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Technological Tools and Pedagogical Approaches in Teaching English Grammar in ESL/EFL Classroom: A Systematic Literature Review

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ABSTRACT

This comprehensive literature review seeks to evaluate the technology tools and pedagogical techniques used in the instruction of English grammar in ESL/EFL class. It aims to address two pivotal research objectives which are to find out the technological tools and pedagogical approaches in teaching English grammar within ESL/EFL class. By using PRISMA framework, 16 scholarly articles published between 2021 and 2024 were meticulously selected from the ERIC and Scopus repositories for comprehensive analysis. The review delineated five principal categories of technological instruments which are Game-Based Tools, Visual Presentation Tools, Mobile Learning Applications, Collaborative and Interactive Tools and Artificial Intelligence (AI) Tools that provide adaptive learning experiences. Six pedagogical methodologies also emerged as significant which are Deductive and Inductive Approaches, the Eclectic Approach, Communicative Language Teaching (CLT), Game-Based Learning and the Corrective Feedback Approach. These approaches were frequently integrated with technological resources to meet diverse learner requirements, foster active participation and enhance grammatical accuracy. The findings underscore the critical necessity of aligning technological resources with suitable pedagogical strategies to facilitate effective grammar teaching.

KEYWORDS: English grammar, technological tools, pedagogical approaches, systematic literature review

Introduction

Grammar acts as a foundation element for successful communication and understanding. In today's globalised world, acquiring proficiency in grammatical structures is vital for students to interact meaningfully in various linguistic environments. According to Rossiter (2021),

grammar ensures that messages are immediately comprehensible to the reader, preventing them from being meaningless or ambiguous. This is particularly important in written communication, where there is no opportunity for immediate clarification. As digital technologies continue to emerge, educators are progressively utilising a range of technological tools to enhance grammar instruction. Tu (2022) discovered that technology tools used in grammar instruction provide opportunities for students to interact with content more dynamically. However, few studies have examined which digital approaches result in long-term improvements in grammatical competence for ESL populations. This study especially tackles this gap by assessing the effectiveness of technology-mediated grammar training approaches in terms of correctness and communicative competence in a variety of ESL learning scenarios.

Emerging Technological Solutions

In consideration of these challenges, there exists an increasing acknowledgment of the necessity for alternative pedagogical methodologies that integrate technology within the domain of grammar instruction. Conventional instructional strategies frequently encounter difficulties in linking learners to the practical applications of language. Thus, the incorporation of digital tools is imperative to enhance the engagement and instructional efficacy. Digital technologies, including gamification and augmented reality, have demonstrated a capacity to enhance student engagement and motivation through the provision of interactive and immersive educational experiences (Sundar, 2023; Mihat et al., 2024). By offering a diverse range of authentic textual materials, this enables students to observe grammatical structures within context, thereby augmenting their comprehension of the operationalization of rules in quotidian communication. This methodology does not only bolster grammatical competence but also motivates learners to interact with language as it is organically employed across various contexts (Xu, 2024). Moreover, applications of artificial intelligence (AI) assume a vital function by delivering personalized educational experiences, incorporating elements of gamification and modulating levels of complexity to align with the individual learning profiles of students. Such innovations render the process of grammar acquisition more engaging, efficient, and responsive to the distinctive requirements of each learner (Selvi & Vaishnavi, 2024). Through the integration of technology in this manner, educators are empowered to transform grammar instruction into a dynamic, interactive, and learner-centred experience.

