Gamification and Digital Game-Based Learning in Enhancing Reading Motivation and Self-efficacy Among ESL/EFL Learners: A Systematic Literature Review

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Abstract

This systematic literature review investigates the role of gamification and digital game-based learning (DGBL) in enhancing reading motivation, engagement, self-efficacy, and self-regulated learning (SRL) among ESL/EFL learners. Given the growing global interest in learner-centered, technology-enhanced education, this review synthesizes empirical findings from 56 peer-reviewed studies published between 2021-2025. Scopus was used as the sole database because it offers broad yet curated coverage of peer-reviewed journals across education, linguistics, and psychology, and provides consistent indexing and citation metadata that facilitate transparent PRISMA screening and replicable searches. The selected literature was thematically analyzed and categorized into five domains. Findings reveal that gamified and DGBL interventions consistently improve learners' intrinsic and extrinsic motivation toward reading, support the development of self-efficacy, and promote sustained engagement. Game mechanics such as feedback loops, narratives, and competitive structures were linked to increased reading comprehension, higher learner confidence, and reduced language anxiety. The integration of technological tools (e.g., mobile apps, learning management systems, AI-enhanced platforms) further enhanced SRL by fostering goal-setting, learner autonomy, and self-monitoring behaviors. Comparative studies indicate that gamified methods often outperform traditional approaches across various contexts and learner types, particularly among struggling learners as well as young and adult learners. The review underscores the importance of aligning game design elements with educational objectives and learner characteristics. It also highlights implementation challenges such as technological access, educator readiness, and potential cognitive overload. This review contributes theoretically grounded, practice-oriented insights into optimizing ESL/EFL reading instruction and offers recommendations for future research and pedagogical innovation.

Keywords: reading motivation; self-efficacy; self-regulated learning; educational technology

1. Introduction

Reading motivation and self-efficacy are foundational psychological constructs in second language acquisition, particularly within English as a Second Language (ESL) and English as a Foreign Language (EFL) contexts. These constructs determine not only learners' engagement with texts but also their perseverance and performance in reading tasks, which are central to successful language mastery. Wang & Gan,(2021) found that extrinsic motivation plays a substantial role in supporting ESL/EFL learners' reading habits, suggesting that external incentives are crucial for sustaining attention and fostering productive reading behaviors. Rahman & Mohamad, (2023) further emphasize that cultivating reading motivation is a prerequisite for developing strong comprehension skills and language proficiency. Learners who are motivated are more likely to adopt effective reading strategies, maintain interest in reading over time, and engage in deeper cognitive processing (Galiansa et al., 2020).

Equally significant is the role of self-efficacy—an individual's belief in their capacity to accomplish specific tasks. In the domain of reading, high self-efficacy correlates positively with learners' willingness to tackle complex texts, their perseverance during difficult reading tasks, and their use of metacognitive strategies (C.-T. Li et al., 2022; Wahyuni et al., 2020). Learners with higher self-efficacy tend to be more autonomous, resilient, and motivated to achieve language-related goals, which leads to better academic outcomes.

Gamification involves the application of game design elements—such as points, badges, and leaderboards—in non-game educational contexts to stimulate learner engagement (Abdeen & Albiladi, 2021; Almufareh, 2021). DGBL, on the other hand, refers to the intentional use of digital games as vehicles for delivering instructional content (Alhebshi(Alhebshi & Halabi, 2020; Yunus & Tan, 2021). The use of gamification and DGBL in language education aligns with the learning preferences of digital-native learners. (Z. Liu et al., 2020) highlight the significance of well-designed educational games in promoting autonomous motivation through features such as personalized feedback, adaptive challenges, and immersive narratives. Lăpădat & Lăpădat, (2024) underscore how these environments can reduce anxiety, increase learner autonomy, and improve overall classroom dynamics. Similarly, mobile apps have been shown to increase motivation by instilling rewards and competition into learning tasks (Ainil Sulaiman et al., 2023; Munirah & Sahriani, 2024).

This systematic literature review is both timely and necessary. While numerous empirical studies have examined the role of gamification and DGBL in language learning, there remains a lack of comprehensive synthesis focusing specifically on their impact on reading motivation and self-efficacy in ESL/EFL contexts. Previous reviews have often targeted broader cognitive or affective outcomes, vocabulary development, or general attitudes toward language learning. However, the intersection of gamified tools and psychological constructs like reading motivation and self-efficacy warrants focused attention given the evolving landscape of digital pedagogy and the increasing need for learner-centered approaches.

This review aims to assess the impact of gamification and digital game-based learning on reading motivation and self-efficacy in ESL/EFL learners. It identifies effective game design features and technological implementations while evaluating the conditions that enhance gamification's benefits. Additionally, it explores effective instructional strategies and examines the limitations and challenges in various educational contexts.

The scope of this review spans a five-year period (2021–2025) and encompasses a global range of ESL/EFL contexts. This includes formal and informal learning settings in both developed and developing countries, across educational levels from primary to tertiary. Subtopics examined include types of gamification (e.g., points-based systems, narrative-driven games), forms of digital game-based tools (e.g., mobile apps, virtual simulations), and methods of measuring reading motivation and self-efficacy.

Reading motivation encompasses both intrinsic (personal interest, enjoyment) and extrinsic (grades, rewards) motivational drivers that influence a learner's willingness to engage with reading materials (Rahman & Mohamad, 2023; Y. Wang et al., 2022). Self-efficacy is defined as a learner's belief in their capability to perform reading tasks successfully, which influences their effort, persistence, and choice of strategies (Y. Li et al., 2024). ESL/EFL learners include students who are learning English either in a primarily English-speaking country (ESL) or in a country where English is a foreign language (EFL).

By systematically analyzing existing empirical studies, this review seeks to contribute to the growing body of literature on educational technology and language learning, with a specific focus on enhancing motivational and affective dimensions through gamification and DGBL. The insights provided are intended to support researchers, practitioners, and instructional designers in developing more effective, engaging, and theoretically grounded reading programs for ESL/EFL learners.

2. Methods

2.1 Search Strategy

To ensure the comprehensiveness and relevance of this systematic literature review (SLR), the search strategy was meticulously designed following established practices in the domains of educational technology and language learning. The Scopus database served as the primary source for literature retrieval due to its rigorous indexing of peer-reviewed publications in education, psychology, and linguistics. This choice aligns with recommendations by (Rajasagaran & Ismail, 2022), who emphasized the importance of selecting scholarly databases such as Scopus, ERIC, and Web of Science when conducting reviews on educational innovations and cognitive constructs.

The search terms were formulated to capture the intersection of key constructs under review—namely, gamification, digital game-based learning (DGBL), reading motivation, self-efficacy, and ESL/EFL contexts. Boolean operators and wildcard symbols were used to refine the query and increase specificity. The core keyword string was**:(**"reading motivation" AND "language learning" AND "self-regulated" AND learning AND English AND language AND teaching)

This combination allowed for the inclusion of studies that examined either one or both of the psychological constructs in relation to gamified or game-based instructional environments within second or foreign language learning settings. The time frame for the search was limited to publications between January 2021 and March 2025, ensuring a focus on the most recent empirical contributions and technological innovations.

