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SYSTEMATIC REVIEW **OPEN ACCESS**

The Cognitive and Motivational Benefits of Gamification in English Language Learning: A Systematic Review

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Abstract:

Background: Gamification has been increasingly used in English language learning, with studies suggesting its potential to enhance cognitive processes and learner motivation. Gamification enhances student involvement and boosts cognitive abilities such as concentration, memory, and other mental processes by integrating game-like features, including point systems, incentives, instantaneous feedback, and achievement monitoring.

Objective: This systematic review examines the cognitive benefits of gamification on working memory and attention in English language learners. It investigates how gamification contributes to measurable improvements in memory retention and attentional control while identifying the underlying cognitive and motivational mechanisms that enhance learning outcomes.

Methods: This systematic review analyzed 30 peer-reviewed studies from 2020 to 2024 on the cognitive benefits of gamification in English language learning. Studies were selected from Scopus, Web of Science, and Eric using strict inclusion criteria, focusing on gamification's impact on cognitive functions like working memory, attention, and processing speed. Both empirical and theoretical studies with a psycholinguistic focus were included. A narrative analysis was conducted to identify key patterns and trends across classroom and online learning contexts.

Results: Gamification significantly enhances working memory and attention control in English language learners, yielding measurable improvements in memory retention and focus through game elements, such as rewards and progress tracking. However, these cognitive gains diminish over time as the novelty of game elements wanes, underscoring the need for continuous innovation in game design.

Conclusion: The review also outlines critical cognitive and motivational mechanisms, such as emotional engagement and social interaction, which support sustained cognitive improvements but require ongoing adaptation to maintain their effectiveness.

Keywords: Cognitive benefits, English language learning, Gamification, Learner engagement memory retention, Motivation in learning.

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1. INTRODUCTION

In recent years, education has experienced a significant shift towards more interactive and learner-centred methodologies, with gamification emerging as an auspicious approach [1, 2]. In gamification, features like points, levels, challenges, and rewards are borrowed from games and used in education to make learning more fun and engaging, such as education, to enhance engagement and motivation. While the motivational benefits of gamification are well established, recent research has increasingly focused on its cognitive benefits, especially within the context of language learning [3]. This systematic review synthesizes the findings from several empirical studies to assess how gamification enhances cognitive processes and fosters greater motivational engagement in English language learning.

Language learning is a complex cognitive process that involves critical processes, such as working memory, attentional control, and processing speed [4, 5]. These cognitive functions are critical for learners as they internalize linguistic structures, retain vocabulary, and maintain fluency in communication. Working memory facilitates the temporary storage and manipulation of language elements, where-as attentional control allows learners to selectively focus on relevant language input and effectively filter out distractions [6]. Processing speed is crucial for real-time language comprehension, enabling learners to process and respond quickly to linguistic stimuli [7]. Given the significant cognitive demands of language learning, employing strategies that enhance these processes can significantly improve learning efficiency and overall success [8].

Gamification extends beyond enhancing learner engagement by directly fostering cognitive engagement, encouraging deeper information processing, and sustaining attention [9]. Gamification helps improve working memory by turning difficult language concepts into simple and fun tasks. This approach facilitates improved encoding and retrieval of language-related information [10]. Features such as progress tracking and real-time feedback allow learners to monitor their development and adjust their strategies accordingly, thus enhancing their cognitive processing and learning outcomes [11, 12].

This review also sustains the capacity of gamification to facilitate repetitive practice in a low-pressure, ludic environment, which is essential for developing linguistic fluency and reinforcing grammatical and syntactic structures [13, 14]. Moreover, in gamified settings, the pressure of traditional tasks is lessened, helping students focus better on learning and enabling learners to allocate more cognitive resources to processing language inputs. Gamification enhances language learning by mitigating unnecessary mental strain, increasing task engagement, improving grammar retention, expanding vocabulary, and enhancing language proficiency [15].

Although the cognitive benefits of gamification are widely acknowledged, its impact on intrinsic motivation and learner autonomy is equally noteworthy [16]. Intrinsic motivation, characterized by an individual's internal drive to engage in tasks for personal satisfaction rather than external rewards, is effectively enhanced through gamification elements such as points, badges, and leveling systems [17]. These features cultivate a sense of achievement and progression, motivating learners to assume ownership of their learning processes, thereby promoting self-directed learning and greater autonomy [18].

Research indicates the significance of goal-setting in gamified environments for sustaining long-term motivation. Gamification transforms learning into an active process by enabling students to establish personal objectives and monitor their progress using tangible game elements. This enhanced sense of engagement and autonomy is particularly advantageous in language acquisition, where sustained motivation is crucial for overcoming challenges, such as comprehending complex grammatical structures or expanding one's vocabulary [17].

From a psycholinguistic perspective, gamification aligns with crucial theories of language processing, notably the Cognitive Load Theory [19, 20] and Dual Coding Theory [21]. According to Cognitive Load Theory, learning improves when students are not overwhelmed by too much information, allowing learners to focus on essential tasks. Gamified learning environments harness this principle by decomposing complex language tasks into more minor, manageable challenges supported by immediate feedback and progress tracking. This approach enables learners to allocate cognitive resources more efficiently, facilitating deeper language processing and comprehension [22].

Similarly, Dual Coding Theory confirms the cognitive benefits of concurrently processing verbal and visual information, enhancing learning outcomes [23]. Gamification enhances working memory by utilizing verbal and visual channels and incorporating graphical elements, such as progress trackers, achievement symbols, and stage indicators, in conjunction with language-based activities. This dual-pathway approach facilitates the improved retention of lexical items and grammatical structures, ultimately supporting the consolidation of information in long-term memory and expediting the development of language proficiency [9].

The integration of gamification into English language learning has become increasingly important due to the rising global demand for English proficiency [24]. As the dominant language in international communication, trade, and academia, English presents numerous cognitive challenges for non-native speakers, given its vast vocabulary, complex grammatical rules, and diverse syntactic structures [25]. Gamification addresses these challenges by enhancing memory retention, improving attentional focus, fostering intrinsic motivation, and making English learning more accessible and effective for many learners [13, 18].

This systematic review evaluated the psycholinguistic foundations of gamification in English language learning to connect cognitive science with language pedagogy. Empirical evidence demonstrates how gamification not only enhances motivation but also strengthens cognitive processes that are critical to language acquisition. Understanding the interaction between game mechanics and cognitive development enables teachers to fully leverage gamification to create more engaging and practical learning experiences. This review also synthesizes research addressing key questions regarding the cognitive

benefits of gamification and its impact on English language learning outcomes.

1. What are the empirically supported cognitive benefits of gamification on working memory and attention among English language learners?

2. How does gamification facilitate measurable improvements in memory retention and attentional control among English language learners?

3. What cognitive and motivational mechanisms underpin the enhancement driven by gamification in English language learning?

2. METHODS

2.1. Study Design

This study conducted a systematic review to combine and analyze research on the cognitive benefits of gamification in learning English, focusing on psycholinguistics. This review aims to critically analyze the existing literature, focusing on how gamification influences cognitive processes, such as working memory, attention, and processing speed within English language instruction. This approach follows a structured process for selecting and reviewing studies, ensuring the work is evident, reliable, and can be repeated by others.

2.2. Eligibility Criteria

The inclusion criteria were carefully established to ensure the selection of studies that provide substantial and reliable contributions to understanding the cognitive benefits of gamification in English language learning. The criteria identified empirical and theoretical research with explicit links to psycholinguistic theories or mechanisms, such as working memory, attention, and processing speed. Moreover, only recent and peer-reviewed studies were included to maintain academic rigour and ensure the relevance of the findings.

2.2.1. Inclusion Criteria

• Publications dated between 2020 and 2024 to incorporate the most recent research.

• Peer-reviewed articles indexed in Scopus, Web of Science, and Eric to guarantee reliability and scholarly integrity.

• Studies addressing gamification in English language learning focus on its cognitive benefits.

• Research presenting measurable outcomes related to working memory, attention, or processing speed.

• Both empirical studies and theoretical frameworks with a psycholinguistic perspective were included.

The selection of 30 peer-reviewed studies published between 2020 and 2024 demonstrates a purposeful emphasis on high-quality, recent research indexed in Scopus, Web of Science and Eric. Carefully designed inclusion criteria guarantee that the studies specifically addressed the cognitive benefits of gamification in English language learning, with a clear prioritization of methodological rigor over volume. Restricting the timeframe and focusing on reputable databases enabled this review to synthesize reliable and pertinent insights into the latest advancements in gamification.

The exclusion criteria were designed to eliminate studies that fell outside the scope of the review or failed to meet the established methodological standards. Studies that did not address the cognitive processes central to the research or focused on languages other than English were excluded. Similarly, non-peer-reviewed sources and studies lacking empirical or theoretical contributions were omitted to maintain the review's rigor and focus.

2.2.2. Exclusion Criteria

• Research focusing on languages other than English.

• Studies that did not examine cognitive processes such as memory, attention, or processing speed.

• Non-peer-reviewed publications, including opinion pieces, book reviews, or unpublished materials.

• Studies address technical aspects of gamification tools without linking them to cognitive or learning outcomes in language learning.

