

# A Systematic Literature Review of Web-Based Learning and Digital Pedagogies in Grammar Education (2015-2024)

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## Abstract

The scarcity of comprehensive reviews on digital pedagogies, especially web-based learning (WBL), in enhancing grammar proficiency among non-native English learners underlines the need for a systematic review to delineate the trends in WBL concerning English grammar education. From 2015 to 2024, employing a set of inclusion and exclusion criteria, 14 articles were extracted from a pool of 124 searches on three databases, which are Scopus, Web of Science (WoS), and the Educational Resources Information Centre (ERIC). Firstly, this systematic review found that WBL for grammar education emphasizes learning management systems or virtual learning environments. Secondly, most studies examining grammar through WBL were conducted within higher education, focusing on undergraduate students. Lastly, the focus of literature has primarily been on the influence of digital pedagogical tools on students' grammar performance, with less attention on the teaching methods of grammar instructors. This systematic literature review provides insights for educators in selecting and developing WBL platforms for grammar instruction, and pinpointing areas for further research, thereby enhancing educational practices.

**Keywords:** English as a Second Language (Esl), Grammar Education, Systematic Literature Review; Web-Based Learning (Wbl), Digital Pedagogy

**Introduction**

Digital pedagogy, the practice of using digital technologies to enhance teaching and learning, has become progressively prevalent in modern education. According to Haugsbakken, Nykvist, & Lysne (2019), although certain traditional methods might prove effective within the context of online learning, instructors must reassess their pedagogical strategies and be open to challenging their current approaches. Web-based learning, also known as online learning or e-learning, is a specific form of digital pedagogy that relies on internet-based technologies to deliver educational content and expedite learning activities (Abd Rashid, Kadiman, Zulkifli, Selamat, Hisyam & Hashim, 2016). Positioned as a key component in fostering quality and inclusivity in education, WBL aligns with the fourth Sustainable Development Goal (SDG) advocating for lifelong learning opportunities. This goal, endorsed by the United Nations with a target year of 2030, underscores education's key role in shaping future industries (Rosa, 2017). Despite the vast nature of the SDG, progress can be achieved incrementally. Focusing on a specific domain within education, such as language learning, particularly English, stands out as paramount alongside other industrial sectors. English's global recognition has long been a primary medium of communication, underscoring its significance in facilitating interaction on a worldwide scale (Crystal, 2003).

Web-based learning (WBL) has also become a widely recognized approach in the scope of teaching and learning the English language, particularly in the post-pandemic situation (Karim, 2023). Research into WBL spans various areas, including English as a Second Language (ESL) and English as a Foreign Language (EFL). A fundamental facet of English language acquisition for non-native learners involves practicing and mastering grammar and vocabulary to effectively utilize it across different language skills, such as reading, writing, listening, and speaking (Rao, 2019; Ibnian, 2017). However, the broader education sector often overlooks the significance of grammar mastery, leading to a lack of comprehensive reviews regarding the effectiveness of web-based learning platforms in improving grammar proficiency among non-native English learners.

Grammar serves as a lexicogrammatical tool for conveying meaning (Nan, 2015), and a strong grasp of grammar is crucial for effective communication (Brown, 1994; Larsen-Freeman & Long, 1991). As a crucial aspect of communicative competence outlined by Canale & Swain (1980), grammar stands as a fundamental pillar in both teaching and learning a language. Since grammar serves as a fundamental element of language, facilitating its flow and enhancing both the precision and quality of English writing and speaking, all English language educators should adopt the most effective methods for incorporating grammar into their teaching practices (Enesi, Strati & Trifoni, 2023). Nevertheless, despite the considerable shifts in language teaching methodologies over time, the question of how to address grammar instruction remains unresolved for language educators, as noted by Ellis (2002).