2.2 Screening and Selection Process

The selection process followed a multi-phase protocol to ensure relevance, objectivity, and replicability. This process was guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which is widely adopted for systematic reviews in educational research (Sukadari et al., 2023).

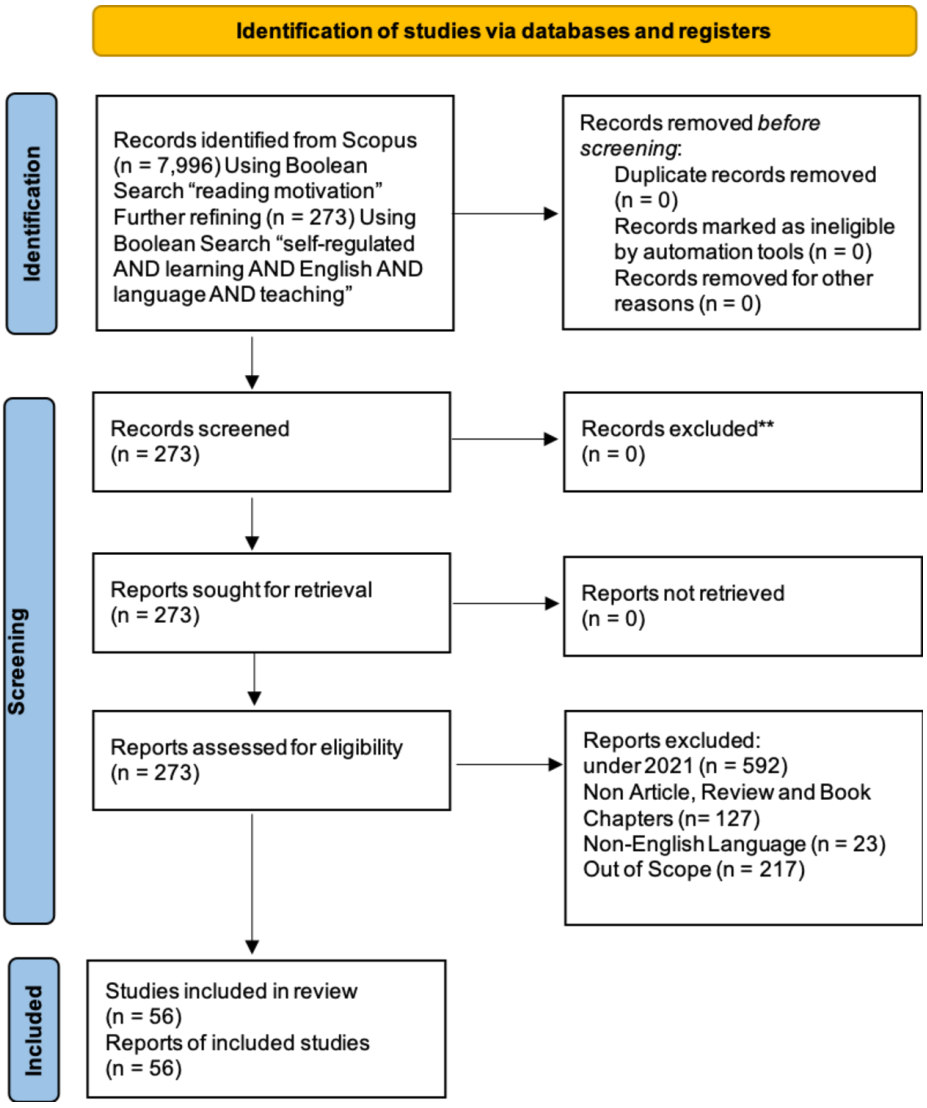

Figure 1. The PRISMA flow diagram

Throughout this process, each decision (to include or exclude a study) was documented, and any uncertainties were resolved through discussion among the reviewers. This rigorous screening approach ensured that the final corpus of studies was both relevant to the review questions and of high methodological quality.

3. Theoretical Framework

3.1 Theories and Models

3.1.1 Self-Determination Theory (SDT)

Self-Determination Theory (SDT), developed by Deci and Ryan, is a widely accepted motivational framework that explains human behavior in terms of three fundamental psychological needs: autonomy, competence, and relatedness (Vallerand, 2000). In the context of ESL/EFL education, SDT provides valuable insights into how intrinsic motivation can be cultivated through instructional design, particularly when using gamified and digital game-based learning approaches. Gamified environments can fulfill these needs by offering learners choices in their learning paths or avatars (supporting autonomy), providing progressive feedback and level-up mechanisms (enhancing competence), and including collaborative elements such as multiplayer tasks or peer interaction (fostering relatedness) (Nurhidayat & Handayaningrum, 2024).

When these needs are satisfied, learners often perceive tasks as enjoyable and personally meaningful, thereby enhancing their intrinsic motivation. For instance, (J. Zhang, 2024) noted that gamified tasks allowing for student choice and providing visual progress indicators significantly contributed to learners' sense of competence and motivation. Similarly, (Madrilejos, 2025) highlighted the significance of peer interaction within gamified platforms, observing that the sense of community (relatedness) in these environments can enhance student engagement and persistence in language tasks.

3.1.2 Social Cognitive Theory (SCT)

Social Cognitive Theory (SCT), developed by Bandura, emphasizes the influence of observational learning, social modeling, and perceived self-efficacy on behavior and motivation. According to SCT, a learner's belief in their ability to succeed (self-efficacy) is crucial in determining their engagement, persistence, and academic success. In gamified ESL/EFL settings, self-efficacy is often nurtured through mechanisms such as immediate feedback, attainable challenges, and peer support (Bandura, 1991).

Digital platforms that incorporate gamification features can be particularly effective in building self-efficacy. For example, (Madrilejos, 2025) observed that timely feedback and collaborative scaffolding in a digital game-based environment contributed to learners' growing belief in their capabilities. (J. Zhang, 2024) also stated that higher self-efficacy was correlated with stronger resilience in overcoming challenges, a vital factor in the complex process of second language acquisition.

3.1.3 Zone of Proximal Development (ZPD)

Vygotsky's Zone of Proximal Development (ZPD) explains that learners develop when they work on tasks slightly beyond their current ability with guidance from a more knowledgeable other. This view emphasizes learning as a socially mediated process supported by interaction and structured assistance (Ahmadishokouh & Samadi, 2021).

In ESL/EFL reading, ZPD is relevant because comprehension and reading strategies can improve when learners receive temporary support and gradually gain independence. In gamified learning, ZPD can be framed through how tasks provide progressive challenge and scaffolded help (e.g., prompts or guided steps) so learners can attempt more complex reading tasks than they could manage alone. From a ZPD perspective, the key is that support should be responsive, goal-aligned, and reduced as learners become more capable.

