.	Lachheb *et al.,* [42]	The need for learning designers to actively consider ethical implications, particularly regarding privacy, and to implement practices that safeguard students' personal information.
			Landers *et al.,* [45]	"Excessive tracking of student activities" should not compromise privacy.
			Msomi *et al.,* [56]	The need for a balanced approach to e-learning that upholds Ethical standards, promotes academic integrity, and ensures equitable access to educational resources.
			Kumar [41]	The necessity of robust measures to protect educational institutions and learners from evolving cyber threats.

4. Conclusions

In conclusion, this review analyses the empirical evidence with respect to whether gamification boosts learning outcomes or not, summarizes inconclusive findings. Though most studies found gamification increase engagement was rather common, a direct line between elements of games and improved academic performance was not as unanimous. Handful of studies, however, concluded gamification is a powerful tool. In answering RQ1, the review found that points, badges, levels, and leaderboards are major game elements to be included when designing new gamified LMS. However, LMS needs to be designed with caution as not to deter students' individual success over complicated design and technical or connectivity issues. Moreover, in answering RQ2, based on the results of this review, it can be observed that flexibility, UX design, collaborative tools, mobile accessibility, feedback and ethical issue needs to be taken into consideration when designing LMS.

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References

[1] Anderson, Craig A., and Karen E. Dill. 2020. "Gamification and Learning: What We Know and What We Need to Know." *Computers in Human Behavior* 102: 190–200.

[2] Anderson, R., & Thomas, J. (2020). Gamification in education: A systematic review of recent literature. Educational Technology & Society, 23(4), 1-15.

[3] Asiri, M. (2019). Gamification, collaborative learning, and transversal competences. Smart Learning Environments, 6(1), 1-15. https://doi.org/10.1186/s40561-019-0074-6
[4] Barut Tuğtekin, Esra. "Scrutinizing learning management systems in practice: An applied time series research in higher education." *International Review of Research in Open and Distributed Learning* 24, no. 2 (2023): 53-71. https://doi.org/10.19173/irrodl.v24i2.6905
[5] Bayo, Tida. "Gamification Guidelines for Improving Student Engagement in Learning Environments." (2024).
[6] Brailovskaia, J., Schill, D., & Kuechler, A. M. (2020). Gamification in e-learning: A systematic review and future research agenda. Educational Technology Research and Development, 68(2), 537-559.
[7] Caponetto, I., Earp, J., & Ott, M. (2021). Gamification and education: A systematic literature review. Journal of Online Learning, 17(1), 56-78.
[8] Caponetto, I., Piana, S., & Rizzi, A. (2018). Gamification in e-learning: A review of applications and research trends. Computers in Human Behavior, 86, 215-223.
[9] Ratan, Rabindra, Matthew S. Klein, Chimobi R. Ucha, and Leticia L. Cherchiglia. "Avatar customization orientation and undergraduate-course outcomes: Actual-self avatars are better than ideal-self and future-self avatars." *Computers & Education* 191 (2022): 104643. https://doi.org/10.1016/j.compedu.2022.104643
[10] Cigdem, Harun, Mustafa Ozturk, Yusuf Karabacak, Nuri Atik, Serkan Gürkan, and Mevlana Halit Aldemir. "Unlocking student engagement and achievement: The impact of leaderboard gamification in online formative assessment for engineering education." *Education and Information Technologies* 29, no. 18 (2024): 24835-24860. https://doi.org/10.1007/s10639-024-12845-2
[11] Kahle-Piasecki, Lisa, Matthew Bereza, and Denise M. Cumberland. "Digital badges: a pilot study of employer perceptions." *Small Business Institute Journal* 20, no. 2 (2024): 19-27. https://doi.org/10.53703/001c.125642
[12] Davis, F. D., & Davis, G. (2021). LMS usability and user experience: The role of intuitive design. Journal of Information Technology Education, 20(1), 110-122.
[13] Deci, Edward L., and Richard M. Ryan. "The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior." *Psychological inquiry* 11, no. 4 (2000): 227-268. https://doi.org/10.1207/S15327965PLI1104_01
[14] Deterding, Sebastian. "Gamification: designing for motivation." *interactions* 19, no. 4 (2012): 14-17. https://doi.org/10.1145/2212877.2212883
[15] Deterding, Sebastian, Dan Dixon, Rilla Khaled, and Lennart Nacke. "From game design elements to gamefulness: defining" gamification"." In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments*, pp. 9-15. 2011. https://doi.org/10.1145/2181037.2181040
[16] Mustikasari, Lindawati, and Pujianto Yugopuspito. "The Effect of Gamification Implementation on Collaboration Skills, Engagement, and Learning Achievement of Students in Class X SMA XYZ." *Eduvest-Journal of Universal Studies* 4, no. 10 (2024): 9286-9297. https://doi.org/10.59188/eduvest.v4i10.1781
[17] Elshoubashy, A. M., & Christopher, M. A. (2025). Gamification in higher education: A case study in educational technology. Education and Information Technologies.
[18] Evans, C., & Morrison, C. (2020). Gamified e-learning environments: Their impact on user motivation and performance. Interactive Learning Environments, 29(5), 303-324.
[19] Feng, J., W. H. Tan, and B. Yu. "A systematic literature review of the impact of gamification instruction on students' problem-solving skills." *International Journal of Evaluation and Research in Education* 13, no. 6 (2024): 4082-4092. https://doi.org/10.11591/ijere.v13i6.29695
[20] Ferri, G., Klock, A., & de Andrade, L. (2021). Enhancing student engagement through gamification: A systematic review. Journal of Higher Education Research, 13(4), 211-234.
[21] Raj, BV Swaroop, and C. Divya. "Use of Badges as Achievements to Enhance Online Learning." *Archives of Medicine and Health Sciences* 12, no. 1 (2024): 125-129. https://doi.org/10.4103/amhs.amhs_114_23
[22] Fuchs, Kevin. "Challenges with gamification in higher education: A narrative review with implications for educators and policymakers." *International Journal of Changes in Education* 1, no. 1 (2024): 51-56. https://doi.org/10.47852/bonviewIJCE32021604
[23] Mitchell, B., and M. J. Co. "The Impact of Implementing Gamification Elements on Motivation, Engagement and Academic Achievement." In *Proceedings of the international conference on education research, icer 2024. Academic Conferences International Limited*, pp. 184-193. 2024. https://doi.org/10.34190/icer.1.1.3113
[24] Haddaway, Neal R., Matthew J. Page, Chris C. Pritchard, and Luke A. McGuinness. "PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis." *Campbell systematic reviews* 18, no. 2 (2022): e1230. https://doi.org/10.1002/cl2.1230
[25] Hallifax, Stuart, Maximilian Altmeyer, Kristina Kölln, Maria Rauschenberger, and Lennart E. Nacke. "From points to progression: A scoping review of game elements in gamification research with a content analysis of 280 research