At present, systematic reviews predominantly focus on English as a Second Language (ESL) (Biju & Vijayakumar, 2023; Ramamuthie & Aziz, 2022; Saravanan, Palanisamy & Aziz, 2021), English as a Foreign Language (EFL) (Zhang, Tan & Roy, 2023; Arslan, 2020; Altay & Altay, 2019), and English Language Teaching (ELT) (Hashemi & Kew, 2021; Turan & Akdag-Cimen, 2020) in general. Consequently, there is a noticeable gap in the emphasis on grammar competence through WBL across various educational levels, particularly within the Malaysian context. Investigating the evolving research landscape concerning web-based learning and

grammar education is imperative to address and accentuate the growing body of research pertinent to this context. Therefore, this systematic review aims to review current trends and research in WBL and grammar education, laying out two research objectives and questions as follows:

### **Research Objectives**

- (1) To investigate the types of platforms used for web-based learning in grammar education for non-native English learners.
- (2) To examine the types of non-native English learners involved in the studies of grammar education utilizing web-based learning.
- (3) To inspect the impact of integration of digital pedagogy on grammar education.

### **Research Questions**

- (1) What are the types of platforms used for web-based learning in grammar education for non-native English learners?
- (2) What are the types of non-native English learners involved in the studies of grammar education utilizing web-based learning?
- (3) How does the integration of digital pedagogy impact grammar education?

### **Digital Pedagogy**

One of the few definitions of digital pedagogy is that it is a branch within pedagogical studies that explores the core principles and patterns of digital education, examining how digitalized learning processes contribute to individual development (Ilaltdinova, Belyaeva, & Lebedeva, 2019). It focuses on devising practical methods and strategies to enhance the efficiency of these educational approaches. Another definition by Shestak, Krutiy, and Karnaushenko (2019), digital pedagogy is the systematic and purposeful use of information technologies and the Internet to organize and implement activities aimed at human development, encompassing the content, methods, and forms of upbringing, education, and instruction.

The concept of digital pedagogy suggests that it has the potential to drive changes in how teaching and learning are approached (Haugsbakken, Nykvist, & Lysne, 2019). An increasing number of educational institutions are investing significantly in exploring the advantages of web-based teaching and learning methods. This trend is evident in the rising enrollment rates in Massive Open Online Courses (MOOCs) and the growing investments in Learning Management Systems (LMS), especially among higher education institutions as well as since COVID-19 happened, as highlighted by various researchers (AL-Nuaimi, Al Sawafi, Malik, Al-Emran, & Selim, 2023; Gamede, Ajani & Afolabi, 2022; Mkhize, Mtsweni, & Buthelezi, 2016). The increasing adoption of digital pedagogy signifies a transformative shift in educational practices.

### *Trends in Web-Based Learning (WBL)*

The progression and adoption of systems and technologies have contributed to the advancement and widening of educational possibilities, as noted by Sarikhani, Salani & Mansouri in 2016. During the technological age, universities face a significant hurdle: incorporating cutting-edge e-learning platforms to enhance and bolster both teaching and learning processes (Fischer, Heise, Heinz, Moebius, & Koehler, 2015). The rise of web-based

learning (WBL) continues to indicate that the advancement of information technology and the proliferation of Internet tools in education led to a notable surge in publications between 2016 and 2020 (De Nito, Rita Gentile, Köhler, Misuraca & Rina, 2023). Consequently, the integration of WBL in higher education and students' evaluations of its effectiveness have become focal points for numerous researchers (Gumasing & Castro, 2023; Alturki & Aldraiweesh, 2021; Alhat, 2020; Lavoie & Proulx, 2019). All of these highlight the transformative impact of technological integration in education, prompting a surge in scholarly interest regarding the efficacy and implications of web-based learning in higher education.

### *Trends in English Grammar Education*

Incorporating ICT into teaching and learning has been recognized as an improved instructional approach, as learners tend to be more engaged in the relaxed learning environment it provides (Noureddine, 2017). However, one factor that dampens learners' enthusiasm for language acquisition is English grammar (Hashim, Rafiq & Md Yunus, 2019). Certain studies on grammar education indicate that non-native English speakers may struggle to attain proficiency because grammar instruction still relies heavily on traditional methods such as the Grammar-Translation approach in the study conducted by Ruman (2022). Additionally, a study by Müller, Gregoric & Rowland (2017), demonstrated minimal improvement in grammar among postgraduate students despite extensive time invested in written corrective feedback. Nevertheless, there have been published studies that utilize digital platforms such as virtual learning environment (VLE), artificial intelligence (AI), and online modules and tests to assess their efficacy in enhancing the grammar proficiency of non-native English learners (Windsor, 2021; Mayanondha & Soontornwipast, 2020; Villessèche, 2019). These studies, along with others, are reviewed in the subsequent sections of this manuscript.