3.2 Major Scholars and Schools of Thought

3.2.1 Bandura and Self-Efficacy

Albert Bandura's work is seminal in understanding how beliefs about one's abilities influence learning behavior. In Self-Efficacy: The Exercise of Control (1997), Bandura defines self-efficacy as the belief in one's ability to take action in various situations. This concept is crucial in studies of motivation among ESL/EFL learners. Individuals with high self-efficacy are more likely to tackle difficult tasks, persist through challenges, and recover quickly from setbacks.

This perspective has direct implications for gamified learning environments where learners often face a series of challenges that require sustained effort. Feedback mechanisms commonly found in educational games—such as progress bars, points, or digital badges—serve as reinforcements, helping learners gauge their competence and build confidence in their reading and language abilities (Bandura, 1991; Madrilejos, 2025). By gradually increasing task difficulty and celebrating incremental successes, gamified systems encourage learners to believe in their capacity to improve.

3.2.2 Deci and Ryan on Motivation

Deci and Ryan's SDT distinguishes between intrinsic and extrinsic motivation, offering a continuum that informs instructional design in ESL/EFL contexts. Intrinsic motivation arises from genuine interest or enjoyment in the learning task itself, whereas extrinsic motivation is driven by external rewards or pressures. Gamified learning environments can be designed to support both forms of motivation by embedding external rewards (e.g., badges, leaderboards) while also ensuring that the tasks are inherently enjoyable or meaningful (Nurhidayat & Handayaningrum, 2024). Gamified activities that align with Self-Determination Theory (SDT) principles generally enhance learner engagement and enjoyment. The key is to design gamification in a manner that external rewards do not diminish intrinsic interest but instead complement it by guiding learners toward their valued goals (Yusriani & Patiro, 2025).

3.3 Ongoing Debates and Controversies

3.3.1 Motivation: Intrinsic or Extrinsic?

Despite their potential benefits, gamification approaches are sometimes critiqued for placing too much emphasis on extrinsic motivators at the expense of intrinsic motivation. (S. Zhang & Hasim, 2023) observed that while gamified environments can boost immediate motivation through points and rewards, the sustainability of this motivation is questionable. Some educators argue that over-reliance on external rewards (like scores or prizes) may undermine learners' inherent interest in the subject matter once the rewards are removed.

This concern is echoed in debates about *motivational transfer*—whether motivation gained in a gamified setting translates into genuine, long-term interest in language learning. The balance between creating an enjoyable, game-like experience and maintaining educational rigor remains contentious, suggesting the need for careful instructional design. Ensuring that gamified tasks have educational value and are tied to learners' personal goals can help address this issue, by making the extrinsic rewards a bridge to intrinsic engagement rather than a substitute for it.

3.3.2 Competition vs. Collaboration

Another point of contention in gamification research involves the role of competition versus collaboration. While a competitive element (such as leaderboards) can drive engagement for some learners, an excessive focus on competition may lead to anxiety or diminished self-esteem, especially among lower-performing students.

To mitigate potential negative effects, many researchers advocate for incorporating cooperative game mechanics that promote teamwork

and collective achievement. Yusriani & Patiro, (2025) highlighted that peer collaboration in gamified tasks can enhance both motivation and self-efficacy by providing social support and shared purpose, aligning with the principles of SDT and SCT. The ongoing debate suggests that the most effective gamified learning designs may be those that strike a balance—encouraging healthy competition while also fostering a sense of community and mutual support.

3.3.3 Implementation and Educational Outcomes

A recurring debate in the literature concerns whether the educational benefits of gamification justify the time and resources required for implementation. (Luo, 2024) argue that the positive effects of gamification on learning outcomes are sometimes overstated or not consistently replicated across different studies. Demirbilek et al.,(2022) called for more empirical research to evaluate the long-term efficacy of gamified learning interventions, particularly across diverse educational settings.

In response to such critiques, proponents point out that many variables (such as quality of implementation, teacher training, and context) can influence outcomes. Thus, some failures or inconsistencies might be due to poor implementation rather than flaws in gamification itself. There is an ongoing discussion about best practices for implementing gamified learning—how to train educators, how to integrate games with curriculum, and how to ensure that engagement in the game translates to learning gains.

3.4 Emerging Concerns in Digital Game-Based Learning (DGBL)

3.4.1 Cognitive Load

DGBL environments, while engaging, can impose high cognitive demands on learners. Complex game interfaces or elaborate game mechanics may sometimes distract learners from the instructional objectives, resulting in only superficial engagement with the learning content. (Khatoon, 2023) highlighted that ESL/EFL learners could struggle with *extraneous cognitive load* when navigating poorly designed educational games, especially since they are already processing complex linguistic information in a second language. Thus, an important consideration in DGBL design is ensuring that the game elements enhance rather than hinder focus on the learning material..

3.4.2 Reward Dependency

Another challenge involves learners becoming overly dependent on extrinsic rewards. Hersi,(2024) warned that if students are conditioned to learn only when a game reward is at stake, they might lose intrinsic interest in reading itself, leading to disengagement once the rewards are removed. Educators are encouraged to design gamified experiences that gradually shift the emphasis from extrinsic to intrinsic motivators. For example, initial stages of a gamified reading program might use points and badges to hook students, but later stages might focus more on personal goal-setting and self-reflection to cultivate internal satisfaction from reading.

4. Result

This section reports the main findings of the 56 studies reviewed, organised into five thematic domains: (4.1) gamification, reading motivation, and learner engagement; (4.2) digital game-based learning (DGBL) and self-efficacy; (4.3) technological integration and self-regulated learning (SRL); (4.4) comparative effectiveness of gamified versus traditional approaches; and (4.5) design features, implementation challenges, and future directions.

4.1 Gamification, Reading Motivation, and Learner Engagement

The 12 empirical studies summarised in Table 1 indicate that gamified instructional designs generally enhance reading motivation and engagement in ESL/EFL contexts. These interventions leverage both intrinsic (enjoyment, interest) and extrinsic (rewards, competition) mechanisms, and often draw on principles consistent with Self-Determination Theory (SDT) and Social Cognitive Theory (SCT).