2.3. Search Strategy

A systematic search was conducted using three major academic databases, Scopus, Web of Science, and ERIC, to identify studies examining the cognitive benefits of gamification in English language learning. These databases were selected due to their rigorous indexing standards, comprehensive coverage of peer-reviewed research, and relevance to education, cognitive science, and language learning. The inclusion of ERIC enhanced the search scope by incorporating education-focused studies, ensuring a more robust and methodologically sound review. This selection strategy maintained methodological consistency and ensured comprehensive literature retrieval, minimizing the risk of omission. While additional databases such as ProQuest and Google Scholar were considered, Scopus, Web of Science, and ERIC were prioritized for their high indexing reliability, disciplinary relevance, and contribution to a well-structured systematic review.

The search employed various key terms to capture the research linking gamification with cognitive processes and English language learning. These included expressions such as "Gamification and language learning," "Cognitive benefits and gamification," "Psycholinguistics and gamified learning," and "Gamification and English language teaching." The combination of these terms was intended to target studies that have focused on the impact of gamification on cognitive functions, including memory and attention, within the context of English language learning. Boolean operators, such as "and," were used to ensure that the results included only studies that addressed these specific areas.

To narrow the search, only articles published between 2020 and 2024 were considered to capture the latest research. Only peer-reviewed scholarly articles were considered to maintain academic rigour. Owing to the emphasis on English language learning, the review was limited to publications in English. Furthermore, to focus on the cognitive aspects of learning, studies in psycholin-

guistics, cognitive psychology, and language education were selected based on their relevance. Following the initial search, a screening process involved examining the titles and abstracts of the studies to eliminate those that did not meet the established criteria. Studies that did not concentrate on English language learning or were unrelated to cognitive functions, such as memory and attention, were excluded. For potentially relevant studies, full-text reviews were conducted to ensure alignment with the review objectives.

During the review, emphasis was placed on studies that provided empirical evidence related to cognitive processes in English-language learning. The focus was on research on gamification and its impact on cognitive aspects such as working memory, attention, and processing speed. Care was taken to select studies with clear connections to the psycholinguistic theories or mechanisms. Studies that did not meet these criteria or focused on languages other than English were not included in the final selection.

Ultimately, 30 studies that fulfilled all established criteria were selected out of 49. These studies constitute the foundation of our review, providing a basis for examining the cognitive benefits of gamification in English language learning from a psycholinguistic perspective. Fig. (1) presents the PRISMA flow diagram, outlining the study selection process in detail.

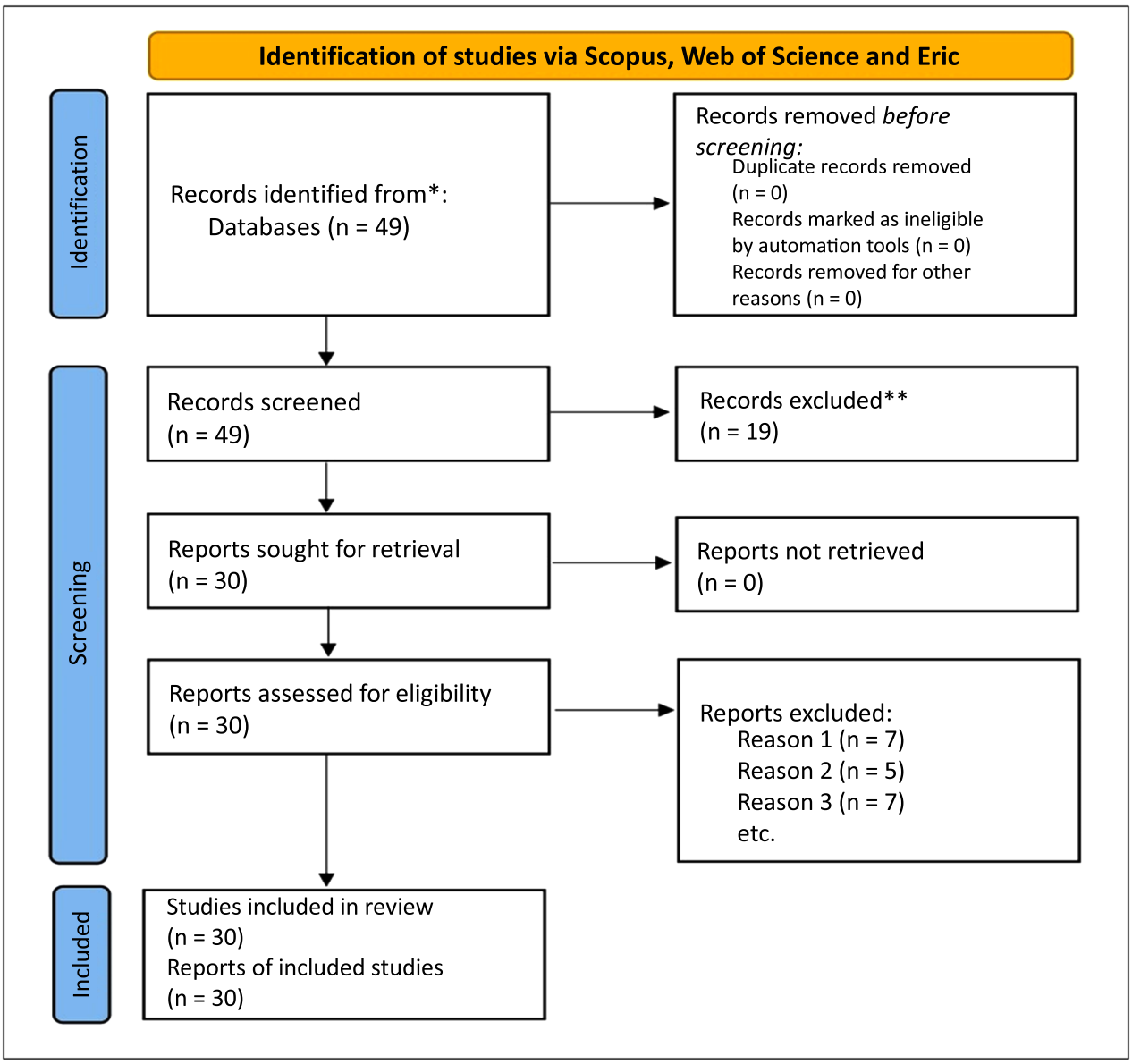

Fig. (1). Study selection process as illustrated by PRISMA flow diagram.

2.4. Data Extraction

Once the 30 studies were selected, we carefully extracted key information from each one. This approach was essential for gathering data on how gamification supports cognitive benefits in learning English. We focused on gathering the most critical details from each study to ensure a thorough analysis and draw meaningful conclusions (Appendix).

For each study, the following key data points were collected:

2.4.1. Research Methodology

The investigation approach employed, whether experimental, quasi-experimental, or observational, was documented. By noting the research methods, we could assess how solid each study was and understand its role in the overall review.

2.4.2. Participant Details

We gathered details about participants, such as how many there were, their ages, English skills, and whether they learned in a classroom or online. These factors are important because different learners may respond to gamification differently.

2.4.3. Game-like Features

The specific gaming elements utilized, such as scoring systems, competitive rankings, achievement symbols, incentives, and progression stages, were catalogued. Identifying the gamification components that were implemented assisted in examining how various game aspects influenced cognitive functions.

2.4.4. Examined Cognitive Functions

Each study focused on specific cognitive processes. This encompassed whether the research examined working memory, attentional processes, information-processing speed, and problem-solving abilities. Moreover, the techniques used to assess these processes (*i.e.*, cognitive assessments, performance-based tasks, or behavioural observations) have been documented to elucidate the relationship between gamification and cognitive outcomes in English language acquisition.

2.4.5. Principal Outcomes

A concise overview of each study's significant findings, particularly how gamification affects cognitive processes in language learning, was incorporated. Notable cognitive advantages, such as enhanced memory retention, heightened attention, and accelerated language processing, were observed.

2.4.6. Psycholinguistic Relevance

Associations with psycholinguistic theories and frameworks were recorded. Studies offering insights into how gamification interacts with cognitive mechanisms such as working memory or attentional capacity are particularly salient for understanding the cognitive foundations underlying the impact of gamification on language learning.

The study data were carefully analyzed to compare the methodological approaches used across the 30 selected studies. This analysis helped identify critical trends, such as the gamification elements most effectively enhancing cognitive functions and the cognitive processes they influenced most frequently. This approach provides valuable insights into the role of gamification in supporting cognitive benefits for English language learning.

2.5. Quality Assessment

A structured quality evaluation was conducted for each of the 30 selected studies to assess the reliability and validity of the results. This process evaluated methodological rigour, consistency, and relevance in exploring the cognitive benefits of gamification in English language learning. Studies were rated based on predefined criteria, including research design, sample characteristics, and measurement tools. Each study was classified into three categories—robust, moderate, or limited—reflecting the methodological strength of its approach.

Our quality check followed a transparent, step-by-step process examining a few crucial areas.

2.5.1. Research Design Evaluation

Each study's research methodology was assessed. Experimental or quasi-experimental designs were considered more suitable for identifying cause-and-effect relationships. Although observational studies were deemed valuable for insights into natural learning environments, their limitations in variable control were acknowledged.

2.5.2. Participant Pool Assessment

Studies with larger and more diverse participant groups were considered more generalizable to broader populations. On the other hand, studies with smaller or less varied groups had limitations in how broadly their findings could be applied. The evaluation also considered the transparency of the participant selection processes and the clarity of the demographic information provided.