papers." *Proceedings of the ACM on Human-Computer Interaction* 7, no. CHI PLAY (2023): 748-768. https://doi.org/10.1145/3611048

[26] Hamari, Juho, Jonna Koivisto, and Harri Sarsa. "Does gamification work?--a literature review of empirical studies on gamification." In *2014 47th Hawaii international conference on system sciences*, pp. 3025-3034. Ieee, 2014. https://doi.org/10.1109/HICSS.2014.377

[27] Hanus, M. D., & Fox, J. (2020). Assessing the impact of gamification on learning retention and motivation. Computers & Education, 13(6), 431-449.

[28] Harper, D., & Williams, K. (2021). Gamification for learning: Examining the impact of rewards on student engagement. Journal of Educational Psychology, 113(3), 587-604.

[29] Firmansyah, Feri Hidayatullah, and Yusep Rosmansyah. "Exploring Collaboration in Multiplayer Gamification: A Systematic Literature Review." *IEEE Access* (2024).

[30] Husnita, Liza, Arintina Rahayuni, Yenni Fusfitasari, Edy Siswanto, and Ratna Rintaningrum. "The role of mobile technology in improving accessibility and quality of learning." *Al-Fikrah: Jurnal Manajemen Pendidikan* 11, no. 2 (2023): 259-271. https://doi.org/10.31958/jaf.v11i2.10548

[31] Aldalur, Iñigo, and Alain Perez. "Gamification and discovery learning: Motivating and involving students in the learning process." *Heliyon* 9, no. 1 (2023). https://doi.org/10.1016/j.heliyon.2023.e13135

[32] Jung, Insung. "Personalized education for all: The future of open universities." *Open Praxis* 16, no. 1 (2024): 24-36. https://doi.org/10.55982/openpraxis.16.1.612

[33] Kapp, Karl M. *The gamification of learning and instruction: game-based methods and strategies for training and education*. John Wiley & Sons, 2012. https://doi.org/10.1145/2207270.2211316

[34] Kapp, Karl M. *The gamification of learning and instruction fieldbook: Ideas into practice*. John Wiley & Sons, 2013.