Innovative pedagogical approaches

The evolution of pedagogical approaches in grammar teaching within the ESL context has been marked by a shift from traditional methods to more communicative and interactive strategies. Conventional methodologies, exemplified by the Grammar Translation Method, emphasises the overt instruction of grammatical principles alongside exercises centred on translation tasks and Direct Method which encourages natural language acquisition through immersion and conversation are some pedagogical approaches that are still used by the teachers to English grammar in EFL/ESL context (Keo & Lan, 2024). Innovative pedagogical approaches for teaching English grammar to ESL/EFL students prioritize active involvement, the incorporation of learning and technology within relevant contexts. Communicative Language Teaching (CLT) Task-Based Learning (TBL) are commonly employed to improve both grammatical knowledge and communicative proficiency, transcending the limits of traditional rote learning. As noted by Chen (2024), these methodologies prompt students to apply grammar in significant

contexts instead of through disjointed exercises by involving them in authentic tasks that necessitate real language use. Another frequently utilised teaching model is the Presentation-Practice-Production (PPP) framework, which comprises organised stages of learning; an initial introduction of grammatical concepts, followed by guided practice exercises and concludes with productive tasks that reinforce language application. Purnomo et al. (2023) discovered that incorporating PPP into ESL/EFL teaching promotes collaborative learning and active involvement by motivating students to collaborate in groups, articulate their understanding of grammar principles and utilize them in communicative contexts.

Technological Tools

In providing a variety of methods to improve learning experiences, technological tools have become essential in teaching English grammar within ESL/EFL settings. These tools encompass everything from AI-driven applications to multimedia resources which both offering a distinct contribution to language acquisition. As noted by Luo and Qiu (2024), AI-enhanced applications boost engagement and academic success by employing machine learning algorithms to evaluate student progress and create personalized exercises. These tools offer immediate feedback, enabling learners to promptly recognise and rectify grammatical mistakes. As Pratiwi et al. (2021) articulate, the integration of multimedia in grammar lessons aids in contextualizing grammatical structures, making abstract rules more easily understood. For instance, videos and animations illustrate grammar concepts through storytelling and real-life situations, demonstrating how grammar is utilized in authentic communication. PowerPoint presentations, featuring a blend of text, images and animations can facilitate structured grammar explanations and interactive classroom discussions. The integration of multimedia does not only boost comprehension but it can also maintain student interest, making grammar lessons more engaging and effective.

Although there is an increasing curiosity surrounding technological tools, a thorough analysis of its interaction in grammar teaching is still lacking. This research seeks to address this deficiency by methodically reviewing the current body of literature. A systematic review is imperative for the synthesis of contemporary findings regarding technological tools utilised in grammar instruction as it affords a holistic comprehension of the varied strategies and resources that are accessible. Although the systematic review underscores the advantages of technological tools, it is imperative to acknowledge the persistent discourse surrounding the relevance of grammar in effective communication. Certain educators contend that grammar may not be a prerequisite for proficient communication, thereby advocating for an instructional approach that equally emphasises grammatical precision and communicative efficacy (Ghafar & Sawalmeh, 2024). Hence, this systematic review aims to review technological tools and pedagogical approaches in teaching English grammar focusing on these research questions:

1. What technological tools are used to teach English grammar in ESL/EFL classrooms?
2. What pedagogical approaches are used to teach English grammar in ESL/EFL classrooms?

Methodology

This thorough examination of existing literature applied the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) 2020 checklist during every part of its execution. By applying comprehensive 27-point PRISMA checklist greatly improves the quality of systematic reviews and raising them to an exceptionally polished and persuasive level. This document is deemed to meet high standards due to the application of the 27-point PRISMA checklist. This article seeks to uncover the technological tools in teaching grammar. The review commenced with a meticulous process of sourcing articles related to technological tools and pedagogical approaches in English language instruction in school worldwide by utilising the esteemed ERIC and Scopus databases. The selection procedure for the research articles included in this systematic literature review was conducted through a modified PRISMA flow diagram. The adapted version comprises three separate stages.

Identification Phase

The preliminary stage of the systematic review entails a process of identification that is directed by the PRISMA guidelines. The study involved selecting two databases deemed suitable for our aims: ERIC and Scopus. The essential terminology employed in this systematic review was thoughtfully designed to encompass the concepts that will be explored. Terms related to technological tools, teaching English grammar and ESL/EFL classroom were incorporated. Table 1 below illustrates the search string applied in this study for each database.