2.5.3. Cognitive Function Measurement

We carefully examined the tools and methods each study used to measure cognitive functions like memory, attention, and processing speed. Studies that used proven, reliable methods were rated higher. By contrast, research relying on self-reported data or ambiguous measurement methods has received lower reliability ratings.

2.5.4. Gamification Element Application

How clearly and consistently gamification was used was another important factor. Studies that clearly explained how game elements like points, rewards, and challenges were used got higher ratings. Studies with imprecise descriptions or inconsistent use of gamification components were rated less favourably.

2.5.5. Theoretical Relevance

Studies that connected their findings to established cognitive or psycholinguistic theories were positively viewed. Studies providing theoretical explanations for the impact of gamification on cognitive processes, such as

working memory or attention, were included to enhance the depth of the review. Studies lacking this theoretical grounding are deemed less informative in elucidating the underlying cognitive mechanisms.

Based on these criteria, each study was assigned a quality rating, categorized as high, medium, or low, contingent on the overall robustness of its methodological approach. These ratings were used to determine the relative weights of each study's findings in a detailed analysis. Studies with higher ratings were given more importance in the review, while those with lower ratings were still included. Their limitations were noted during the analysis.

2.6. Data Synthesis

Following the collection and evaluation of the selected studies, the subsequent phase involved analyzing the findings to identify common patterns and insights regarding the cognitive benefits of gamification in English language learning. The goal was to consolidate the key findings and explain how gamification affects cognitive processes such as memory, attention, and problem-solving. To facilitate interpretation, the studies were grouped based on the cognitive processes they examined, including memory, attention, and processing speed. This categorization allowed for an effective comparison of methods and results across different studies. Moreover, the analysis focused on specific gamification elements, such as points, rewards, and levels, to determine their impact on cognitive functions.

Due to the methodological heterogeneity across the selected studies, including variations in participant characteristics, research designs, and reported outcomes, conducting a meta-analysis or reporting effect sizes was not feasible. Instead, a narrative synthesis approach was adopted to provide a structured and systematic exploration of patterns and trends. This approach facilitates a qualitative understanding of how different game elements influence cognitive and motivational processes, enabling the identification of recurring themes and key mechanisms underlying gamification's effectiveness.

3. RESULTS

3.1. Study Characteristics Overview

In this section, we look at the research methods, participant details, and study settings from the 30 papers that investigate gamification in EFL instruction. The studies cover a range of educational environments, research methods, and student groups, from elementary to university-level education. Most of the analyzed studies employed quasi-experimental designs and integrated both quantitative and qualitative methodologies. For example, Roseni and Muho [26] examined the role of gamification and interactive learning platforms in improving student engagement and language proficiency among university learners. Through a quantitative analysis of 59 students studying English and German, the study demonstrated that gamified elements effectively boost motivation and facilitate language acquisition. These findings align closely with the study's focus, outlining the value of technology-driven approaches in enhancing engagement and achieving better learning outcomes in English language education. Zhang *et al*. [27] investigated the integration of gamification into blended learning and its impact on Chinese students' engagement and foreign language anxiety. The study, employing mixed methods, demonstrated that gamified strategies significantly improved student engagement and reduced anxiety levels. These findings accentuate the role of gamification in addressing emotional and cognitive challenges in language learning, contributing valuable insights into enhancing learning outcomes within EFL contexts.

The studies demonstrated a wide variation in sample sizes, reflecting the diverse research approaches adopted. Smaller-scale studies, such as Al-Jamili *et al*. [28] with approximately 60 participants and Roseni and Muho [26] with 59 participants, focused on aspects like speaking skills and language engagement. In contrast, other studies involved larger participant groups to examine broader outcomes. Most participants were from non-English-speaking countries, particularly regions such as South Korea, China, Iran, and Southeast Asia, showing the widespread global interest in leveraging gamification for English language learning.

Most of the research occurred in traditional settings like universities and schools, where gamification was part of the regular curriculum. Some studies looked at gamification in different contexts: Matviienko *et al*. [29] studied the integration of gamification into teacher education programs in Ukraine, showcasing its dual benefits: improving English language proficiency and cultivating vital teaching skills. Through a mixed-methods approach, Matviienko *et al*. reveal how gamified environments inspire learner motivation while empowering future teachers to design dynamic and engaging classrooms. Santos *et al*. [30] focused on its effects on university-level engagement and language proficiency. Studies such as Pai *et al*. [31] investigated the role of gamification in reducing English-speaking anxiety among elementary students. Through experimental methods, the research identified a significant negative correlation between gamification and speaking anxiety, alongside improvements in student confidence and motivation. The findings reveal the potential of interactive learning strategies to alleviate language anxiety and enhance learner outcomes.

The gamification components studied included points, badges, quizzes, and progress-tracking systems. For example, Panmei and Waluyo [32] investigated how mobile appli-cations like Quizizz supported vocabulary acquisition. Hong *et al*. [33] examined how gamifying grammar-based questions reduced student anxiety and increased curiosity. The research also illustrated important cognitive and emotional aspects. For instance, Chen *et al*. [34] showed that gamification can help reduce language learning anxiety and manage cognitive load, while Casanova-Mata [35] focused on boosting motivation and class participation.

The combined research suggests that gamification can enhance EFL learning, particularly vocabulary, speaking, and listening. Moreover, gamification consistently enhances learner engagement, motivation, and emotional well-being, supporting its growing utilization as an effective educational tool.

3.2. Cognitive Processes Impacted by Gamification

3.2.1. Memory

Although numerous studies have pointed out the potential of gamification to enhance memory retention and recall, their findings are not universally conclusive. For instance, Roseni and Muho [26] showed that gamified learning platforms significantly improve students' engagement and language proficiency. By fostering active participation and sustained motivation, their findings reveal how gamification supports cognitive processes like memory retention, which is essential for effective language learning. Conversely, Panmei and Waluyo [32] found that gamified learning does not significantly surpass traditional methods in terms of vocabulary retention, indicating that gamification alone may not always lead to superior outcomes. Ahmed *et al*. [36] observed a positive impact of gamification on idiomatic knowledge retention, though the extent of improvement depended on the learners' engagement levels with the game.

3.2.2. Attention

The effects of gamification on attention and focus are well supported, albeit with some limitations. Casanova-Mata [35] and Tao and Zou [37] reported a significant enhancement in student engagement and sustained attention through gamification. However, Matviienko *et al*. [29 found that gamified learning environments effectively captured and sustained students' attention by incorporating interactive tasks and dynamic activities. The study also revealed that these strategies enhanced focus during English language learning sessions, equipping future teachers with innovative techniques to engage learners and improve instructional outcomes. Similarly, Yaroshenko *et al*. [38] presented the role of gamification in enhancing attention among young learners by incorporating interactive and dynamic activities. The study demonstrates that gamified methods effectively capture and sustain students' focus, creating an engaging and cognitively stimulating learning environment in primary school English education.

3.2.3. Processing Speed

The impact of gamification on processing speed is inconclusive. Al-Sabbagh [39] reported improvements in listening and speaking processing speeds, which were attributed to the fast-paced, competitive nature of gamified activities. In contrast, Hong *et al*. [33] found no significant effect on processing speed, although they confirmed the benefits of gamification in reducing anxiety and fostering curiosity. Similarly, Panmei and Waluyo [32] noted that, while students enjoyed gamified vocabulary learning, the improvements in processing speed were not significantly better than those achieved through traditional methods.

3.2.4. Cognitive Load and Anxiety

The relationship between gamification, cognitive load, and anxiety in learning environments is complex and yields mixed results. Chen *et al*. [34] found that gamification helped reduce foreign language anxiety but sometimes introduced extraneous cognitive load due to the complexity of game mechanics. Hong *et al*. [33] similarly noted that gamification reduced anxiety by fostering curiosity but also cautioned that overly competitive environments could increase anxiety for some learners. Chen and Zhao [40] further called attention to the transient nature of these emotional benefits, suggesting that while gamification may offer short-term relief from anxiety, its long-term effects remain uncertain.

3.2.5. Learner Autonomy and Motivation

The capacity of gamification to enhance learner autonomy and motivation is a recurrent theme in the literature, although outcomes exhibit variability. Chen and Zhao [40] determined that autonomous motivation was a primary factor in students adopting gamified vocabulary applications. However, Panmei and Waluyo [32] indicated that such tools do not necessarily surpass traditional learning methods in terms of their effectiveness. Phuong observed positive attitudes towards gamified learning, although the approach was predominantly applied to vocabulary acquisition, with limited extension to other language skills [41-44].

Not all the findings were positive or without constraints. Pai *et al*. [31] found that gamified activities alleviated anxiety and boosted students' confidence and willingness to participate, promoting a more self-directed and motivated approach to language learning. Zhang *et al*. [27] demonstrated that gamification in blended learning enhances learner autonomy by boosting engagement and reducing foreign language anxiety, focusing on its role in sustaining motivation in language learning. While gamification offers considerable potential, particularly in enhancing memory, attention, and motivation [26, 27, 35], its efficacy is highly context-dependent. Numerous studies have reported diminishing effects over time, technical challenges, and a limited impact on deeper cognitive processes such as processing speed or long-term language retention [29, 31, 36]. The effectiveness of gamification is contingent on thoughtful design and sustained engagement strategies [30, 40].