### *Reviews on Web-Based Learning (WBL)*

Cong-Lem (2018), outlined five main groups: general websites providing linguistic inputs, blogging platforms, communication tools, project-based learning tools, and learning management systems. Apart from these, Social Networking Services (SNS) have also been integrated into English education for many years now, offering educators and learners free platforms with wide-ranging applicability for both synchronous and asynchronous instructions (Citrawati, Suwastini, Jayantini, Artini & Dantes, 2021). Additionally, interactive web-based learning modules have become increasingly vital in the field of education. Notable scholars, such as Girard & Pinar (2011), Isaacs, Walton & Nisley (2015), and Febliza, Afdal & Copriady (2023), have employed interactive web-based modules across diverse disciplines, including medicine and marketing. Web-based learning platforms in past studies have shown benefits in enhancing learners' progress and attitudes and fostering collaborative language acquisition. For instance, within chat sessions, learners can engage, share information, and collaborate on language tasks (Razagifard, 2013; Satar & Ozdener, 2008; Wang & Chen, 2007). Interactions between peers facilitate the reinforcement of skills and knowledge acquired in class, while also enabling the acquisition of new lexical and grammatical elements (Cong-Lem, 2018).

## Methods

This systematic review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology, which involves four key stages: identification, screening, eligibility assessment, and inclusion, as depicted in Figure 1. PRISMA is commonly employed by researchers for its comprehensive framework and its applicability to various studies. Consequently, this study aims to adhere to PRISMA guidelines in conducting the systematic review, as outlined below.