Table 1. Keywords used in each database

Database	Search String
ERIC	technology AND teaching AND english AND grammar AND NOT review
Scopus	technology AND teaching AND english AND grammar AND NOT review

Screening Phase

After the identification of relevant articles, the screening phase commenced by eliminating those that were not pertinent to the teaching of English grammar. A total of 227 articles were discarded during the initial screening, leaving 37 that qualified for further examination. These 37 articles underwent a review based on their titles, abstracts and keywords, with the understanding that they must pertain to the teaching of English grammar, the technological tools employed by educators and their accessibility. In this phase of screening, 16 articles were removed due to accessibility issues. Following this, the other 21 articles were evaluated according to the criteria of inclusion and exclusion. To ensure that the articles that are chosen adhered to the criteria established by the researcher, additional information was integrated into the search parameters for the studies, as provided in Table 2.

Table 2. Inclusion and Exclusion criteria

Inclusion	Exclusion
Publications on empirical research	Books, systematic reviews, review papers, reports, conference proceedings, conceptual papers
English Text	Text written in other languages
Studies conducted between 2021 to 2025	Studies conducted before 2021
Accessible articles	Articles that cannot be accessed
Related to technological tools and pedagogical approaches used to teach English Grammar in ESL/EFL classrooms	Not related to technological tools and pedagogical approaches used to teach English Grammar in ESL/EFL classrooms

Table 2 delineates the criteria for inclusion and exclusion. The primary inclusion criterion stipulates that the studies must be derived from scholarly journals. According to Kumar (2023), systematic literature reviews (SLRs) are essential to evidence-based practice because they enable researchers to obtain the most accurate estimations of the efficacy of an intervention. This is best achieved by analysing and combining findings from various journal articles. Consequently, this investigation exclusively encompasses research articles published in academic journals. Furthermore, the studies must have been conducted within the temporal framework of 2021 to 2025 (a duration of five years). The articles considered for inclusion should be composed in the English language and must pertain to technological tools and pedagogical methodologies in the instruction of grammar within ESL/EFL educational settings.

Inclusion Phase

Following two rigorous rounds of screening and the exclusion of articles, a total of 16 articles were identified. The research articles acquired conformed entirely to the specifications delineated by the researchers for this systematic literature review. Figure 1 provides a comprehensive depiction of the entire procedural continuum from Phase 1 through Phase 3. The processes of screening and eligibility verification were executed manually, necessitating a considerable investment of time for the completion.