3.3. The Influence of Gamification Elements on Cognitive and Learning Outcomes

This section investigates the influence of diverse gamification components and their particular effects on cognitive processes and educational outcomes. The analyzed research suggests that the efficacy of gamification strategies often depends on how these fundamental elements, including points, rewards, levels, and leaderboards, are designed and implemented.

Among the various gamification elements examined, points and rewards have emerged as the most frequently employed and consistently associated with enhanced motivation, engagement, and information retention [27, 35]. Roseni and Muho [26] confirmed that the use of gamified elements, including interactive platforms, significantly enhanced student motivation and engagement. This heightened engagement led to improved learning outcomes, particularly in language proficiency, showcasing the effectiveness of gamification in supporting cognitive and learning processes. In the same way, Zhang *et al*. [27] illustrated how

gamified elements in blended learning positively influence cognitive and learning outcomes by fostering higher engagement and alleviating foreign language anxiety, thereby enhancing students' overall language acquisition experience. This aligns with other studies that show the positive impact of rewards and badges on motivation and task completion in various EFL contexts [14, 30].

Panmei and Waluyo [32] also found that gamified vocabulary applications foster participation and increase learner autonomy; however, the resulting learning outcomes are not always superior to those achieved through traditional methods. Likewise, Arsyad *et al*. [41] demonstrated that while the integration of gamification into flipped learning environments improved motivation, it did not consistently result in better academic performance than conventional approaches. These findings suggest that while rewards are effective in fostering motivation and engagement, they may not always lead to significant improvements in learning outcomes [31].

However, the benefits of points and rewards are not universally sustained. Matviienko *et al*. [29] found that gamified teacher education programs enhance English proficiency and equip future teachers with innovative strategies, fostering cognitive engagement and improved learning outcomes. Similarly, Zhang *et al*. [27] disclosed that while gamified strategies effectively enhanced engagement and reduced foreign language anxiety, these benefits required ongoing adaptation and variation to remain effective. Such findings reveal the importance of continuously evolving reward systems to sustain long-term engagement [40, 42].

Including level and progress tracking in gamified learning environments has also demonstrated efficacy in maintaining attention and promoting task completion [39, 43-45]. Al-Sabbagh [39] observed that students exhibited increased engagement and motivation when they could visually monitor their progress through levels, resulting in accelerated acquisition of language skills, particularly in listening and speaking. These findings were corroborated by Pai *et al*. [31] and Phuong [44], who noted that progress tracking enables learners to establish clear objectives, maintain focus, and achieve higher completion rates, ultimately improving material retention.

Furthermore, Daliranfirouz *et al*. [43] found that gamified flipped classrooms significantly improved grammar, vocabulary, and reading comprehension among 327 participants, demonstrating notable enhancements in cognitive and learning outcomes. Nevertheless, Phuong [44] and Wen [42] cautioned that while progress tracking initially enhances motivation, it can also induce stress and anxiety, particularly in students who experience difficulty in keeping pace with their peers. This suggests that levels and tracking mechanisms can enhance learning, but they should be implemented judiciously to avoid creating undue emotional pressure [35].

Leaderboards, which introduce an element of competition by ranking students based on their performance, have yielded mixed outcomes across studies. Several studies have found that leaderboards significantly enhance motivation and focus among high-performance students [35]. Hong *et al*. [33] reported that leaderboards foster a competitive spirit, motivating students to practice more frequently and improve their grammar and writing skills. Similarly, Casanova-Mata [35] and Chen and Zhao [40] observed that students felt compelled to improve their performance when their rankings were visible on a leaderboard, which increased classroom engagement.

The competitive aspect of leaderboards, while motivating for some learners, has been linked to increased anxiety and negative emotional experiences, particularly among lower-performing students. Ahmed *et al*. [36] and Matviienko *et al*. [29] observed that while leaderboards can drive engagement, they may also intensify feelings of inadequacy, especially when the competition becomes overly intense. Zhao and McClure [15] further observed that while gamification, including leaderboards, can reduce anxiety and enhance motivation for some students, overly competitive environments can negate these benefits, leading to higher stress levels. These findings suggest that while leaderboards can be practical tools for enhancing performance, they should be implemented cautiously to promote healthy competition without causing emotional distress [31, 46].

The efficacy of gamification elements, including point systems, incentives, stage progression, achievement monitoring, and competitive rankings, largely depends on their implementation, educational context, and individual student characteristics. While these features generally enhance motivation, engagement, and cognitive development, they may also result in unintended negative consequences such as increased anxiety, stress, or diminished efficacy over time. For instance, Chen *et al*. [34] pointed out that poorly executed gamification approaches could potentially overwhelm students cognitively or exacerbate their anxiety. Consequently, the successful integration of gamification into language instruction necessitates meticulous planning and a good understanding of learners' needs to maximize potential benefits while mitigating adverse effects.

3.4. Emotional and Behavioral Outcomes in Gamified Learning

This section examines the emotional and behavioural impacts of gamification on language learning, as reported across various studies. The design and context of the gamified elements employed significantly influenced the following outcomes: motivation, engagement, anxiety, and emotional regulation.

3.4.1. Motivation and Engagement

Gamification is widely acknowledged for its potential to enhance learner motivation and engagement. For instance, Roseni and Muho [26] demonstrated that integrating interactive gamified elements fosters heightened motivation and active involvement among students, ultimately driving enhanced performance in language learning activities. Similarly, Zhang *et al*. [27] reported that integrating gamification into blended learning led to notable increases in student engagement and reductions in foreign language anxiety, confirming the effectiveness of gamified strategies in enhancing participation and motivation. Al-Sabbagh [39]

recorded a 93% increase in student motivation when competitive gamification elements were introduced into language learning activities, facilitating more active participation and reducing public speaking anxiety in EFL settings. Casanova-Mata [35] corroborated these findings, reporting a similar motivational increase among younger learners who engaged with game-based strategies such as the 'Among Us game.' However, some studies noted a decline in motivation over time. Matviienko *et al*. [29] revealed that gamified learning environments significantly enhance student motivation and engagement. The study acknowledged how gamification fosters active participation, making learning more dynamic and effective in boosting language proficiency and teaching competencies.

3.4.2. Anxiety and Emotional Regulation

Gamification also influences learners' anxiety levels and their ability to regulate their emotions. Chen *et al*. [34] found that well-designed gamified environments could reduce foreign language anxiety by creating immersive and engaging experiences that draw students into learning. However, other studies, such as that by Hong *et al*. [33], disclosed potential drawbacks. In comparison, gamification reduced anxiety in grammar learning, and overly competitive features, such as leaderboards and public rankings, inadvertently increased anxiety levels among some students. Similarly, Ahmed *et al*. [36] noted that while competition through leaderboards could motivate particular learners, it also heightened feelings of inadequacy and anxiety among lower-performing students. These findings acknowledge the importance of carefully balancing competition and emotional well-being when designing gamified learning environments.

3.4.3. Autonomy and Self-regulation

Gamified learning environments have been shown to support learner autonomy and self-regulation, particularly when they tap into intrinsic motivation. Chen and Zhao [40] found that students using gamified vocabulary learning applications demonstrated increased autonomy, with perceived usefulness and ease of use contributing to greater self-regulation in completing language tasks. However, these positive effects are not universally observed. Panmei and Waluyo [32] pointed out that, while students appreciated the gamified approach to vocabulary learning, these methods did not consistently outperform traditional approaches in fostering autonomy. This suggests that the alignment of gamification with learners' personal goals is crucial for realizing its full potential to support autonomy and self-regulation. The benefits may be limited when the design fails to resonate with learners' self-directed objectives.

3.4.4. Challenges and Limitations

Despite the positive emotional and behavioural outcomes, several challenges persist in gamified learning environments. Matviienko *et al*. [29] noted challenges in adopting gamification, including the steep learning curve for digital tools and unequal access to resources. Pai *et al*. [31] discussed challenges using gamified learning methods, indicating the need for thoughtfully designed activities to achieve desired outcomes. While the approach successfully reduced speaking anxiety and boosted confidence, the study pointed out the risks of cognitive overload and potential difficulties in maintaining consistent engagement. These findings show the importance of balancing gamification with practical considerations in educational settings. Zhang *et al*. [27] identified that while gamified strategies within blended learning enhanced engagement and alleviated foreign language anxiety, some students faced difficulties adapting to the interactive components of gamification. Integrating traditional and gamified methods presented challenges for particular learners, accentuating the necessity of designing flexible approaches to accommodate varying learner needs.

The emotional and behavioral outcomes of gamified learning are diverse and context-dependent. While gamification generally enhances motivation, engagement, and emotional regulation, its long-term effectiveness is contingent on thoughtful design and ongoing adjustments. A balance between competition and collaboration, along with the careful integration of progress tracking, rewards, and autonomy-supportive features, is crucial for maximizing the emotional and behavioural benefits of gamification in language learning. To sustain engagement over time, teachers and designers must continuously innovate and adapt gamified elements to meet diverse learner needs.

3.5. Cognitive Load and Learning Efficiency

This section examines the relationship between gamification and cognitive load and its influence on learning efficiency in language acquisition. Cognitive load refers to the mental effort required to process new information, and the design of gamified learning environments can either alleviate or exacerbate this load depending on the complexity of game mechanics and their alignment with learning objectives.