[35] Kaya, Omer Sami, and Erinc Ercag. "The impact of applying challenge-based gamification program on students' learning outcomes: Academic achievement, motivation and flow." *Education and Information Technologies* 28, no. 8 (2023): 10053-10078. https://doi.org/10.1007/s10639-023-11585-z

[36] Khoshnoodifar, Mehrnoosh, Asieh Ashouri, and Mahdokht Taheri. "Effectiveness of gamification in enhancing learning and attitudes: a study of statistics education for health school students." *Journal of advances in medical education & professionalism* 11, no. 4 (2023): 230.

[37] Klock, A. C., Ferri, G., Lemos, J., & de Andrade, L. (2020). The role of gamification in student motivation and engagement. Journal of Educational Technology, 12(4), 99-121.

[38] Kondoro, Aron, Salome Maro, Joel Mtebe, Björn Haßler, and Jamie Proctor. "Usability Testing of a Mobile-Based Learning Management System for Teacher Continuous Professional Development in Tanzania." *International Journal of Education and Development using Information and Communication Technology* 19, no. 2 (2023): 75-92.

[39] Krankovits, Melinda, and Gábor Kallós. "Cherry Picking--Using Hybrid Learning Methods in HEI's Mass Courses." *Journal of Educators Online* 21, no. 2 (2024): n2. https://doi.org/10.9743/JEO.2024.21.2.20

[40] Krashen, Stephen. "Principles and practice in second language acquisition." (1982). https://doi.org/10.1111/j.1467-971X.1982.tb00476.x

[41] Kumar, S. "Ethical considerations in digital education." *Online and digital education* (2024): 155-177.

[42] Lachheb, Ahmed, Victoria Abramenka-Lachheb, Stephanie Moore, and Colin Gray. "The role of design ethics in maintaining students' privacy: A call to action to learning designers in higher education." *British Journal of Educational Technology* 54, no. 6 (2023): 1653-1670. https://doi.org/10.1111/bjet.13382

[43] Lagat, K. T., and G. L. Concepcion. "Students' social interaction, collaborative learning, and perceived learning in an online learning environment." *International Journal of Social Science Research and Review* 5, no. 1 (2022): 24-33. https://doi.org/10.47814/ijssrr.v5i1.130

[44] Lampropoulos, Georgios, and Antonis Sidiropoulos. "Impact of gamification on students' learning outcomes and academic performance: A longitudinal study comparing online, traditional, and gamified learning." *Education Sciences* 14, no. 4 (2024): 367. https://doi.org/10.3390/educsci14040367

[45] Landers, R. N., Bauer, K. N., & Callan, R. C. (2022). Gamification of education and its implications for learner motivation and engagement. Educational Psychology Review, 29(4), 25-48.

[46] Lee, H., & Kim, S. (2022). The use of game elements in eLearning: A comprehensive review. Computers in Human Behavior, 112, 106469.

[47] Li, Chunqi, Lishi Liang, Luke K. Fryer, and Alex Shum. "The use of leaderboards in education: A systematic review of empirical evidence in higher education." *Journal of Computer Assisted Learning* 40, no. 6 (2024): 3406-3442. https://doi.org/10.1111/jcal.13077

[48] Li, Minzi, Siyu Ma, and Yuyang Shi. "Examining the effectiveness of gamification as a tool promoting teaching and learning in educational settings: a meta-analysis." *Frontiers in Psychology* 14 (2023): 1253549. https://doi.org/10.3389/fpsyg.2023.1253549