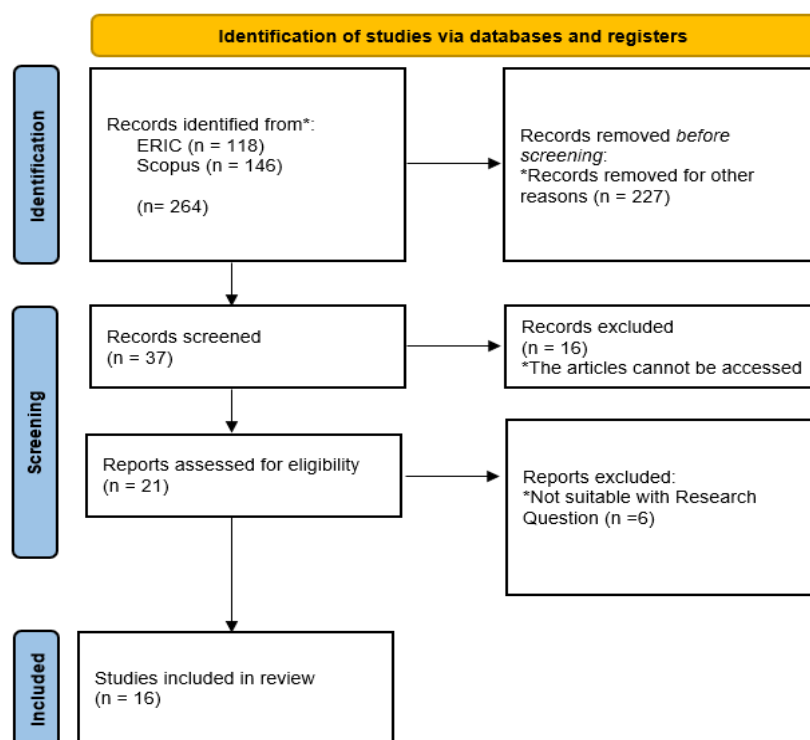


Figure 1: PRISMA Flow Diagram

Findings

Selected Articles Summary

This part will showcase a detailed analysis of the results obtained from the process of selecting research articles. After meticulously assessing articles through the three stages, 15 were chosen that fulfilled the criteria for this systematic literature review paper. These studies can be found in Table 3. Ten articles were selected from ERIC, while five were sourced from Scopus. All of the research articles concentrate on the technological tools and pedagogical approaches employed to teach English grammar in ESL/EFL classrooms around the world.

Table 3. Summary of the selected articles

Study	Database	Technological Tools	Teaching Approaches
(Koroglu & Kimsesiz, 2023)	ERIC	Infographics	Digital Approach
(Celik & Kara, 2024)	ERIC	Web 2.0	Deductive Approach
			Inductive Approach
			Eclectic Approach
			Communicative Language Teaching (CLT)
(Rofiah & Waluyo, 2024)	ERIC	Kahoot!, Quizizz, and Quizlet.	Gamified-based learning
(Pham, 2023)	ERIC	Quizizz	Gamified-based learning
(Alemi & Fard, 2023)	ERIC	An assistive humanoid robot, the NAO H21	Deductive Approach
			Game-Based Language Learning (GBLL)
			Robot-Assisted Language Learning (RALL)
(Syafrietal et al., 2021)	ERIC	Whiteboard animation	Digital Approach
(Kaosayapandhu, 2023)	ERIC	Duolingo app.	Gamification and Game-Based Learning
			Technology-Enhanced Learning
(Al Ghaithi, 2024)	ERIC	Interactive WhatsApp bot	Computer-Assisted Language Learning (CALL)
(Turula, 2021)	ERIC	Kahoot, Quizlet, Grammar Clinic	Eclectic Approach
			Computer-Assisted Language Learning (CALL)
			Gamified Learning
			Collaborative Learning
			Traditional Methods

(Guanuche et al., 2023)	ERIC	The Canvas mobile application	Mobile-assisted Language Learning
(Ardi & Rianita, 2022)	ERIC	Kahoot!	Gamification and Game-Based Learning
(Qadha & Al-Wasy, 2022)	Scopus	3D Prezi presentation software	Visual Grammar Approach
(Watanapokakul, 2024)	Scopus	Google Slides, Google Forms, AnswerGarden	Eclectic Approach Presentation-Practice-Production (PPP) Approach Fink's holistic view of active learning, which emphasizes engaging students in activities that require them to think critically about what they are doing.
(Baskaran et al., 2023)	Scopus	PowerPoint	Digital Approach
(Pham & Pham, 2022)	Scopus	Quizziz, Kahoot and Quizlet	Gamification and Game-Based Learning
(Tabrizi & Etemad, 2021)	Scopus	WhiteSmoke	Corrective Feedback (CF) Approach

Result Analysis Based on Research Question

RQ1: What technological tools are used to teach English grammar in ESL/EFL classrooms?

In this systematic literature review, technological tools are categorized into 5 main categories; Game-Based Tools, Visual Presentation Tools, Mobile Learning Apps, Collaborative and Interactive Tools and Artificial Intelligence (AI) Tools. Table 4 below presents the categorization of the aspects highlighted in the articles and reviewed in this study.