Several studies have studied the relationship between gamification and cognitive load in the educational setting. Adrefiza [47] demonstrated that gamification can simplify complex language tasks, reducing extraneous cognitive load and allowing students to concentrate more effectively on language retention. Also, Chen and Zhao [40] observed that gamification elements, such as points and progress tracking, helped streamline tasks and mitigate cognitive strain by organizing the learning process. However, they also noted that overly intricate game mechanics could elevate the intrinsic cognitive load, particularly for learners unfamiliar with the gaming platform or educational content. Supporting these findings, Al-Jamili *et al*. [28] reported that simplifying gamified tasks in a speaking proficiency intervention reduced mental fatigue and fostered sustained engagement. Conversely, Panmei and Waluyo [32] found no significant difference in cognitive load between gamified and traditional vocabulary learning approaches, indicating that the cognitive benefits of gamification may not be universally applicable and may largely depend on the quality and design of gamified tasks.

Regarding learning efficiency, defined as the speed and effectiveness with which students acquire language skills, findings varied across the reviewed studies. Roseni and

Muho [26] asserted that gamified elements, integrated within interactive learning platforms, significantly enhance motivation and facilitate language acquisition. Their findings suggest that these elements effectively manage the cognitive load by maintaining learner engagement, enabling a more focused and efficient approach to language learning tasks. Similarly, Gao and Pan [18] noted that gamification enhances vocabulary acquisition speed when integrated into digital learning platforms. Al-Sabbagh [39] also reported that gamification elements such as progress tracking and level-based mechanics improved students' focus, leading to faster listening and speaking skills learning compared to traditional, non-gamified environments. However, Arsyad *et al*. [41] noted that while gamification increased learner motivation, it did not always translate into superior academic performance, particularly in TOEFL assessments. This suggests that heightened engagement does not necessarily equate to improved learning efficiency.

Numerous studies have accentuated the impact of gamification on cognitive load and learning efficiency. Pai *et al*. [31] noted that incorporating multiple game elements simultaneously may overwhelm learners, especially those less experienced with digital platforms, increasing cognitive load. Likewise, Zhang *et al*. [27] observed that incorporating gamification into blended learning environments eased foreign language anxiety and fostered greater student engagement. Reducing emotional barriers facilitated a more streamlined learning process, enabling learners to allocate cognitive resources more effectively toward mastering language skills. Luo [14] also revealed that complex game mechanics can elevate the intrinsic cognitive load, especially for learners with lower proficiency levels, impeding overall learning progress.

Gamification has a manifold impact on cognitive load and learning efficiency. Well-designed gamified environments, as described by Santos *et al*. [30], can reduce the cognitive load by structuring tasks more effectively and enhancing student engagement. However, Pai *et al*. [31] found that incorporating gamified elements in English-speaking activities helped reduce the cognitive strain associated with speaking anxiety, enabling students to focus more efficiently on language tasks and boosting their confidence and motivation. To maximize the benefits of gamification, teachers must ensure that game mechanics align closely with educational objectives, while regularly updating and diversifying game elements to mitigate cognitive fatigue and disengagement. Future research should focus on refining gamification strategies to balance managing cognitive load and sustaining long-term learning efficiency, as acknowledged by several studies [18, 27, 31, 46].

3.6. Long-term Retention and Transfer of Learning

This section examines the influence of gamification on long-term information retention and the capacity to apply acquired skills in diverse contexts. The efficacy of gamification in achieving these outcomes is mainly contingent on the design and alignment of game elements with educational objectives.

Research has indicated that gamification positively affects long-term retention, particularly in language learning. Wen [42] found that gamified methods in elementary education resulted in significantly better vocabulary retention than conventional approaches. Al-Sabbagh [39] demonstrated that progress monitoring and reward systems helped maintain speaking and listening skills. Zhang *et al*. [27] revealed that incorporating gamified strategies into blended learning environments fostered sustained retention of language skills. By encouraging consistent engagement with interactive elements, the approach strengthened cognitive processing, enabling learners to apply their acquired skills in varied contexts over time effectively. Matviienko *et al*. [29] stressed that gamification in teacher education fosters the development of skills that can be transferred to real-world teaching, enabling teachers to create engaging environments that support long-term retention and language proficiency among learners. Pai *et al*. [31] revealed that gamified approaches not only reduced speaking anxiety but also fostered a sustained improvement in students' confidence and motivation, which are essential for the long-term retention and application of language skills. Ahmed *et al*. [36] stated that the extent of student engagement with gamified tasks significantly influenced retention outcomes. Their research on idiomatic language learning showed that students who interacted more deeply with game mechanics exhibited better long-term retention, revealing the importance of continued involvement in maximizing retention benefits.

The ability to apply learned skills to new contexts is another crucial outcome of gamified learning environments. Casanova-Mata [35] discovered that incorporating team-based competitive strategies within gamification considerably improved students' capacity to use communication skills in various settings, such as group discussions and presentations. This finding indicates that gamification can facilitate the transfer of social and communication skills beyond the immediate learning context. On the other hand, Panmei and Waluyo [32] indicated that while gamification enhances vocabulary retention, it is less effective in promoting vocabulary knowledge in other language domains, such as reading and writing. This accentuates the necessity of carefully aligning gamified activities with broader educational objectives to maximize skill transferability. Similarly, Zhao *et al*. [45] observed that although gamified virtual reality systems improved students' vocabulary and speaking skills, these enhancements were not consistently evident in formal assessment contexts such as written examinations. This suggests the need to develop gamification designs that support skill transfer across various learning environments.

While gamification offers significant advantages, its effectiveness in promoting long-term retention and learning transfer is not without challenges. Pai *et al*. [31] warned that an excessive focus on immediate rewards, such as points and badges, might undermine the ability of gamified tasks to encourage deeper cognitive engagement and sustained knowledge transfer. Similarly, Cruz *et al*. [27] suggested that gamified platforms may fail to activate the critical cognitive processes necessary for effective learning transfer without adequate support. Moreover, Luo [34]

claimed that poorly conceived game mechanics can increase cognitive load, particularly for less proficient learners, thereby hindering retention and knowledge transfer. To address these challenges, gamification must be meticulously tailored to address learners' needs and to ensure alignment with educational objectives.

Put briefly, while gamification shows promise in enhancing long-term retention and facilitating learning transfer, its efficacy heavily depends on thoughtful design and regular updates to sustain student engagement. Teachers should focus on aligning game mechanics with broader learning goals and creating opportunities for deep cognitive engagement. Future studies should refine gamification strategies to balance retention and learning transfers across diverse educational settings.

3.7. Challenges and Limitations of Gamified Learning

Despite the well-documented advantages of gamification in language learning, such as improved motivation, engagement, and retention, several inherent challenges and limitations undermine its overall effectiveness. These issues reveal the critical need for careful design, thoughtful implementation, and the sustained maintenance of gamified learning environments to ensure long-term success.

A significant challenge lies in maintaining long-term engagement, as the initial increase in motivation often diminishes over time. Matviienko *et al*. [29] disclosed challenges in gamification, such as limited technological resources and the need for teacher training, confirming the importance of maintaining engagement and avoiding cognitive overload. Wen [42] also confirmed this trend in primary education, noting that the enthusiasm surrounding gamification tends to decrease after the novelty wears off. To address this, Gao and Pan [18] recommended regularly refreshing game elements and incorporating personalized learning paths to sustain engagement. However, this requires continuous innovation and substantial resources, raising concerns about gamified learning environments' practical sustainability.

Overemphasis on competition is another challenge that can lead to mixed outcomes for learners. Ahmed *et al*. [36] found that competitive features like leaderboards motivated high-achieving students and heightened anxiety and stress among lower-performing students. Similarly, Hong *et al*. [33] observed that competition, particularly in grammar-learning tasks, can overshadow educational objectives by forcing students to outperform their peers. In contrast, Casanova-Mata [35] demonstrated that integrating team-based competition fostered collaboration and improved communication skills, suggesting that matching competition and cooperation may be more effective in accommodating diverse learners.

Technical barriers and usability challenges remain critical obstacles in gamified learning environments. Daliranfirouz *et al*. [43] identified that while gamified flipped classrooms enhanced learning outcomes, they introduced significant workload challenges for both teachers and students, reflecting the complexities of implementing gamified strategies in language instruction. In contrast, Tao and Zou [37] demonstrated that intuitive platforms like Kahoot effectively boosted student engagement by reducing technical hurdles. These findings disclose the need for user-friendly and accessible gamification tools that prioritize functionality over unnecessary complexity.

The sustainability of gamification's benefits over time poses a significant challenge. Matviienko *et al*. [29] observed that the initial gains in retention and learning efficiency tended to wane as students acclimated to the game mechanics, disclosing the need for evolving strategies to maintain long-term effectiveness. Arsyad *et al*. [41] similarly observed that while gamification initially boosted motivation in TOEFL preparation courses, its long-term impact on academic performance plateaued. To address this issue, Luo [14] proposed incorporating dynamic and evolving game mechanics to maintain interest. However, this approach can be resource-intensive and not feasible for all educational institutions.