Table 1. Gamification, Reading Motivation, and Learner Engagement (n = 12)

Author(s)	Year	Gamification/Engagement Intervention	Motivation/Engagement Measures	Key Outcomes	Reference
Qiao et al.	2022	Online gamified morphological awareness platform with SRL support	Intrinsic motivation scale	↑ intrinsic motivation & morphology learning	(Qiao et al., 2022)
Casanova Mata	2023	"Among Us" game-based ESL unit	Reading motivation checklist	↑ reading scores & positive attitude	(Casanova Mata, 2023)
Chang & Hwang	2024	Motivation model digital English game	Gaming motivation log	↑ professional English proficiency & engagement	(Chang & Hwang, 2024)
Pérez et al.	2025	Virtual reality CLIL vocabulary game	Self-efficacy & engagement survey	↑ reading/listening performance & self-efficacy	(Pérez et al., 2025)
Siraji	2025	TikTok short video tasks	Interview-derived themes	↑ vocabulary breadth & confidence	(Siraji, 2025)
Ismail et al.	2023	Task-based reading missions	L2 grit & anxiety scales	↑ motivation; ↓ anxiety	(Ismail et al., 2023)
Saito	2025	Extensive reading program (with M-Reader analytics)	M-Reader analytics data	Engagement predicts proficiency gains	(Saito, 2025)
Maharsi et al.	2024	Directed motivational currents in extensive reading	Reading diaries & interviews (IPA)	Four motivational wave patterns identified	(Maharsi et al., 2024)
Khonamri et al.	2024	Weekly reading circles	Learning journals	↑ reading motivation & engagement	(Khonamri et

					al., 2024)
Linde & Daniela	2025	"Reading Circle" graded reader project	Teacher questionnaire	↑ motivation & comprehension	(Linde & Daniela, 2025)
Romero-Gonzá lez et al.	2023	Active Home Literacy Environment (home/school collaboration)	Parent/teacher survey	↑ reading motivation (ages 6–8)	(Romero-Gonzá lez et al., 2023)
Gallagher et al.	2023	USHER history-themed reading intervention	Reading engagement log	Mixed results; variable gains across classes	(Gallagher et al., 2023)

4.1.1 Intrinsic Motivation and Meaningful Engagement

Several studies revealed that gamified platforms contribute to increased intrinsic motivation, which is critical for sustained engagement in reading. For instance, (S. Qiao et al., 2022) implemented an online gamified morphological awareness platform (with embedded self-regulated learning tools) and found significant gains in students' intrinsic motivation as well as improvements in morphology learning. This aligns with SDT's emphasis on fulfilling psychological needs such as autonomy and competence (Vallerand, 2000); the gamified platform likely provided a sense of choice and progress that made the learning process inherently rewarding. (Chang & Hwang, 2024) applied a motivational model in a digital English learning game and reported increased learner engagement along with the acquisition of professional vocabulary. These findings underscore the power of well-designed digital games in creating autonomy-supportive environments where learners find the act of reading and learning enjoyable in itself.

Pérez et al.,(2025) introduced a virtual reality CLIL (Content and Language Integrated Learning) game and observed not only improved reading and listening skills, but also increased self-efficacy among participants. The immersive nature of the gamified experience appeared to stimulate student interest and create a state of flow. From the perspective of SCT, this suggests that the belief in one's capability can be reinforced through interactive feedback and mastery experiences provided by the game (Bandura, 1991). In other words, as students navigated challenges in the virtual environment and succeeded, their confidence in handling real-world reading tasks grew.

4.1.2 Extrinsic Motivation, Rewards, and Recognition

Extrinsic motivators such as badges, points, and competitive elements were also found to be effective in stimulating learner effort in reading activities. (Casanova-Mata, 2023) demonstrated that an ESL reading unit structured around the popular game "Among Us" positively influenced students' reading motivation and test scores. The game-based context provided immediate rewards and a fun narrative, which kept students eager to read and solve language tasks. Ismail et al., (2023) integrated task-based reading missions into their instruction and used measures of L2 grit and anxiety; they reported that the gamified approach led to increased motivation and reduced anxiety levels among learners. These outcomes are consistent with the idea that game-based rewards and recognitions can satisfy learners' need for achievement and validation, thereby encouraging persistence (Ede, 2022; Mohammed & Özdamlı, 2021). Siraji, (2025)) adopted short-form video tasks using TikTok, which not only expanded learners' vocabulary but also boosted their confidence in using the language. While the gains from such social media-based gamified tasks can initially be attributed to extrinsic factors (likes, comments, or the novelty of using a trendy platform), over time these may transition into intrinsic motivation as learners internalize the value and enjoyment of the language learning tasks (Vallerand, 2000). In practice, this means educators might harness the appeal of extrinsic rewards to draw learners in, but the ultimate goal is to help students find personal meaning and satisfaction in reading itself.

4.1.3 Learner Engagement and Behavioral Outcomes

The studies reviewed also shed light on how gamification influences various aspects of behavioral and cognitive engagement in reading. (Saito, 2025) leveraged an M-Reader analytics system in an extensive reading program and found that students' engagement levels (e.g., consistency and volume of reading) significantly predicted their reading proficiency gains. This suggests that gamification elements which track and visibly reward ongoing participation can lead to meaningful improvements in reading skills. (Maharsi, 2024) investigating a concept called *directed motivational currents* in extensive reading, identified four distinct motivational wave patterns in learners' reading trajectories over time. These nuanced patterns indicate that a well-structured gamified system can sustain engagement—learners kept reading extensively as long as the tasks remained meaningful and appropriately challenging for them, resonating with Vygotsky's idea that optimal learning occurs just beyond the current ability level (ZPD).

Moreover, (Khonamri et al., 2024) implemented weekly reading circles as a gamified, collaborative activity, and (Linde & Daniela, 2025) ran a "Reading Circle" graded reader project. Both interventions reported significant gains in students' reading motivation and comprehension. Notably, their designs emphasized collaborative and scaffolded reading practices, meaning students worked together towards shared goals and supported each other's learning. These social and cooperative elements further validate the role of interaction in enhancing motivation, as posited by SCT. When learners engage in a community (even a gamified one) where reading is a shared adventure, their motivation can be bolstered by peer support and a sense of belonging.

4.1.4 Developmental and Contextual Considerations

Gamification strategies in reading have been applied across various age groups, and some findings highlight the importance of developmentally appropriate design. For example, (Romero-Gonzá lez et al., 2023) explored an Active Home Literacy Environment program for young learners aged 6–8. They found substantial improvements in reading motivation among these children when parents and teachers collaboratively used gamified literacy activities at home. This confirms that gamified reading practices can be effective even for early readers, but it also points to the

need for age-sensitive approaches—ones that involve parents or use story-based games that appeal to children.

On the other hand, not all gamified interventions show uniformly positive results. (Gallagher et al., 2023) reported mixed outcomes from their USHER history-themed reading intervention in high school classrooms, noting variable gains across different classes. This variability likely reflects differing contextual factors, such as how teachers facilitated the gamified activities or the learners' prior exposure to game-based learning. It suggests that while the gamification concept is broadly applicable, its success may depend on aligning the game design with the specific age group and classroom context, as well as ensuring teacher buy-in and effective implementation.

4.1.5 Summary of Theme 1

Overall, the studies in this theme suggest that well-designed gamified activities can enhance ESL/EFL learners' reading motivation and engagement through a combination of intrinsic and extrinsic mechanisms, social collaboration, and data-informed feedback. At the same time, variability in outcomes points to the importance of contextual alignment, age-sensitive design, and consistent implementation

4.2 Digital Game-Based Learning (DGBL) and Self-Efficacy

The second theme focuses on 12 studies that examine how DGBL and related digital tools shape learners' self-efficacy in ESL/EFL contexts (Table 2). Grounded in Bandura's Social Cognitive Theory, these studies highlight the role of motivation, SRL, and affective experiences in developing learners' beliefs about their capabilities.