Table 4. Findings from the selected articles that are aligned with research question 1

Study	Technological Tools				
	Game-Based Tools	Visual Presentation Tools	Mobile Learning Apps	Collaborative and Interactive Tools	Artificial Intelligence (AI) Tools
(Koroglu & Kimsesiz, 2023)		/			
(Celik & Kara, 2024)				/	
(Rofiah & Waluyo, 2024)	/				
(Pham, 2023)	/				
(Alemi & Fard, 2023)					/
(Syafrizal et al., 2021)		/			
(Kaosayapandhu, 2023)			/		
(Al Ghaithi, 2024)			/		
(Turula, 2021)	/			/	
(Guanuche et al., 2023)			/		
(Ardi & Rianita, 2022)	/				
(Qadha & Al-Wasy, 2022)		/			
(Watanapokakul, 2024)	/	/		/	
(Baskaran et al., 2023)		/			
(Pham & Pham, 2022)	/				
(Tabrizi & Etemad, 2021)			/		/

RQ2: What pedagogical approaches are used to teach English grammar in ESL/EFL classrooms?

In this systematic literature review, pedagogical approaches are categorized into 6 main categories; Traditional Approaches, Communicative Approaches, Digital and Technology-Enhanced Approaches, Game-Based Learning Approaches, Corrective Feedback Approaches and Collaborative and Holistic Learning Approaches. Table 5 below presents the categorization of the aspects highlighted in the articles and reviewed in this study.

Table 5. Findings from the selected articles that are aligned with research question 2

Study	Pedagogical Approaches					
	Traditional Approaches	Communicative Approaches	Digital and Technology-Enhanced Approaches	Game-Based Learning Approaches	Corrective Feedback (CF) Approach	Collaborative and Holistic Learning Approaches
(Koroglu & Kimsesiz, 2023)			/			
(Celik & Kara, 2024)	/	/				
(Rofiah & Waluyo, 2024)				/		
(Pham, 2023)				/		
(Alemi & Fard, 2023)	/		/	/		
(Syafriza et al., 2021)			/			
(Kaosaya pandhu, 2023)			/	/		
(Al Ghaithi, 2024)			/			
(Turula, 2021)	/		/	/		/
(Guanuc he et al., 2023)			/			
(Ardi & Rianita, 2022)	/					
(Qadha & Al-Wasy, 2022)		/				
(Watanap okakul, 2024)	/	/		/		
(Baskara n et al., 2023)		/				
(Pham & Pham, 2022)	/					
(Tabrizi & Etemad, 2021)			/		/	

Discussion

In this section, the findings of technological tools used to teach English grammar in ESL/EFL classrooms are analysed in depth.

RQ 1: What technological tools are used to teach English grammar in ESL/EFL classrooms?

Generally, there are five types of technological tools that have been highlighted in the previous section which are Game-Based Tools, Visual Presentation Tools, Mobile Learning Apps, Collaborative and Interactive Tools and Artificial Intelligence (AI) Tools.

Game-Based Tools

As depicted in the table, five articles proved that English teachers use game-based tools to teach grammar in ESL/EFL classrooms. Most of them use online quizzes as a platform to assess students' performance. A study by Watanapokakul (2024) stated that Google Form is used to replace paper-based exercises. This application was used for creating sentences. This is similar to a study by Turula (2021), which found that Kahoot was used as a tool for checking homework since it can provide an interactive and engaging way for students to learn grammar. Besides, online quizzes are also used to improve students' performance in grammar (Turula, 2021; Pham & Pham, 2022; Pham, 2023; Rofiah & Waluyo, 2024).

Visual Presentation Tools

Another type of technological tool used by the English teacher to teach grammar in ESL/EFL classrooms is visual presentation tools. These include Microsoft PowerPoint, Google Slides, Prezi 3D, Whiteboard Animation and Infographic. Using technological tools while presenting the lesson is proven to increase engagement among learners. This aligns with findings that 21st-century students are more active learners when using ICT (Baskaran et al., 2023). Besides, using technological tools to present the lesson can also improve students' performance for grammar (Syafrizal et al., 2021; Qadha & Al-Wasy, 2022; Koroglu & Kimsesiz, 2023; Watanapokakul, 2024). In addition, a study by Koroglu and Kimsesiz (2023) found that incorporating technological tools such as infographics to present the lesson can be beneficial for students to understand grammar topics since visual illustrations helped them to remember the information more easily, particularly for those with high visual intelligence.