Furthermore, the varying impact of gamified learning environments on different learner types indicates the need for more adaptive approaches. Phuong [44] found that students with higher technological proficiency adapted well to gamification and demonstrated increased engagement and improved outcomes. In contrast, Kazazoğlu [48] reported that students with lower technological literacy, or those who preferred traditional learning methods, struggled to adapt, resulting in disengagement. Almusharraf [49] also noted that while tools like Kahoot boosted engagement in online EFL classrooms during the COVID-19 pandemic, not all students benefited equally, with some encountering difficulties adjusting to the gamified format. These findings suggest that gamified environments must be tailored to meet students' diverse needs, learning preferences, and technological proficiency.

To sum up, while gamification is promising for enhancing language learning through increased motivation, engagement, and retention, its long-term success depends on overcoming several key challenges. Effective gamification requires thoughtful design, continuous updates, and a balance between competitive and collaborative elements to sustain engagement and foster positive learning outcomes.

4. DISCUSSION

4.1. Discussion of Research Question 1

• What are the empirically supported cognitive benefits of gamification on working memory and attention among English language learners?

Multiple studies show the significant cognitive benefits of gamification for English language learners, particularly in enhancing working memory and attention. Across various educational contexts, gamified elements such as points, rewards, and progress tracking have consistently been shown to improve learners' cognitive focus and memory retention [39, 27]. These mechanisms facilitate attentional control and reinforce working memory, enabling learners to retain information more effectively and engage deeply with language tasks.

For example, Zhang *et al*. [27] demonstrated that gamified learning environments substantially enhance attention in English language learners by fostering sustained focus and task engagement through blended learning strategies. Similarly, Al-Sabbagh [39] reported that integrating progress tracking and competitive elements into language-learning activities boosts the retention of listening and speaking skills. These findings reveal how gamified strategies sustain cognitive engagement, a critical factor in effective language acquisition.

Although the cognitive advantages of gamification are well-established, their longevity may vary. Research by Matviienko *et al*. [29] and Pai *et al*. [31] indicates that the initial improvements in engagement and focus tend to wane as students become accustomed to the game-like elements. Cognitive Load Theory explains these findings by showing how gamification reduces extraneous cognitive load through structured and manageable tasks. Features such as rewards and immediate feedback allow learners to focus cognitive resources on essential language tasks like vocabulary acquisition and grammar application, minimizing distractions [20, 36]. Likewise, Flow Theory upholds gamification's role in maintaining optimal engagement by balancing task difficulty with learner skill levels. Progressive challenges and real-time rewards foster sustained focus and immersion, as noted by Tao and Zou [37].

Matviienko *et al*. [29] asserted that gamification supports working memory and attention by immersing learners in dynamic and interactive activities, reinforcing their focus on language tasks. Similarly, Pai *et al*. [31] found that gamified strategies positively influenced learners' focus and confidence during English-speaking activities, indicating the role of gamification in improving attentional control and reducing anxiety.

The observed improvements in working memory and attention align with cognitive load theory [20], which posits that reducing extraneous cognitive load in educational tasks allows learners to allocate more resources to processing and retaining information. In gamified environments, rewards and progress tracking simplify complex tasks, minimize distractions, and promote sustained cognitive engagement [36, 40]. These structured environments optimize working memory performance, ensuring learners remain focused on their language-learning objectives.

Tao and Zou [37] provided further insights into gamification's impact on attention, showing that interactive elements such as quizzes and leaderboards provide immediate feedback, which helps sustain students' focus on learning tasks. These elements maintain engagement and enhance attentional control by reducing distractions that might otherwise interfere with learners' ability to concentrate on language tasks.

Nevertheless, maintaining long-term cognitive improvements remains a significant hurdle. Studies by Matviienko *et al*. [29] and Pai *et al*. [31] have noted that the repeated use of game-like elements may result in diminishing effectiveness, ultimately leading to a stagnation in cognitive advancement. To address this issue, gamification designs should incorporate adaptable mechanics that evolve with learner progress, as Flow Theory suggests. Dynamic game features such as adjustable difficulty levels and periodic updates can help sustain engagement and support ongoing cognitive development. Without continuous evolution in design, gamified learning environments risk losing their effectiveness, as learners may disengage, and the initial cognitive gains could be lost.

To conclude, gamification presents an effective strategy for boosting working memory and attention among English language students. The incorporation of elements such as points, rewards, and progress monitoring enhances concentration on tasks and aids in language retention. Nevertheless, to maintain these advantages over time, it is crucial to continuously innovate gamification techniques, ensuring that learners remain captivated and driven throughout their language learning journey. Incorporating theoretical frameworks like Cognitive Load Theory and Flow Theory provides a deeper understanding of how gamification optimizes cognitive engagement while stressing the need for adaptive and evolving designs to maintain long-term benefits.

4.2. Discussion of Research Question 2

• How does gamification facilitate measurable improvements in memory retention and attentional control among English language learners?

The analysis of the 30 reviewed studies offers comprehensive insights into how gamification enhances memory retention and attentional control among English language learners. These cognitive benefits stem from the strategic incorporation of gamified mechanics, including rewards, real-time feedback, and progress tracking, which sustain motivation and promote deeper cognitive engagement.

A recurring theme across the studies is the positive impact of gamification on memory retention, particularly in vocabulary acquisition and the development of broader language skills. Wen [42] and Panmei and Waluyo [32] demonstrated that learners using gamified tools, such as Quizizz, achieved significantly higher vocabulary retention rates compared to those using traditional methods. Similarly, Kazazoğlu [48] found that combining repetition, immediate feedback, and competitive settings significantly enhanced learners' ability to recall vocabulary over time. These findings endorse the effectiveness of gamification in reinforcing memory through repeated exposure and active engagement.

Casanova-Mata [35] further revealed the role of immersive and interactive game-based strategies, such as 'Among Us' games, in embedding learning tasks within engaging contexts. This approach required learners to continually apply and recall vocabulary during gameplay, promoting long-term retention. Collaborative elements also emerged as crucial, as Santos *et al*. [30] noted that students involved in team-based competitions retained more information than those learning individually.

Despite its benefits, gamification's impact on memory retention has limitations. Matviienko *et al*. [29] observed that dynamic and interactive gamified activities significantly bolstered memory retention and attentional control.

However, they also pointed out that learners' sustained engagement and memory retention depend on the novelty and evolution of game mechanics. Ahmed *et al*. [36] similarly stated that the retention of idiomatic knowledge varied with learners' sustained interest, further stressing the importance of adaptive and engaging game design.

In addition to memory retention, gamification markedly enhances attentional control, enabling learners to maintain focus on language tasks. Tao and Zou [37] found that platforms like Kahoot! helped students sustain focus through real-time feedback, interactive elements, and competitive features. Santos *et al*. [30] also noted improved student focus when rewards and progress tracking were integrated into learning activities, enhancing both short-term attention and long-term engagement.

Zhang *et al*. [27] corroborated these findings, showing that incorporating gamified elements into blended learning environments strengthened cognitive focus and improved material retention. Similarly, Wen [42] demonstrated that progress tracking and rewards encouraged sustained attention during vocabulary learning, enabling better processing and retention of information.

However, maintaining attentional improvements over time presents challenges. Matviienko *et al*. [29] and Pai *et al*. [31] found that attentional gains diminished as learners became accustomed to game mechanics, confirming the need for innovative and evolving designs. Pai *et al*. [31] also noted that gamification reduced speaking anxiety and boosted confidence, facilitating attentional control and memory retention in English language tasks. To sustain these benefits, Phuong [44] advocated for gamified systems that prioritize adaptability and inclusivity, ensuring they meet diverse learner preferences and technological proficiencies.

The observed cognitive benefits align with cognitive load theory [20], which posits that reducing extraneous cognitive load enables learners to focus on essential information, enhancing retention and attentional control. Structured tasks, real-time feedback, and rewards in gamified environments reduce distractions, allowing learners to concentrate on crucial language tasks such as vocabulary acquisition and grammar application [27, 42]. Flow Theory [50] further supports these findings, suggesting that learners achieve optimal focus and engagement when tasks align with their abilities. By offering progression systems and rewards that match skill levels, gamified environments create a state of flow that sustains cognitive engagement and attentional control [48, 30].

Despite its advantages, gamification's long-term efficacy depends on dynamic and innovative designs. Matviienko *et al*. [29] cautioned that reliance on repetitive mechanics risks disengagement over time. Luo [46] and Santos *et al*. [30] declared the importance of introducing evolving challenges and tasks to maintain cognitive stimulation and engagement. Evidence confirms that gamification significantly enhances memory retention and attentional control among English language learners. However, to sustain these benefits, regular updates and innovations in game design are essential to keep learners motivated and engaged over time.

4.3. Discussion of Research Question 3

• What cognitive and motivational mechanisms underpin the enhancement driven by gamification in English language learning?

The analysis of the 30 reviewed studies provides a nuanced understanding of the cognitive and motivational mechanisms that drive the efficacy of gamification in English language learning. These mechanisms include cognitive engagement, attentional control, memory retention, intrinsic and social motivation, emotional investment, and the development of higher-order thinking skills—all crucial for creating sustainable and impactful gamified learning environments.

One of the most prominent cognitive mechanisms is the enhancement of memory retention. Gamified platforms, such as Quizizz [32, 42], employ repetition, progress tracking, and immediate feedback to strengthen learners' capacity to store and retrieve information effectively. Cognitive Load Theory explains that these features minimize extraneous cognitive load, allowing learners to focus their mental resources on essential tasks like vocabulary acquisition and language skill development. By organizing tasks and eliminating distractions, gamification facilitates the encoding, storage, and retrieval of information, promoting sustained long-term memory retention [20].