Table 2. Digital Game-Based Learning (DGBL) and Self-Efficacy (n = 12)

Author(s)	Year	Digital/Game Tool	Self-Efficacy Instrument	Major Finding	Reference
Almayez et al.	2025	Mobile language learning apps	English Self-Efficacy Scale	Motivation → SRL → self-efficacy pathway confirmed	(Almayez et al., 2025)
Yılmaz & Aydın	2025	AI-generated reading materials	MREQ (Motivation questionnaire)	AI-generated texts ↑ reading motivation, aiding self-efficacy	(Yılmaz & Aydın, 2025)
Al-Obaydi & Pikhart	2022	Visually based experiential tasks	Qualitative (interviews/coding)	↑ motivation & risk-taking leading to higher confidence	(Al-Obaydi & Pikhart, 2022)
Benati & Chan	2023	Structured input (SI) reading game	Motivation questionnaire	Motivation ↑ but ∅ improvement in SI learning (mixed outcome)	(Benati & Chan, 2023)
Lin	2025	Motivated CLIL model (bilingual content)	Ability self-concept scale	Self-concept mediates performance gains	(Lin, 2025)
Wei	2023	AI-mediated instruction	Self-regulated learning log	↑ L2 motivation & SRL behavior, boosting self-efficacy	(Wei, 2023)
Li et al.	2022	Intensive reading (POA approach)	L2 Motivational Self System scale (L2MSS)	↑ Ideal L2 Self (stronger self-image as English user)	(Li et al., 2022)
Shawaqfeh	2024	Gamified Jolly Phonics literacy program	Qualitative reflections	↑ literacy skills & reading motivation	(Shawaqfeh, 2024)
Shen	2025	iFIAS tech-enhanced classes	Interaction efficacy model	Language use ratio ↔ effectiveness (class interaction linked to efficacy)	(Shen, 2025)
Gao	2023	Online literature course (LMS + VC)	Reading Motivation Questionnaire	23–25% ↑ in reading motivation (associated with higher confidence)	(Gao, 2023)
Vaknin-Nusbaum & Tuckwiller	2023	Co-vitality based reading project	Well-being & motivation scales	Motivation ↔ well-being ↔ reading achievement (interlinked)	(Vaknin-Nusbaum & Tuckwiller, 2023)
Li et al.	2021	GOAL SDL reading system	Self-Directed Learning ability rubric	High SDL ability → ↑ motivation (and self-efficacy)	(Li et al., 2021)

4.2.1 Motivation, Self-Regulated Learning, and Self-Efficacy Pathways

Several studies identify motivation and SRL as key mediators of self-efficacy development. For instance, (Almayez et al., 2025) found that mobile language learning apps enhanced self-efficacy through a pathway in which increased motivation led to more frequent use of SRL strategies. Relatedly, (L. Wei, 2023a) reported a similar pattern for AI-mediated instruction, where heightened motivation and improved SRL behaviours contributed to stronger self-efficacy.

(Vaknin-Nusbaum & Tuckwiller, 2023) further showed that motivation, well-being, and reading outcomes are reciprocally related, suggesting that DGBL interventions that support positive emotional states can be particularly effective for building self-efficacy

4.2.2 Diversity of Digital Tools and Their Effects

The reviewed studies employed a wide range of digital tools, including mobile apps, AI-generated materials, LMS-based courses, and structured phonics games. For example, (Shen, 2025) found that interactive features in iFIAS-enhanced classes were associated with improved performance and interaction-related efficacy

The findings of (C.-T. Li et al., 2022) showed that students using the GOAL SDL reading system developed stronger self-directed learning habits, which in turn increased motivation and self-efficacy. Gao, (2023) reported a substantial increase in reading motivation in an online literature course that combined an LMS with virtual classroom sessions; this motivational boost coincided with higher learner confidence. These findings indicate that digital tools which promote goal-setting, independence, and frequent feedback can positively influence

self-efficacy.

4.2.3 Self-Concept, Risk-Taking, and Identity

Several studies emphasise affective and identity-related dimensions. (Al-Obaydi & Pikhart, 2022) found that visually rich experiential tasks encouraged risk-taking and increased confidence by normalising mistakes in a low-stakes game context. Lin,(2025) demonstrated that in a motivated CLIL model, learners' self-concept mediated performance gains, suggesting that DGBL environments can support positive academic identities. (C.-T. Li et al., 2022) found that an intensive reading course based on the Production-Oriented Approach increased learners' Ideal L2 Self, a construct closely linked to self-efficacy. As learners began to see themselves as competent English users, their confidence and persistence in reading tasks strengthened.

4.2.4 Mixed Outcomes and Designed Considerations

Not all DGBL interventions produced straightforward performance gains For example, Benati & Chan, (2023) reported that a structured input reading game increased motivation but did not significantly improve learning of the targeted grammar structures. This finding illustrates that enhanced motivation does not automatically translate into improved performance if game mechanics are not closely aligned with learning objectives. Overall, the studies in this theme suggest that DGBL can foster self-efficacy by combining motivational support, SRL scaffolding, and positive affective experiences. However, careful alignment between game design and instructional goals is necessary to ensure that increased engagement leads to measurable learning gains.

4.3 Technological Integration and Self-Regulated Learning

The third theme focuses on how technological tools, often used alongside gamified or game-based approaches, support SRL in ESL/EFL reading. The 12 studies summarised in Table 3 examine metacognitive strategy use, emotional regulation, contextual influences, and identity formation in technology-mediated environments.

Table 3. Technological Integration and Self-Regulated Learning (n = 12)

Author(s)	Year	Tech / Platform	SRL Strategy Focus	Result Summary	Reference
Wei D. et al.	2025	Survey & SEM analysis (motivation and strategy use)	Metacognitive strategy use (task value)	Task value ↔ SRL use (reciprocal effect)	(Wei et al., 2025)
Akopyan & Saks	2022	Readvise web platform	Metacognitive reading prompts	↑ SRL behaviors & motivation	(Akopyan & Saks, 2022)
Hong & Lee	2023	Knowledge Forum (online platform)	Knowledge-building cycles	↑ competence motivation	(Hong & Lee, 2023)
Xie & Huang	2024	Online reading portal	Motivation and anxiety mediation (MORQ)	Motivation mediates anxiety (reduces impact)	(Xie & Huang, 2024)
Chen T.-I. et al.	2023	Picture book reciprocal teaching	Interactive tasks	↑ motivation & reading comprehension	(Chen T.-I. et al., 2023)
Chen S. et al.	2022	Cross-cultural study (online surveys)	FLRAS & strategy use	Attitudes predict anxiety levels	(Chen S. et al., 2022)
Sun et al.	2024	Home literacy activities (tech-supported)	Intrinsic motivation index	Home literacy facets → ↑ vocabulary & motivation	(Sun et al., 2024)
Liu & Du	2024	Large-scale motivation survey	ELA motivation & anxiety	Motivation & anxiety → performance	(Liu & Du, 2024)
Olifant et al.	2023	4IR reading platforms (varied media)	Access vs. motivation	Diverse materials ↑ motivation	(Olifant et al., 2023)
Park	2023	SEM model (MSLQ-based)	Learning strategies mediators	Extrinsic motivation → achievement (mediated by strategies)	(Park, 2023)
Ahmad & Alam	2024	Metacognitive Reading Strategies Questionnaire (MRSQ)	Achievement motivation	AM + MRSQ ↔ proficiency (bidirectional)	(Ahmad & Alam, 2024)
Smith & Li	2022	Digital reading logs	Attitude & effort scales	Ideal L2 self predicts effort	(Smith & Li, 2022)