Mobile Learning Apps

Mobile phone application is also a technological tool used by teachers to teach grammar in ESL/EFL classrooms. Based on Table 4, this technological tool is applicable mostly among those who teach adult learners (foundation program undergraduates). Research found that incorporating mobile phone apps in teaching grammar can improve students' performance, indicating the effectiveness of mobile applications in enhancing grammatical learning (Tabrizi & Etemad, 2021; Guanuche et al., 2023; Kaosayapandhu, 2023; Al Ghaithi, 2024). Besides, Al Ghaithi (2024) also found that using technological tools, specifically a WhatsApp chatbot can

give benefits to both parties, teacher and student, as it can ease the teacher's burden and give immediate feedback to students.

Collaborative and Interactive Tools

As depicted in Table 4, three articles found that Web 2.0 is used as a collaborative and interactive instrument to teach grammar in ESL/EFL classrooms. Some examples of Web 2.0 are AnswerGarden, Grammar Clinic and BBC Learning English. Celik and Kara (2024) discovered that Web 2.0 helps students learn English by giving them access to interactive materials. Since Web 2.0 requires students to use technology, it is easier to access the interactive and engaging features. Not only that, teachers also mostly use Web 2.0 as a platform to give grammar practices for students (Turula 2021; Celik & Kara 2024; Watanapokakul 2024).

Artificial Intelligence (AI) Tools

Two research studies emphasize the incorporation of AI tools in the instruction of English grammar. Alemi and Fard (2023) indicate that educators utilize assistive humanoid robots, particularly the NAO H21 robot, in ESL/EFL classrooms to enhance grammar teaching. Although the inclusion of humanoid robots in language education might appear unusual, their findings revealed that these robots significantly improve grammar acquisition and retention for young non-native English speakers. Furthermore, Tabrizi and Etemad (2021) investigated the application of an automated feedback program, WhiteSmoke, which teachers use to boost translation accuracy for EFL learners. This resource delivers automated corrective feedback, assisting students in sharpening their grammar and linguistic precision in written translations.

RQ2: What pedagogical approaches are used to teach English grammar in ESL/EFL classrooms?

Generally, there are six pedagogical approaches that are highlighted in the studies selected, which are Traditional Approaches, Communicative Approaches, Digital and Technology-Enhanced Approaches, Game-Based Learning Approaches, Corrective Feedback Approaches and Collaborative and Holistic Learning Approaches.

Traditional Approaches

In this study, traditional approaches include Deductive Approach, Inductive Approach, Eclectic Approach and Presentation-Practice-Production (PPP) Approach are used by the teachers while incorporating technological tools in ESL/EFL classrooms. These approaches are highlighted in 4 studies (Celik & Kara, 2024; Alemi & Fard, 2023; Turula, 2021; Watanapokakul, 2024). Celik and Kara (2024) found that some traditional approaches used to teach grammar are the Deductive Approach, which involves explicit teaching where rules are presented first, followed by examples; Inductive Approach which emphasizes implicit teaching, where learners are first exposed to examples and then encouraged to infer the rules themselves; and Eclectic Approach which combines elements of both deductive and inductive methods. This is similar to a study by Alemi and Fard (2023), which found that teachers use a Deductive Approach to teach grammar. In addition, Turula (2021) also found that teachers use Eclectic

Approach since this approach is the most suitable as it combines both implicit and explicit learning. Watanapokakul (2024) also found the same approach, the Eclectic Approach was most commonly used by the teachers. In addition to that, the same study found that teachers also use the Presentation-Practice-Production (PPP) Approach, especially during the teaching session. Although it is a traditional approach, it can also be incorporated with technology. Research by Celik and Kara (2024) found that the deductive approach, which involves presenting rules followed by examples, can be enhanced with Web 2.0 tools like Quizlet and Kahoot. By providing students with interactive tests and flashcards that reinforce grammar principles, these resources help students learn more efficiently.