Immersive and interactive gamified environments further enhance cognitive processing. Casanova-Mata [35] demonstrated how such environments compel learners to actively apply and reinforce new language concepts through repeated, meaningful exposure. This continuous engagement with language structures in dynamic contexts helps embed knowledge, making it more readily accessible for future use. Similarly, Tao and Zou [37] and Santos *et al*. [30] found that through features like real-time feedback and competitive elements, gamified platforms effectively sustain learners' focus, fostering prolonged attentional control. These findings align with Flow Theory [50], which posits that learners achieve optimal focus when tasks balance their skill level with appropriate challenges. In gamified environments, progression systems and rewards are tailored to match learners' abilities, ensuring consistent cognitive engagement.

Gamification also cultivates higher-order cognitive skills such as problem-solving and critical thinking. Kazazoğlu [48] showcased how gamified tasks require learners to navigate complex language structures, analyze information, and apply language rules in realistic scenarios. These tasks foster deeper cognitive involvement, equipping learners to handle nuanced language challenges more effectively.

On the motivational front, gamification significantly enhances intrinsic motivation, a critical factor in maintaining sustained engagement. Zhang *et al*. [27] and Phuong [44] found that elements like points, badges, and levels provide tangible progress markers, appealing to learners' intrinsic desire for mastery and achievement. This aligns with Self-Determination Theory, which acknowledges that learners' intrinsic motivation is enhanced when their autonomy, competence, and relatedness are supported. Gamified environments foster these needs by allowing

learners to set goals, track progress, and engage in meaningful social interactions [51-53]. Moreover, Self-Efficacy Theory indicates the importance of learners' confidence in completing tasks effectively, which increases when they perceive tangible progress and receive positive reinforcement. Gamified environments leverage these principles by fostering a sense of accomplishment and promoting self-directed learning [54].

Social and competitive factors significantly influence engagement in learning. Research by Hong *et al*. [33] and Ahmed *et al*. [36] indicates that features like multiplayer modes and leaderboards encourage both teamwork and friendly rivalry, inspiring learners to enhance their performance through peer comparison. Moreover, Pai *et al*. [31] showed that gamification techniques alleviate speaking anxiety and boost confidence, concentration, and ongoing participation among learners. Activity Theory provides a valuable framework for understanding these dynamics, accentuating the interconnectedness of learners, tools, and tasks. Within gamified environments, this theory pinpoints how tools like multiplayer modes and leaderboards mediate interactions and create a collaborative and motivating learning space. Activity Theory offers a lens to analyze how gamification promotes individual and collective learning outcomes by facilitating shared objectives and encouraging engagement through competition and teamwork [53].

Nevertheless, maintaining learner engagement becomes challenging as the novelty of gamified elements wears off. Initially, features like points, rewards, and leaderboards boost motivation, but research by Matviienko *et al*. [29] and Pai *et al*. [31] indicates that their effectiveness decreases as learners become familiar with them. To combat this issue, it is essential to implement dynamic and adaptive gamification designs. Regularly updating content, introducing evolving challenges, and creating personalized learning pathways can reignite interest and maintain motivation. Additionally, incorporating thematic changes or seasonal game modifications can offer fresh opportunities for engagement. These approaches align with Activity Theory, which emphasizes the dynamic interactions among learners, tools, and evolving tasks, thereby reinforcing sustained motivation and engagement throughout the learning process [53].

Emotional engagement is another integral factor. Rewards such as digital badges and points foster a sense of accomplishment and emotional investment, as noted by Al-Sabbagh [39] and Zhang *et al*. [27]. Anticipating these rewards strengthens learners' emotional connections to their tasks, making them more likely to remain motivated and engaged. However, this emotional impact can wane over time as learners become accustomed to the rewards, underscoring the importance of regularly updating game elements to sustain engagement [36, 29].

Despite its benefits, gamification faces challenges in sustaining long-term engagement and cognitive gains. Static or repetitive game mechanics may lead to disengagement, as observed by Matviienko *et al*. [29] and Pai *et al*. [31]. To address this, Luo [14, 46] pointed out the need for evolving game designs that introduce novel challenges and adaptable tasks, ensuring ongoing cognitive stimulation and motivation. This dynamic approach prevents learners from losing interest and extends the positive effects of gamification beyond the initial engagement.

To summarize, the implementation of game-like elements enhances English language learning by leveraging cognitive and motivational processes, including better memory consolidation, increased focus, analytical reasoning, and self-driven learning. Nevertheless, to maintain these advantages long-term, updating and refining the gaming components continually is essential. Teachers must create flexible, dynamic, gamified learning environments that adapt to students' evolving requirements, ensuring sustained engagement and cognitive development.

5. PEDAGOGICAL IMPLICATIONS

This review provides significant insights into the efficacious implementation of gamification in English language education and elucidates its primary cognitive and motivational advantages. A paramount benefit of gamification is its ability to enhance memory retention and attentional control. Teachers can facilitate vocabulary acquisition while effectively managing the cognitive load by incorporating progress tracking, immediate feedback, and repetition. These mechanisms assist students in maintaining a focus on learning tasks without experiencing cognitive overwhelming, aligning with Cognitive Load Theory. Tailoring progress-tracking systems to accommodate individual student learning paces can further augment cognitive engagement. Moreover, regular modification or rotation of game elements is crucial for sustaining attention and mitigating habituation, ensuring continued cognitive benefits for students over extended periods.

This review also focuses on the role of gamification in enhancing intrinsic motivation and fostering learner autonomy. Encouraging students to establish personal objectives, monitor their progress, and experience a sense of accomplishment promotes more profound engagement with learning materials. To maximize these benefits, teachers should design tasks that empower students to assume control of their learning trajectory, transitioning from passive to active involvement. Teachers can promote autonomy and sustain student engagement by enabling students to customize their learning objectives or game elements, even as the initial enthusiasm for gamified education diminishes. This approach aligns with the Self-Determination Theory, which displays the significance of autonomy in maintaining long-term motivation.

However, the competitive nature of specific gamified environments, particularly those that utilize leaderboards, can yield mixed outcomes. While leaderboards can motivate high-achieving students, they may discourage or alienate those struggling. To mitigate this effect, teachers should strive for equilibrium between competition and collaboration. One strategy involves combining team-based challenges with individual competition, fostering cooperation, and rewarding personal efforts. For instance, group language tasks with shared incentives can motivate learners across various skill levels without imposing undue pressures.

One of the significant challenges identified in this review is ensuring sustained engagement in gamified learning environments. Although gamification initially enhances motivation and participation, its effectiveness often diminishes as students acclimate to its features. To counter this, teachers should design adaptive game elements that continuously renew interest and excitement, such as introducing new levels, seasonal updates, or surprise rewards. Furthermore, tailoring the learning experience to individual student progress can foster a dynamic and personalized educational environment, effectively reducing cognitive fatigue and preventing disengagement.

This review upholds the necessity of interdisciplinary research to examine the complex effects of gamification comprehensively. With its integration of psychological, educational, and technological dimensions, future investigations should draw upon these diverse fields to provide a deeper and more holistic understanding of how gamification shapes cognitive and motivational outcomes. Such an approach would address existing theoretical gaps and inform the development of more effective and adaptable strategies for implementing gamified learning environments.

6. LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

The limitations of this review primarily stem from the scope and focus of the analyzed studies. A substantial proportion of the reviewed studies concentrated on specific gamification elements, such as points and leaderboards, while overlooking other emerging game mechanics. This focus restricts a complete understanding of gamification's potential to improve language learning. Furthermore, most studies have measured short-term cognitive and motivational outcomes, offering limited insight into the long-term effects of gamification on language retention and proficiency development. In addition, the preponderance of studies has been conducted in formal educational settings, resulting in a gap in understanding how gamification might function in informal or self-directed learning environments. Another challenge is inconsistency in assessment methods, which makes comparing results across different contexts difficult and hinders the accurate evaluation of gamification effectiveness for various learner groups. Future research could include various gamification techniques to determine their impacts on informal learning environments and diverse cultural contexts. Expanding the range of databases in systematic reviews can help achieve a more comprehensive representation of existing literature, reducing potential biases in study selection. Longitudinal studies are necessary to assess the long-term effects of gamification on language acquisition. Moreover, additional research should be conducted on how gamification impacts different learner types, considering individual factors such as learning preferences, personality, and cognitive styles.