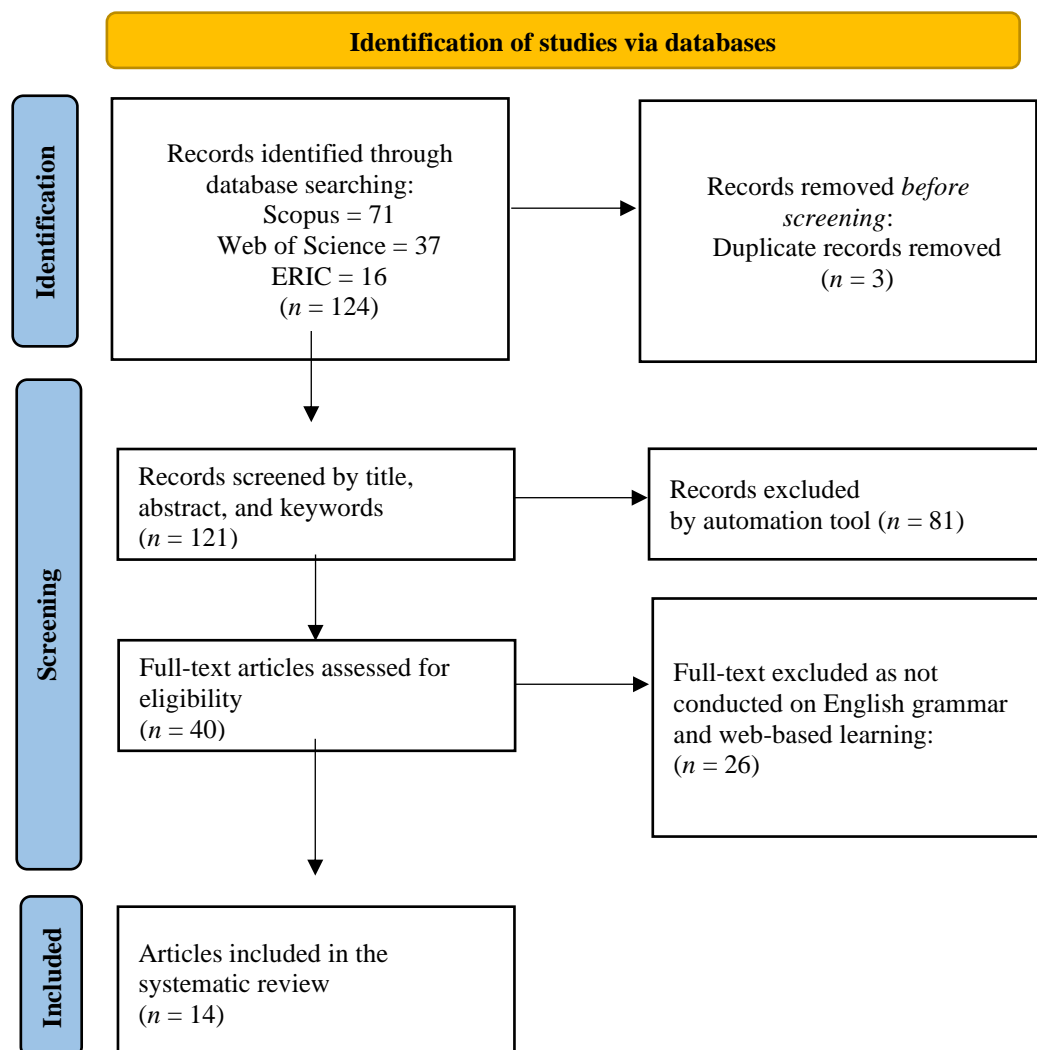


Figure 1. PRISMA systematic review adapted from Page et al. (2020).

### Identification

The first stage of the systematic review involves adhering to the identification process outlined in the PRISMA guidelines. Three databases, which are Scopus, Web of Science (WoS), and the Educational Resources Information Centre (ERIC), were selected due to their relevance to the study's objectives. The selection of key terms for this review was meticulously crafted to encompass the targeted constructs. Specifically, terms associated with web-based learning and English grammar were incorporated. The search strings utilized for each database in this study are presented in Table 1.

Table 1

*Search string used in this study*

Database	Search String
Scopus	TITLE-ABS-KEY(("English grammar*" or "grammar construction" OR "grammar rules" OR "grammar module" OR "grammar for ESL" OR "ESL grammar*") AND ("web learning*" OR "web-based learning*" OR "online learning*" OR "e-learning" OR "web-assisted language learning*" AND "digital pedagogy*"))
Web of Science (WoS)	TS(("English grammar*" or "grammar construction" OR "grammar rules" OR "grammar module" OR "grammar for ESL" OR "ESL grammar*" ) AND ( "web learning*" OR "web-based learning*" OR "online learning*" OR "e-learning" OR "web-assisted language learning*" AND "digital pedagogy*"))
ERIC	ESL grammar and web-based learning and digital pedagogy

\*: Search String

**Screening**

Following the identification of articles, the screening process ensues. The initial phase of this stage involved the elimination of duplicate articles found across multiple databases. Through this initial screening step, 3 duplicate articles were identified and subsequently removed, leaving a total of 124 articles for further evaluation. These 124 articles underwent scrutiny based on their titles, abstracts, and keywords, with the criterion that they should pertain to English grammar education for ESL or EFL learners and web-based learning. As a result of this screening process, 81 articles were deemed irrelevant to the focus of the study and were consequently excluded. Following this exclusion, the remaining 40 articles were subjected to a thorough assessment based on inclusion and exclusion criteria outlined in Table 2.

Table 2

*Inclusion and exclusion criteria*

Inclusion Criteria	Exclusion Criteria
Studies conducted between 2015 and 2024 (10-year timespan)	Studies conducted prior to 2015
Articles from journals	Conference proceedings, book chapters, reports, review articles
Texts written in English	Texts not written in English
Related to English grammar and web-based learning	Not related to English grammar and web-based learning

Following meticulous criteria-based selection, 14 articles were deemed potential for inclusion in this systematic review. However, book chapters and conference proceedings were omitted from consideration due to their relatively limited scope (González-Albo & Bordons, 2011).