Communicative Approaches

Based on the review, there is only one study stating that teachers use Communicative Language Teaching (CLT) to teach grammar, which is by Celik and Kara (2024). This approach, according to Celik and Kara (2024), prioritizes authentic materials and social interaction, facilitating language mastery through meaningful tasks.

Digital and Technology-Enhanced Approaches

These approaches are widely used by the teachers, which are shown in 9 studies in the review (Koroglu & Kimsesiz, 2023; Alemi & Fard, 2023; Syafrizal et al., 2021; Kaosayapandhu, 2023; Al Ghaithi, 2024; Turula, 2021; Guanuche et al., 2023; Qadha & Al-Wasy, 2022; Baskaran et al., 2023). Studies by Koroglu & Kimsesiz (2023), Syafrizal et al. (2021) and Baskaran et al. (2023) proved that instructors utilise the Digital Approach to teach grammar in order to improve students' participation and achievement. The Digital Approach was also found to help students understand the lesson easily. Other than that, Al Ghaithi (2024) and Turula (2021) found that Computer-assisted Language Learning (CALL) is utilised by the teachers to improve students' performance. Additionally, Guanuche et al. (2023) discovered that one strategy teachers employ to help pupils do better in English grammar is Mobile-assisted Language Learning (MALL). On the other hand, research by Qadha & Al-Wasy (2022) found that teachers incorporate the Visual Grammar Approach to improve students' grammar performance, since visuals can help the learners understand the lesson effectively. The study also found that this approach can foster greater motivation and interest among learners.

Game-Based Learning Approaches

In this review, it is found that there are 7 articles which show that teachers use Game-Based Learning Approaches to teach grammar in ESL/EFL classrooms (Rofiah & Waluyo, 2024; Pham, 2023; Alemi & Fard, 2023; Kaosayapandhu, 2023; Turula, 2021; Ardi & Rianita, 2022; Pham & Pham, 2022). According to Rofiah and Waluyo (2024), there were significant increases in learning motivation and classroom dynamics, along with a reduction in learning anxiety by the incorporation of gamification. This is aligned with studies by Pham (2023), Kaosayapandhu (2023) and Turula (2021), which found that game-based learning can increase students' grammar performance. Besides, Ardi and Rianita (2022) also found that Game-Based Learning Approaches can boost students' engagement. This finding is aligned with a study by Pham and Pham (2022), which also found that by incorporating game mechanics into the

learning process, students are more likely to participate actively and remain focused on the tasks at hand.

Corrective Feedback Approaches

According to Tabrizi and Etemad (2021), corrective feedback (CF) has been shown to significantly improve language accuracy. It helps students to find out and correct their mistakes, which is crucial to develop proficiency in a second language (L2). Research indicates that CF can have a moderate to large positive effect on L2 development across various contexts and modes, such as oral and written communication. Despite the benefit of this approach, based on this review, only one study shows that teachers use this approach to teach grammar in ESL/EFL classrooms.

Collaborative and Holistic Learning Approaches

Research by Watanapokakul (2024) found that the holistic approach is integrated with active learning principles. It involves engaging students in activities that require critical thinking and active participation, rather than passive reception of information. This approach is aligned with the Collaborative Learning Approach which is stated in Turula (2021). In the study, the collaborative learning approach is designed to harness the power of technology and social interaction to improve grammar learning outcomes, while also considering individual learner differences and preferences.

Conclusion

This comprehensive literature analysis underlines the importance of technological tools and various pedagogical techniques in improving English grammar instruction in ESL/EFL environments. By categorising the tools into five unique types and describing six essential teaching strategies, the review highlights their combined usefulness in boosting learner outcomes, engagement, and flexibility. The combination of these techniques provides promising solutions to typical grammar-learning issues. Future research should look at the long-term effects and broader applicability of these tools and methodologies, which will help shape curriculum development and language teaching practices.

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