4.3.1 Self-Regulated Learning and Metacognitive Supports

Several studies show that technology-enhanced reading environments can foster SRL by embedding metacognitive prompts and reflective tasks. D. Wei et al., (2025) demonstrated a reciprocal relationship between task value and SRL strategy use: students who valued reading tasks tended to use more strategies, and strategic engagement increased perceived value. Akopyan & Saks, (2022) found that metacognitive prompts in the Readvise platform encouraged learners to plan, monitor, and evaluate their reading, leading to improved SRL behaviours and motivation. (Hong & Lee, 2023), showed that iterative knowledge-building cycles in Knowledge Forum enhanced competence motivation by requiring students to refine their ideas over time. These designs highlight how digital platforms can scaffold SRL by prompting learners to engage in planning, monitoring, and revision.

4.3.2 Motivation, Anxiety and Emotional Regulation

Xie & Huang, (2024) reported that motivation mediated the relationship between anxiety and online reading outcomes, suggesting that well-designed platforms can buffer negative emotional states by maintaining learners' interest. Complementing this, (T.-I. Chen et al., 2023) used reciprocal teaching with digital picture books and found gains in both motivation and comprehension, illustrating how interactive,

student-led tasks can support both affective and cognitive aspects of SRL. Large-scale survey data from (K. Chen et al., 2022; M. Liu & Du, 2024) confirmed that attitudes toward SRL, motivation, and anxiety are significant predictors of performance. These findings underscore the importance of combining cognitive strategy instruction with emotional and motivational support in technology-mediated reading.

4.3.3 Contextual and Demographic Influences

Contextual variables such as home literacy environment and cultural attitudes toward independent learning also shape SRL outcomes. Sun et al.,(2024) found that access to books and parental involvement in tech-supported home literacy activities predicted vocabulary growth and intrinsic motivation in bilingual contexts. (Smith & Li, 2022) showed that learners' Ideal L2 Selves predicted effort in digital reading logs, indicating that identity-related goals can drive sustained SRL behaviors. Collectively, these findings suggest that technology can support SRL most effectively when it is embedded in supportive home and school environments and when it aligns with learners' broader goals and identities.

4.4 Comparative Effectiveness: Gamified vs. Traditional Approaches

Ten studies directly compared gamified or motivationally enhanced approaches with more traditional instruction (Table 4). Overall, gamified methods tended to yield higher reading comprehension, stronger motivation, and reduced anxiety, although effects varied according to learner characteristics and design features.

Table 4. Comparative Effectiveness: Gamified vs. Traditional Approaches (n = 10)

Author(s)	Year	Comparison Design	Measured Outcomes	Key Comparative Result	Reference
Heydarnejad et al.	2022	PBA (gamified) vs. traditional	Reading comprehension, motivation, anxiety	PBA (gamified) group outperformed traditional (higher RC & motivation, lower anxiety)	(Heydarnejad et al., 2022)
Ritonga et al.	2022	Peer assessment (gamified) vs. self-assessment	Reading comprehension, motivation, vocabulary	Peer assessment ↑ RC & motivation (better than self-assessment)	(Ritonga et al., 2022)
Al-Qahtani & Alwaheebi	2023	Motivational teaching (with gamification) vs. traditional	Reading skills battery	Experimental (motivational) > control (better reading skills outcomes)	(Al-Qahtani & Alwaheebi, 2023)
Maghsoudi et al.	2021	High motivation vs. low motivation learners (across methods)	Reading comprehension	High initial motivation learners > Low, regardless of method (motivation baseline matters)	(Maghsoudi et al., 2021)
Luele	2023	Grade 9 vs. Grade 10 (motivational differences)	Intrinsic & extrinsic motivation	Significant grade-level differences in motivation profiles	(Luele, 2023)
Albashtawi & Al Awabdeh	2023	CALLA (strategy-focused, gamified) vs. traditional	Task value, self-efficacy	CALLA ↑ task value & self-efficacy (beats traditional)	(Albashtawi & Al Awabdeh, 2023)
Tywoniw	2023	Gamified vs. non-gamified (eye-tracking study)	Reading behaviors (eye fixation), motivation	Gamified group: more strategic visual engagement (fixation patterns linked to motivation)	(Tywoniw, 2023)
Serrano	2023	Reading-only vs. Reading-while-listening	Science vocabulary gains	Reading-only first half > combined R+L second half (better vocabulary retention)	(Serrano, 2023)
Leeming & Harris	2024	LLOS-J (motivation scale) replication in gamified vs. non-gamified	Motivation vs. proficiency link	Gamified context: improved external validity (motivation-proficiency link stronger)	(Leeming & Harris, 2024)
Zhu et al.	2024	Ideal self model (gamified context)	Engagement, reading proficiency, motivation types	Intrinsic motivation = strongest predictor of proficiency in gamified context	(Zhu et al., 2024)

Across these studies, gamified or motivationally enriched conditions frequently outperformed traditional instruction in reading outcomes and affective measures. However, findings by (Luele, 2023; Maghsoudi et al., 2021) indicate that initial motivation and developmental stage shape how learners benefit from specific approaches, suggesting that learner characteristics must be considered when adopting gamification.

4.5 Design Features, Implementation Challenges & Future Directions

The final theme synthesises 10 studies that focused on design elements, contextual factors, and broader implementation issues (Table 5). Rather than evaluating a single intervention, these studies offer cross-cutting insights into how gamified and digital reading environments can be optimised.