**Included**

The articles for this systematic review encompassed web-based learning and English grammar for non-native English learners. The included studies are shown in Table 3.



Table 3

*Summary of the selected studies*

Study	Database	Aim	Sample
Hendriani, Yunita, & Putra (2023)	Scopus, WoS	To investigate the underlying factors causing the learners' differentiation of learning model in learning English grammar	262 EFL undergraduate learners from three state universities in Indonesia
Mayanondha & Soontornwipast (2020)	WoS	To investigate the effects of the interactive web-based Test of English for International Communication tutoring course on students' English grammar proficiency and explores students' opinions on the course	40 students enrolling in the interactive web-based TOEIC tutoring course of the tutoring institution in Thailand
Villessèche, Oriez, Besnard, Le Bohec, Quaireau, Noël, De La Haye, Nogues & Lavandier (2019)	Scopus, WoS	The platform TACIT-Grammar module targets the evaluation and adaptive remediation of cross-disciplinary cognitive and linguistic competencies to meet the specific needs of the Lansod (Language for Specialists of Other Disciplines).	Students of the Lansod (Language for Specialists of Other Disciplines) in France
Windsor (2021)	Scopus, WoS	To investigate the effectiveness of a virtual learning environment (VLE) as a grammar learning resource for first year students at a university in southern China over two academic years	Newly enrolled year one university students who had just left high school in Mainland China
Kuzmina & Vinčela (2021)	WoS	To elicit university students' attitudes to the mobile applications and speech analysis software-based seminar activities in Moodle e-course following the blended learning model selected for the studies of theoretical grammar and phonetics	40 undergraduate students (30 full-time and 10 part-time) in Latvia
Lin (2023)	ERIC	To examine the effectiveness of guided data-driven learning (DDL) activities on helping technological university students with a lower	51 non-English majors in a freshman English class in Taiwan

			intermediate proficiency level to learn grammar and vocabulary topics for the TOEIC test
Khodabandeh, & Soleimani (2018)	ERIC	To investigate the effect of two different tasks, namely Computer Assisted Language Learning (CALL) based tasks and written questions tasks on students' English grammar learning	60 homogeneous Iranian junior high school participants
Sangeetha (2023)	Scopus	To assist EFL teachers in maximizing the efficiency of their English grammar lessons through the use of online resources	250 first-year English Programme students in Bahrain
Rokhayani, Rukmini, Hartono, & Mujiyanto (2022)	Scopus	To investigate students' achievement and perceptions in English grammar class using Computer-Mediated Communication Artificial Intelligence (CMC AI)	43 students of the English Education Department in a private university in Indonesia
Pratama, Dewi, & Susilowati (2022)	Scopus	To assess how learners perceive the synchronous and asynchronous learning they have received using three applications; Camtasia video creator, YouTube, and Google Classroom	52 students from the English Literature Department's Intermediate English Grammar Class in Indonesia
Anggrawan & Satria (2020)	Scopus	To explore the relationship between teaching quality and English knowledge points from the depth of English vocabulary, English grammar, reading comprehension, cloze test, and composition	1 instructional expert, 1 English language expert, 60 third-semester students in Indonesia
Ali (2018)	Scopus	To investigate the effects of Computer-Assisted Language Learning (CALL) as compared to Teacher-Driven Instruction (TDI) on the achievement of EFL undergraduates in Saudi Arabia	68 EFL undergraduates divided into two equal groups namely: experimental (CALL) group and control (TDI) group



Mustafa & Hajan (2022)	Scopus	To find out the effect of an authentic learning experience, the experience in taking a real course in a university, when e-learning was combined with face-to-face interaction on the pre-service teachers' intention of using e-learning in their future teaching employment	52 pre-service teachers majoring in an English grammar course at a state university in Indonesia
Nurhayati (2019)	ERIC	To explore the perspective on analyzing online media text using task-based learning in learning basic grammar	45 Indonesian undergraduate students who were taking English Basic Grammar with online media text

### Data Analysis Procedure

All articles selected were exported to a referencing software, Mendeley. Then, thematic analyses were conducted to identify the major themes to answer the following research questions:

- (1) What are the types of platforms used for web-based learning in grammar education for non-native English learners?
- (2) What are the types of non-native English learners involved in the studies of grammar education utilizing web-based learning?
- (3) How does the integration of digital pedagogy impact grammar education?