CONCLUSION

The findings of this systematic review affirm the substantial role of gamification in enhancing English language learning by harnessing the cognitive and motivational processes. Game elements like points, rewards, real-time feedback, and progress tracking have significantly improved memory retention, attentional control, and overall learner engagement. These cognitive improvements, particularly in vocabulary acquisition and task focus, indicate the capacity of gamification to create more effective learning environments and sustain cognitive engagement over time. Beyond cognitive advantages, gamification also amplifies motivational processes. This review demonstrates that intrinsic motivation is elevated through thoughtfully designed game mechanics that provide learners with a clear sense of progress and achievement. Gamification enhances language learning by creating more engaging and fulfilling experiences. This approach encourages students to become more emotionally and socially invested, ultimately inspiring them to play a more active role in their language acquisition journey. However, the benefits of gamification are limited. Cognitive and motivational gains can diminish over time, particularly in scenarios in which game elements become repetitive or predictable. To ensure sustained effectiveness, ongoing innovation is crucial, and game structures must be regularly updated with new challenges and varied content. A well-rounded approach that balances competition with collaboration is also necessary to maintain learner engagement, prevent cognitive fatigue, and reduce anxiety, especially among lower-performing students. This review further confirms the importance of personalized gamification strategies tailored to individual learning preferences. Customizing game elements to align with learners' unique needs and extending gamified learning beyond traditional classrooms into informal and self-directed environments unlocks even more significant potential. Gamification can promote enduring motivation and continuous involvement in language learning by encouraging students' autonomy and flexibility. Essentially, gamification offers a versatile framework for enhancing English language learning by tapping into cognitive and motivational mechanisms, thereby promoting holistic engagement. For teachers, the primary challenge lies in designing gamified environments that are flexible, inclusive, and capable of sustaining long-term learner interests. As the field of gamification progresses, future studies should evaluate its applications and assess its effects on language competence to ensure that its advantages remain substantial and long-lasting.

AUTHORS' CONTRIBUTION

M.H.A-K.: Study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

ABBREVIATION

PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses

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SUPPLEMENTARY MATERIAL

PRISMA checklist is available as supplementary material on the publisher's website along with the published article.

APPENDIX

Summary of selected studies for the systematic review on gamification in english language learning.

S.No.	Study Title	Author(s)	Year	Study Design	Summary
1	Impact of Gamification and Interactive Language Learning Platforms on Engagement and Proficiency	Roseni & Muho	2024	Quantitative	The study assesses the impact of gamification and interactive learning platforms on student engagement and proficiency in English language learning. Data from 59 university students show enhanced motivation and language skills.
2	Effects of Blended Learning by Gamification on Chinese College Students' Learning Engagement	Zhang *et al*.	2024	Mixed Methods	Assesses how gamification in blended learning impacts engagement and reduces foreign language anxiety. Findings show significant improvement in learning engagement and lowered anxiety, with practical insights for teachers.
3	The Impact of Integrating Gamification Strategies on English Speaking Anxiety	Pai *et al*.	2024	Experimental	Examines gamification's role in reducing speaking anxiety and improving performance among elementary students. Results reveal a negative correlation between gamification and anxiety, with students favoring the interactive approach.
4	Gamified English Language Learning in Ukraine	Matviienko *et al*.	2023	Mixed Methods	Investigates gamification's effects in teacher education programs in Ukraine, representing its role in enhancing teacher competencies and English proficiency while preparing students for global educational standards.
5	Enhancing English Language Skills Through Gamification: A Case Study at Umm Al Quwain University	Al-Sabbagh, A.	2023	Case Study	The case study found significant improvements in English speaking, listening, reading, and writing skills, recommending gamification integration in e-learning programs.
6	Gamified-Flipped English Classes and L2 Learners' Achievement and Perceptions	Daliranfirouz *et al*.	2024	Mixed Methods	Evaluates the benefits of gamified-flipped classrooms on grammar, vocabulary, and reading comprehension. Findings show significant achievement improvements and positive learner perceptions, despite workload challenges.
7	Using Gamification in the English Classroom: Impact on Motivation and Learning Outcomes	Adrefiza, A.	2022	Qualitative Study	This qualitative study found gamification enhanced academic performance and motivation in English classes, offering valuable insights for teachers and decision-makers.
8	The Pedagogical Use of Gamification in English Vocabulary Training and Learning in Higher Education	Panmei, B., & Waluyo, B.	2022	Quasi-Experimental	This quasi-experimental study found gamification apps facilitate vocabulary learning and foster learner autonomy, although traditional methods produced similar results.
9	Effects of Gamifying Questions on English Grammar Learning Mediated by Epistemic Curiosity and Language Anxiety	Hong *et al*.	2020	Experimental	This study showed gamification reduced learning anxiety and increased epistemic curiosity, positively impacting attitudes toward gamification and learning progress.
10	The Effect of Gamification Learning on Primary School Students' Second Language Learning	Wen, X.	2023	Experimental	This study focused on vocabulary, grammar, and language ability, finding gamification significantly improved primary school students' second language learning outcomes.
11	Enhancing English Acquisition: Effects of Among Us Game-Based Gamification on Language Competence, Motivation, Attention, and Attitude	Casanova-Mata, I.	2023	Experimental	This experimental study found the "Among Us" game significantly improved language competence, motivation, and attention among primary students.
12	The Modern Principles of Gamification in Teaching English as a Foreign Language	Yaroshenko *et al*.	2022	Qualitative	Examines gamification principles in primary school EFL contexts, showing its potential to increase motivation and learning outcomes through innovative teaching methods that align with students' digital environments.
13	Comparative Analysis of Gamification and Storytelling Strategies in EFL Vocabulary Acquisition	Kazazoğlu, S.	2023	Comparative Study	This study compared gamification and storytelling, finding gamification more effective in vocabulary retention for young learners.

(Table) contd.....

S.No.	Study Title	Author(s)	Year	Study Design	Summary
14	Gamified Learning: Are Vietnamese EFL Learners Ready Yet?	Phuong, H.	2020	Mixed-Methods	This study discoverd the readiness and attitudes of Vietnamese EFL learners towards online-based gamification, finding positive attitudes but limited gamification use beyond vocabulary learning.
15	Factors Contributing to Teachers' Acceptance Intention to Gamified EFL Tools: A Scale Development Study	Luo, Z.	2024	Scale Development Study	This study developed a scale to measure teachers' acceptance of gamified EFL tools, affirming perceived usefulness and ease of use as key factors.
16	Understanding Chinese EFL Learners' Acceptance of Gamified Vocabulary Learning Apps	Chen, Y., & Zhao, S.	2022	Survey Study	This study found that Chinese EFL learners preferred gamified apps due to autonomous motivation, with perceived usefulness and ease of use influencing acceptance.
17	Evaluating the Efficacy of Computer Games-Based Learning in Enhancing English Speaking Proficiency	Al-Jamili *et al*.	2024	Action Research	This study showed that game-based learning improved ESL learners' speaking skills more effectively than traditional methods.
18	A Longitudinal Study on Students' Foreign Language Anxiety and Cognitive Load in Gamified Classes	Chen *et al*.	2022	Longitudinal Study	This study found that gamification reduced foreign language anxiety but had mixed effects on cognitive load, influencing language learning outcomes.
19	Gamification as a Tool for Learning English: The EWB-UFS Case	Santos *et al*.	2020	Case Study	This study detailed a gamified course designed to teach English, finding positive results in engagement and performance.
20	Students' Perceptions of the Use of Kahoot! in EFL Classroom Learning Contexts	Tao, Y., & Zou, B.	2023	Mixed-Methods	This study found that Kahoot! increased motivation, engagement, and learning effectiveness in EFL classrooms.
21	Teachers' and Students' Perception of Gamification in Online Tertiary Education During the Pandemic	Chan, S., & Lo, N.	2022	Survey Study	This study studied how gamification tools affected university students' and teachers' motivation and participation in online learning during the pandemic.
22	Learning English Vocabulary Through Playing Games: The Gamification Design of Vocabulary Learning Applications	Gao, Y., & Pan, L.	2023	Design Study	This study examined gamification design in vocabulary learning applications, finding that multimodal and interactive features significantly enhanced learning.
23	Assessing the Effects of Gamification on Developing EFL Learners' Idiomatic Knowledge	Ahmed *et al*.	2022	Quasi-Experimental	This study found that gamification improved idiomatic knowledge in Iranian EFL learners, with positive attitudes toward the approach.
24	Effects of Self-Regulated Gamified Virtual Reality System on Students' English Learning Performance	Zhao *et al*.	2023	Quasi-Experimental	This study found that a self-regulated gamified VR system improved students' English vocabulary, speaking, self-regulation, and learning motivation.
25	Serious Game Design Model for Language Learning in Cultural Contexts	Ishaq *et al*.	2022	Design Study	This study presented a serious game design model for language learning, finding that culturally contextualized games significantly enhanced learning outcomes.
26	Station Rotation with Gamification Approach to Increase Engagement in Learning English Online	Zhao & Abdullah	2023	Qualitative	Investigates gamification within the station rotation model for online English learning. Results indicate enhanced cognitive, emotional, and behavioral engagement, offering practical insights for future gamified learning models.
27	Incorporation of a Game-Based Approach into EFL Online Classrooms	Almusharraf, N.	2023	Survey Study	This study invistigated students' perceptions of using Kahoot! in EFL online classrooms, finding increased motivation, engagement, and interaction.
28	Determinants of Perceived Usefulness in Gamification for Classroom-Based ESL Teaching	Luo, Z.	2023	Scale Development Study	This study developed a scale measuring the perceived usefulness of gamified learning tools for ESL teaching, finding curriculum-relatedness and social influence as key factors.
29	English Language Learning Through Non-Technology Games: A Case Study of International Students at a Lithuanian University	Annamalai *et al*.	2021	Case Study	This case study found that non-technology gamified English lessons improved students' proficiency and 21st-century learning skills.
30	Enhancing TOEFL Performance Through Integrated Flipped and Gamified Learning	Arsyad *et al*.	2024	Mixed-Methods	This study found that integrated flipped and gamified learning improved TOEFL performance, particularly in listening and reading skills.

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