Table 5. Design Features, Implementation Challenges & Future Directions (n = 10)

Author(s)	Year	Design / Context Focus	Implementation Insight	Reference
Coumel et al.	2023	Syntactic priming modalities (design of practice)	Attention ↔ modality effects (interaction between how practice is presented and attention)	(Coumel et al., 2023)
Prystiananta et al.	2025	Assistive technology meta-narrative (broad review)	Tool diversity & training (varied tools require teacher training)	(Prystiananta et al., 2025)
Chen X. et al.	2021	Grit & Ideal L2 Self measures (learner traits)	Scale validation (emphasizes measuring non-cognitive traits in design)	(Chen X. et al., 2021)
Sukjairungwattana et al.	2025	Anxiety & involution (competitive pressure) study	Cultural context variation (effects depend on cultural academic pressures)	(Sukjairungwattana et al., 2025)
Cekiso	2024	Reading self-concepts (learner perceptions)	Student typologies (different profiles of readers need different support)	(Cekiso, 2024)
Mardiani & Baharuddin	2023	Literature-based EFL instruction (content-based)	Benefits for skills & culture (integrating local culture increased engagement)	(Mardiani & Baharuddin, 2023)
Chan & Rao	2025	Home-based picture book intervention	↑ intrinsic motivation (parental involvement key for young learners)	(Chan & Rao, 2025)
Al-Obaydi et al.	2024	Online oral reading program	↓ anxiety; ↑ comprehension (speaking component lowered anxiety)	(Al-Obaydi et al., 2024)
Zhou et al.	2022	Writing-from-sources course (integrating reading & writing)	Transformation self-efficacy (improved confidence in applying skills)	(Zhou et al., 2022)
Wang & Low	2024	Social media English reading (platform: social media)	Extrinsic motivation mediates performance (social media likes etc. boost performance via motivation)	(Wang & Low, 2024)

The table above provides a high-level overview of studies focusing on how gamified and digital designs are implemented and what challenges or unique insights they present. From tool diversity and the necessity of teacher training (Prystiananta et al., 2025) to cultural and psychological phenomena like *involution* (intense competition) in academic settings (Sukjairungwattana et al., 2025), these studies examine factors that influence the success of gamification beyond just "does it work or not."

One clear message from these studies is that context matters. For example, (Coumel et al., 2023) looked at syntactic priming in different modalities and found that the effectiveness of practice can depend on how the content is presented (visual, auditory, etc.), which in turn affects student attention. This kind of finding suggests that when designing gamified learning tasks, the modality (text, voice, animation) should be chosen carefully to align with learning goals and keep students' attention where it needs to be.

(Prystiananta et al., 2025) in their meta-narrative review emphasized *tool diversity and training*. With so many gamified and assistive technologies available, a key challenge is preparing educators to use them effectively. No matter how good a tool is, if teachers are not comfortable integrating it, or if they use it in a suboptimal way, students might not benefit fully. This underlines a crucial implementation point: professional development and support for teachers are as important as the technology itself.

Some studies (Cekiso, 2024; G. Chen et al., 2020) highlights the nature and typology of students. They validated the scale for fortitude and ideal L2 self, reminding that not all learners approach gamification tasks with the same diligence. Identifying different student typologies (Cekiso, 2024)– for instance, the highly motivated vs. the disengaged, or those with high reading self-concept vs. those with low – can inform differentiated design. Perhaps gamification should not be monolithic but adaptive: offer more collaborative quests for social learners, more solitary challenges for independent ones.

Chan & Rao, (2025) underscore that home-based interventions (gamified or not) significantly boost reading motivation for children, especially with parental involvement. This reflects that any educational innovation, to be maximally effective, may need a home-school partnership. Parents playing or reading together with their children in a gamified framework double the impact: they provide encouragement and accountability that a game alone might not achieve. Al-Obaydi & Pikhart, (2022) deal with an online oral reading program and find decreased anxiety and improved comprehension. It shows innovation in one skill area (speaking/oral reading) can affect another (comprehension) and emotional state (anxiety). The implication is that gamified learning should consider cross-skill effects and that addressing one area (like giving students a chance to practice reading aloud in a low-pressure, maybe game-like environment) can pay dividends elsewhere (like silent reading comprehension, because they're less anxious). Zhou et al.,(2022) in their writing-from-sources course talk about "transformation self-efficacy" – essentially students feeling confident in transferring and applying their skills (here, integrating reading into writing). This reminds designers that beyond motivation, building students' belief that "I can use what I learn in new contexts" is key. A gamified design might include scenarios where students have to use their reading to solve a problem or create something, which fosters that transfer. Y. N. Wang & Low, (2024) bring an interesting point from social media: extrinsic motivators (likes, shares) on social media posts did boost reading performance via motivation. It's a bit like turning reading into a social game. The takeaway is that sometimes extrinsic rewards in a social context (which are often discouraged in pure SDT theory) can still have net positive effects if they meaningfully engage learners – likely by giving recognition and a sense of audience for their efforts. In sum, the studies in Table 5 point toward a nuanced view of gamification: it's not a magic bullet, but when carefully designed (with attention to modality, cultural content, skill

integration) and properly implemented (with trained teachers, parental support, and awareness of student differences), it can significantly mediate successful learning experiences. They also highlight that the *future of gamification* likely involves:

- **Greater personalization/adaptive learning paths:** So each student's experience can be tailored to their level, interests, and motivational profile.
- **Integration of emerging tech ethically:** For example, using AI to adjust difficulty or using AR/VR for immersion, while ensuring accessibility and not widening digital divides.
- **Focus on teacher facilitation:** Many successes in research had enthusiastic teachers behind them; scaling gamification means investing in teacher training and resources.
- **Evaluation of long-term engagement:** Making sure games remain meaningful and aren't just fleeting gimmicks – keeping content updated, involving students in co-creating content or rules might be ways to sustain engagement.

5. Discussion

This systematic literature review synthesised evidence from 56 empirical studies (2021–2025) on gamification and digital game-based learning (DGBL) in ESL/EFL reading. Taken together, the findings indicate that gamified and game-based environments can enhance reading motivation, strengthen self-efficacy, and support sustained engagement, with growing evidence that technology-mediated features also scaffold self-regulated learning (SRL). However, effects were not uniform across studies, suggesting that gamification is not inherently beneficial; it is most effective when design choices align with instructional objectives, learner characteristics, and implementation conditions.

A consistent pattern across the reviewed literature is improved motivation and engagement, often through a blend of intrinsic and extrinsic mechanisms. From a Self-Determination Theory (SDT) lens, the strongest outcomes tended to appear when interventions supported autonomy (e.g., meaningful choice and personalisation), competence (e.g., progressive challenge and clear feedback), and relatedness (e.g., collaborative tasks and peer interaction). In such cases, learners were more likely to persist, read more frequently, and sustain effort—behaviours that predicted gains in proficiency and comprehension in several studies (Khonamri et al., 2024; H. Qiao & Zhao, 2023; Saito, 2025). At the same time, the evidence also reinforces concerns that points, badges, and leaderboards can stimulate short-term participation without guaranteeing durable motivation (S. Zhang & Hasim, 2023). Several interventions likely benefited from novelty effects or social recognition tied to new platforms. These findings suggest that extrinsic incentives are most productive when they function as an initial hook and are paired with tasks that are meaningful and progressively challenging, so that learners can internalise the value of reading.