This review conducted an interpretive analysis of the articles, organizing the themes according to the research questions.

The themes were categorized based on the platforms cited in the literature review for the first research question. The types of web-based learning (WBL) platforms discussed in this paper are adapted from Cong-Lem's research (2018), which identified five primary categories: General websites providing linguistic inputs, blogging platforms, communication tools, project-based learning tools, and learning management systems. Notably, the category of blogging platforms is excluded from consideration in this systematic review due to the absence of studies utilizing blogs. This paper includes two more categories, which are social networking sites (SNS) and interactive web-based learning module that have gained increased significance within the realm of education. For the second research question, the types of non-native learners were categorized into education levels and working professionals by extracting sample information from the studies. The third research questions delved to explore how the integration of digital pedagogies impact grammar education among non-native English learners.

### Results

*RQ1: What are the types of platforms used web-based learning in grammar education for non-native English learners?*

This systematic review classifies web-based learning (WBL) into several categories: (1) learning management system (LMS) or virtual learning environment (VLE), (2) social

networking sites (SNS), (3) interactive web-based modules, (4) communication tools, (5) project-based learning tools, (6) general websites offering linguistic inputs, and (7) unspecified. These categories were identified through literature review and are designated to enhance the organization of WBL in grammar education. Table 4 illustrates this categorization alongside the corresponding articles referenced in this study.

Table 4

*Types of platforms used in web-based learning in the teaching and learning of English grammar*

Type of platform	Example	Study
Learning Management System (LMS) / Virtual Learning Environment (VLE)	Sketch Engine Independent Grammar Study Scheme (IGSS) Moodle Hot Potatoes	Lin (2023) Windsor (2021) Anggrawan & Satria (2020); Kuzmina & Vinčela (2021); Mustafa & Hajan (2022) Ali (2018)
Social Networking Sites (SNS)	Facebook Youtube & Google Classroom	Mayanondha & Soontornwipast (2020) Pratama et al. (2022)
Interactive Web-Based Module	Web-based TOIEC course TACIT-Grammar module	Mayanondha & Soontornwipast (2020) Villessèche et al. (2019)
Communication Tool	Computer-Mediated Communication Artificial Intelligence (CMC AI)	Rokhayani et al. (2022)
Project-Based Learning Tool	Camtasia video creator Swish Max & e-Studio 7 Online media text	Pratama, et al. (2022) Khodabandeh & Soleimani (2018) Nurhayati (2019)
General website providing linguistic inputs	Learn English Anywhere	Sangeetha (2023)
Unspecified		Hendriani et al. (2023)

Table 4 illustrates that the Learning Management System (LMS) or Virtual Learning Environment is the most prevalent platform for examples and studies. All three investigations presented favorable outcomes regarding students' grammar acquisition: Windsor (2021), noted enhanced grammar scores, Kuzima & Vincela (2021), highlighted its facilitation of English grammar learning processes, Anggrawan & Satria (2020), found that participants felt online English grammar lessons eased their learning and comprehension, and Lin (2023), demonstrated a notable improvement in grammar achievement. In addition, all remaining research studies conveyed comparable favorable results utilizing the mentioned platforms. Nonetheless, Hendriani et al (2023), did not specify the platform employed, solely documenting their participants' preference towards blended learning.

*RQ2: What are the types of non-native English learners involved in the studies of grammar education utilizing web-based learning?*

In the second research question, we investigated the demographics of non-native English learners involved in the studies. Based on our analysis, we categorized the participants into three distinct groups: (1) school students, (2) undergraduate students, and (3) employees. Table 5 illustrates the breakdown of these learner categories across the 14 studies focusing on WBL and grammar.