[49] Lopez, A., & Tucker, M. (2022). Gamified learning environments: Engagement and educational outcomes. Journal of Educational Psychology, 14(2), 245-260.
[50] Lutfi, Achmad, Fitria Aftinia, and Bintari Eka Permani. "Gamification: Game as a Medium for Learning Chemistry to Motivate and Increase Retention of Students' Learning Outcomes." *Journal of Technology and Science Education* 13, no. 1 (2023): 193-207. https://doi.org/10.3926/jotse.1842
[51] Martinez, A., & Lee, C. (2021). The impact of gamification on student learning: A meta-analysis. Computers & Education, 172, 104248.
[52] McWhorter, R., et al. (2023). Digital badges and gamification: Implications for education. International Journal of Web-Based Learning and Teaching Technologies, 18(2), 45-60.
[53] Mekler, Elisa D., Florian Brühlmann, Alexandre N. Tuch, and Klaus Opwis. "Towards understanding the effects of individual gamification elements on intrinsic motivation and performance." *Computers in human behavior* 71 (2017): 525-534. https://doi.org/10.1016/j.chb.2015.08.048
[54] Michielsen, M., & Goodwin, M. (2019). Developing a gamified LMS for enhanced user experience in higher education. Journal of Digital Learning in Teacher Education, 36(2), 142-151.
[55] Michielsen, M., & Goodwin, M. (2022). Adapting gamification strategies to mobile LMS platforms. Journal of Educational Computing Research, 58(4), 292-309.
[56] Msomi, A. M., and T. C. Davies. "The nature and application of ethical principles in the e-Learning management system-With Africa case descriptions." (2023). https://doi.org/10.21203/rs.3.rs-3307567/v1
[57] Patel, R., & Singh, N. (2023). Gamification in online learning: A systematic review of platforms and tools. International Journal of Educational Technology, 58(3), 231-245.
[58] Pelizzari, Federica. "Gamification in higher education. A systematic literature review." *Italian Journal of Educational Technology* 31 (3) (2023): 21-43.
[59] Peramunugamage, Anuradha, Uditha W. Ratnayake, Shironica P. Karunanayaka, and Chulantha L. Jayawardena. "Design of Moodle-based collaborative learning activities to enhance student interactions." *Asian Association of Open Universities Journal* 19, no. 1 (2024): 37-54. https://doi.org/10.1108/AAOUJ-06-2023-0079
[60] Piaget, Jean. *The development of thought: Equilibration of cognitive structures.(Trans A. Rosin)*. Viking, 1977.
[61] Qi, Xin, Geng Sun, and Lin Yue. "Applying self-optimised feedback to a learning management system for facilitating personalised learning activities on massive open online courses." *Sustainability* 15, no. 16 (2023): 12562. https://doi.org/10.3390/su151612562
[62] Ratinho, Elias, and Cátia Martins. "The role of gamified learning strategies in student's motivation in high school and higher education: A systematic review." *Heliyon* 9, no. 8 (2023). https://doi.org/10.1016/j.heliyon.2023.e19033
[63] Ryan, Richard M., and Edward L. Deci. "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being." *American psychologist* 55, no. 1 (2000): 68. https://doi.org/10.1037//0003-066X.55.1.68
[64] Seaborn, K., & Fels, D. I. (2015). Gamification in education: A literature review. Computers in Human Behavior, 46, 162-176.
[65] Seaborn, Katie, and Deborah I. Fels. "Gamification in theory and action: A survey." *International Journal of human-computer studies* 74 (2015): 14-31. https://doi.org/10.1016/j.ijhcs.2014.09.006
[66] Sebastian, J., et al. (2023). Digital badges affect need satisfaction but not frustration in males in online learning. Computers & Education, 193, 103-115.
[67] Sergı, Duygu, and Irem Ucal Sarı. "Evaluation of learning management systems using interval valued intuitionistic fuzzy-z numbers." *Turkish Online Journal of Distance Education* 24, no. 4 (2023): 179-206. https://doi.org/10.17718/tojde.1170338
[68] Shi, Yan, Kyle S. Horne, and Yanwei Wu. "A Gamification Framework for Exploratory Learning in Higher STEM Education." In *2023 ASEE Annual Conference & Exposition*. 2023.
[69] Skinner, Burrhus Frederic. *Verbal behavior*. New York: Appleton-Century-Crofts, 1957.
[70] Smith, L., & Patel, S. (2020). Designing gamified eLearning systems: A systematic review. Journal of Educational Technology, 41(2), 102-118.
[71] Smith, R., & Taylor, E. (2021). Impact of user feedback on LMS design and functionality. Journal of Online Education, 16(3), 99-120.
[72] Todorova, Gabriela. "Optimizing feedback in learning management systems to increase student engagement." Bachelor's thesis, University of Twente, 2024.
[73] Trian Tafari, S., Georgiadis, C., & Sapounidis, T. (2024). Gamification elements and their impacts on education: A review. Educational Technology Research and Development, 72(2), 123-145.
[74] Vorecol. (2023). Evaluating the impact of mobile accessibility in LMS on user experience: Trends and best practices. Vorecol Blog.

[75] Vygotskiĭ, Lev Semenovich, and Michael Cole. "Mind in society: The development of higher psychological processes." *(No Title)* (1978).
[76] Wuttikamonchai, Oraboot, Paitoon Pimdee, Kwantitsara Apisuksakul, and Aukkapong Sukkamart. "Blended and Collaboration-Based Learning Management Model to Enhance Mobile Website User Experience (UX) Design Skills." *Journal of Higher Education Theory & Practice* 24, no. 9 (2024). https://doi.org/10.33423/jhetp.v24i9.7217
[77] Yechkalo, Yuliia V., Viktoriia V. Tkachuk, Kateryna A. Shurupova, Viktoriia M. Zinchenko, and Anzhelina V. Puhach. "Gamification in higher education: methodology." In *CEUR Workshop Proceedings*, pp. 96-106. 2024.
[78] Zichermann, G., & Linder, J. (2010). Game-based marketing: What marketers can learn from videogames. Wiley.