The DGBL evidence further suggests that self-efficacy improves when digital environments provide mastery experiences, low-stakes practice, and timely feedback—mechanisms predicted by Social Cognitive Theory (SCT) (Bandura, 1991). Digital systems can strengthen these mechanisms by making progress visible (e.g., dashboards and analytics), allowing repeated attempts, and delivering support at the point of difficulty. In several studies, growth in self-efficacy co-occurred with increased motivation and SRL behaviours, indicating a reinforcing cycle in which confidence encourages strategic engagement and persistence, leading to further success (Almayez et al., 2025; L. Wei, 2023b). Beyond performance beliefs, some interventions also appeared to strengthen learners' academic self-concept and future-oriented identities such as the Ideal L2 Self (C. Li et al., 2022; Smith & Li, 2022). This identity dimension matters for reading because sustained improvement typically requires long-term practice; designs that document growth over time (reading logs, milestones, narrative progression) may therefore be especially valuable for maintaining effort.

Importantly, several studies reported increased motivation without corresponding learning gains when game mechanics were not tightly aligned with instructional targets (Benati & Chan, 2023). This pattern highlights a central interpretation across themes: engagement is necessary but not sufficient. Game actions must require the specific reading behaviours the intervention intends to develop (e.g., inference, vocabulary-in-context, monitoring comprehension), rather than rewarding superficial interaction. When alignment is weak, learners may be active in the platform without improving the targeted reading outcomes.

SRL emerged as both a mechanism explaining why gamified reading can be effective and an outcome that technology can strengthen. Studies using metacognitive prompts, task-value supports, and reflective routines suggest that learners employ SRL strategies more consistently when tasks feel meaningful and manageable (Akopyan & Saks, 2022). Platforms that prompt planning, monitoring, and evaluation can help learners move from teacher-regulated learning to self-regulation. These findings also align with ZPD-oriented reasoning: adaptive hints, guided steps, and peer-supported activities can function as scaffolds that allow learners to work just beyond their current ability. When scaffolds are well calibrated, learners experience success that strengthens competence and self-efficacy; when scaffolds are poorly calibrated or interfaces are overly complex, learners may experience cognitive overload and disengage (Khatoon, 2023).

Contextual moderators help explain variability in outcomes across the evidence base. Age and developmental level influenced responses to competition, narrative framing, and interface complexity; younger learners often benefited from simpler structures and family involvement, whereas older learners benefited from autonomy, relevance, and flexible pacing (Chan & Rao, 2025; Romero-González et al., 2023). Access to stable technology and institutional infrastructure also shaped what designs were feasible, and teacher digital competence appeared to be a practical determinant of whether gamification became meaningful learning or a disconnected add-on

(Prystiananta et al., 2025). Cultural attitudes toward gaming and competition further mattered: leaderboards or intense competition may motivate some learners, but can elevate anxiety or reduce self-esteem in high-pressure contexts (Sukjairungwattana et al., 2025; Tatli et al., 2023). Across studies, approaches that strengthened collaboration and offered optional competition appeared better positioned to maintain psychological safety while still leveraging motivational dynamics.

These interpretations point to practical implications for ESL/EFL reading instruction. First, educators and designers should prioritise alignment between mechanics and reading objectives so that rewards and progression depend on evidence of reading processes (e.g., summarising, predicting, justifying answers from the text), not only on completion or speed. Second, interventions are more likely to sustain engagement when they support autonomy, competence, and relatedness through meaningful choice of texts or pathways, actionable feedback, and structured peer interaction. Third, SRL scaffolds—such as goal-setting prompts, metacognitive check-ins, and progress tracking—should be embedded as part of the learning flow rather than treated as optional add-ons. Fourth, implementation planning is essential: teacher training, equitable access to devices/connectivity, and curricular integration determine whether gamified systems can be used consistently and effectively across diverse classrooms.

This review has limitations that should be considered when interpreting the evidence. Interventions varied substantially in duration, tool type, outcome measures, and participant profiles, reducing direct comparability across studies. Many studies were short-term, limiting conclusions about whether gains persist after novelty fades. In addition, motivation, self-efficacy, and SRL were frequently measured using self-report instruments, which can be sensitive to context and social desirability. Finally, variation in design rigor and reporting quality (including non-randomised comparisons) means that causal claims are stronger for some findings than others.

Future research should address these constraints by conducting longitudinal studies that track sustained reading habits and durable proficiency outcomes, and by testing which combinations of mechanics (feedback, narrative, collaboration, competition) best support specific learner profiles. Stronger triangulation is also needed, combining validated psychological scales with behavioural indicators (learning analytics, reading logs) to strengthen inference. Additional work in under-represented contexts—particularly low-resource environments with limited technology access and diverse cultural settings—is important for improving generalisability and equity. Finally, research should clarify transfer effects, including whether increases in motivation and self-efficacy observed in reading interventions extend to other language skills under comparable theory-informed designs.

Overall, the evidence supports gamification and DGBL as promising approaches for ESL/EFL reading when implementations are theory-informed, instructionally aligned, and context-sensitive. The most useful next step for the field is to specify what works, for whom, and under which conditions, rather than treating gamification as a uniform intervention.

6. Conclusion

This systematic literature review synthesized 56 empirical studies (2021–2025) on how gamification and digital game-based learning (DGBL) influence ESL/EFL learners' reading motivation, self-efficacy, engagement, and self-regulated learning (SRL), identifying five thematic clusters spanning motivational/engagement outcomes, self-efficacy development, technology-supported SRL, comparisons with traditional instruction, and implementation/design challenges. Overall, gamified and DGBL approaches frequently outperformed conventional methods on motivation, reading comprehension, self-efficacy, and engagement; common mechanics (e.g., feedback, badges, leaderboards, narratives) align with Self-Determination Theory by supporting autonomy, competence, and relatedness and with Social Cognitive Theory by strengthening mastery experiences and social modeling. However, effects vary by learner and contextual conditions (e.g., age, technology access, cultural attitudes), underscoring the need to align game mechanics with explicit reading objectives, embed SRL scaffolding (goal-setting, reflection), and invest in teacher training and stakeholder support to achieve sustainable benefits.

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Authors' contributions

St. Asriati Am was responsible for data collection, drafting the initial manuscript, and analyzing the data, **Muliati** was responsible for designing the study, developing the research framework, and overseeing the methodology, **Nurdevi bte Abdul** contributed to the study design, provided key revisions to the manuscript, and ensured the accuracy of the research approach, **Nunung Anugrawati** was responsible for proofreading the manuscript, checking for language accuracy, and ensuring clarity in the presentation, **Herlina Daddi** contributed to drafting the manuscript, providing critical revisions, and ensuring the coherence and flow of the content, **Harlan** played a major role in drafting the manuscript, revising it critically, and ensuring the alignment of the findings with the study's objectives, **Yulian Purnama** contributed to the drafting, revising, and final editing of the manuscript, ensuring that the research was appropriately represented in the paper. All authors read and approved the final manuscript.

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