Table 5

*Types of learners in the studies of grammar learning utilizing web-based learning*

<b>Type of learners</b>	<b>Study</b>
School students	Khodabandeh & Soleimani (2018)
Undergraduate students	Hendriani et al. (2023) Villessèche et al. (2019) Windsor (2021) Kuzmina & Vinčela (2021) Lin (2023) Rokhayani et al. (2022) Sangeetha (2023) Pratama et al. (2022) Anggrawan & Satria (2020) Ali (2018) Mustafa & Hajan (2022) Nurhayati (2019)
Employees	Mayanondha & Soontornwipast (2020) Anggrawan & Satria (2020)

The findings in Table 5 evidently indicated that among 14 studies, 12 included undergraduate students from different academic years at the universities where the research was carried out. While it is exemplary that researchers are actively engaged in higher education studies, it's notable that there's a significant scarcity of research focusing on school and employed individuals. Additionally, none of the studies involved participants at the pre-university or foundation level which signifies an important transition from secondary or high school to university.

*RQ3: How does the integration of digital pedagogies impact the effectiveness of grammar education?*

The third research question delved into the effects of digital pedagogies, encompassing instructional strategies, on grammar learning. Figure 2 presents an overview of the impacts of digital pedagogies, focusing on the implementation of WBL, in grammar education based on the 14 articles under review.

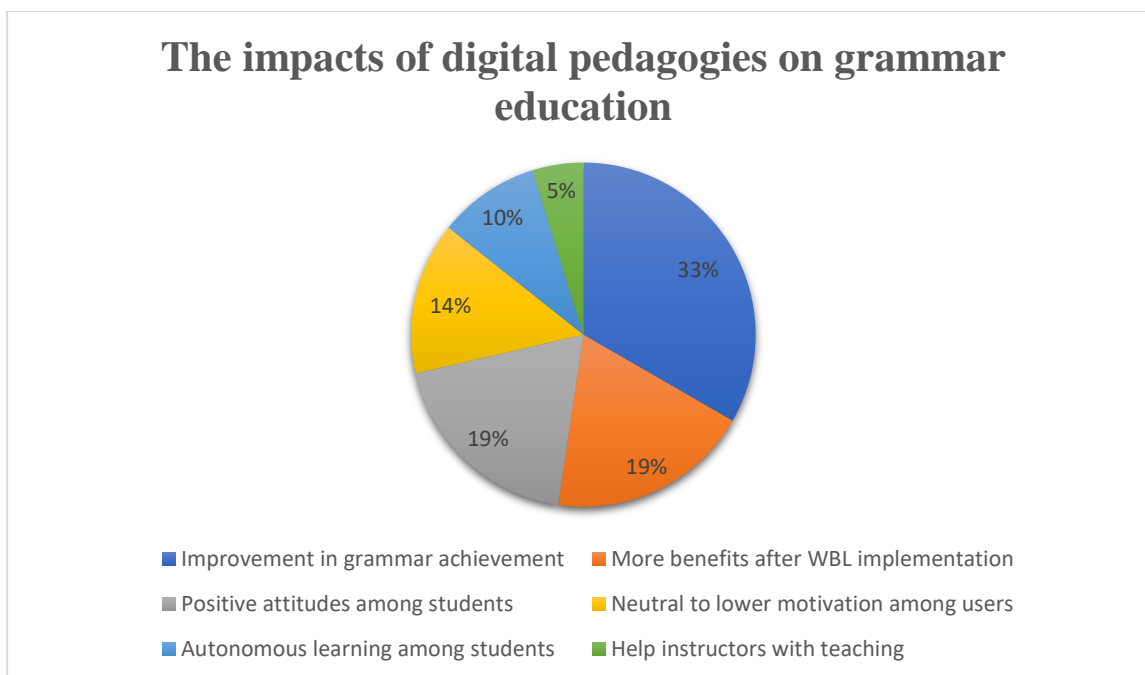


Figure 2. The impacts of digital pedagogies on grammar education.

From Figure 2, seven of the reviewed studies highlighted improvement in the students' achievement in grammar, which make up 33%. Mayanondha & Soontornwipast (2020), found that students substantially progressed their grammar proficiency after taking the web-based TOEIC tutoring course. Likewise, Lin (2023) revealed that guided data-driven learning (DDL) activities which included computer-based lessons, improved students' grammar and vocabulary scores in preparation of the TOIEC test significantly. In Windsor's (2021), study, it was suggested that a virtual learning environment (VLE) grammar learning resource named Independent Grammar Study Scheme (IGSS) successfully increased students' grammar test scores two years in a row. Khodabandeh & Soleimani (2018) discovered that the CALL-based tasks had a better effect on the learning of grammar compared to written question tasks. Similarly, Ali (2018), also found that the CALL group that used Hot Potatoes showed significantly better performance in grammar than the control group. There was also a significant improvement in students' grammar skills and enhancement in their academic accomplishment in the exit-level test after using online resources, according to Sangeetha (2023). Rokhayani et al (2022), identified that students' grammar scores improved due to the chatbot implementation as Computer-Mediated Communication Artificial Intelligence (CMC AI).

Next, four studies supported web-based learning (WBL) as giving benefits to students' grammar learning after its implementation. The students who participated in the study by Hendriani et al (2023), claimed that online learning provides them convenience, which may include the flexibility of time and place of study. In Villessèche et al (2019), study, it was proposed that the TACIT adaptive e-learning platform also benefits university students who are learning English as a second language, particularly in grammar, apart from school students in France. Windsor (2021), also mentioned that IGSS was advantageous to students with lower English proficiency. According to Nurhayati (2019), there were more benefits gained in participating and learning English Basic Grammar using online media text.

Four of the 14 reviewed studies also revealed that the students were showing positive attitudes towards the implementation of WBL in grammar education. Kuzmina et al (2021), discovered that students approved the mobile applications and speech analysis software-based seminar activities in Moodle e-course and considered that those facilitate their learning process of grammar. Students also showed higher motivation to learn English grammatical rules after participating in CALL-based tasks (Khodabandeh et al., 2018). In Pratama et al.'s (2022), study, majority of the students responded well to the adoption of asynchronous learning when Camtasia, Youtube, and Google Classroom are used. Likewise, Anggrawan and Satria (2022), students favoured asynchronous grammar online learning modules along with animated images that characterise instructors presenting teaching material.

In terms of motivation level in using WBL in grammar education, there were slightly mixed reactions in three of the articles. Lin (2023), mentioned that the students had a neutral to less than positive attitudes towards data-driven learning (DDL) despite the fact that the treatments helped them to significantly perform in grammar. Similarly in Anggarawan & Satria's (2020), study, the students were neutral concerning enthusiasm for asynchronous online English grammar lessons although they preferred the online modules to be animated and they agreed that the online lessons were more convenient, easy to comprehend, and helped them achieve good learning outcomes up to 67% and meet their learning needs. On the other hand, Mustafa & Hajan (2022), indicated that the intention of low-performing pre-service English teachers who performed poorly in quizzes based on assigned reading materials to use e-learning was less after they experienced authentic e-learning.

Another impact digital pedagogies on grammar education is the development of students' autonomous learning, Windsor (2021), argues that IGSS promotes independent learning and that the students will progress and learn grammar at a various pace. IGSS is voluntary, flexible, and offers corrective feedback and external learning resources, hence fulfilling the independent learning vacuum at the university. In the same way, utilizing CMC AI in English grammar lessons can improve autonomous learning among students (Rokhayani et al., 2022).

Finally, only one article focused on the digital pedagogy on grammar. Villessèche (2019), contends that the TACIT platform allows the teacher to conduct training sessions by introducing phases of communication and explanation of the grammar exercises. Both MCQ and adaptive systems embedded in the platform are perceived as beneficial and effective pedagogical tools, but they will also help grammar instructors to understand the position of the overall English grammatical competence of their learners better (Villessèche, 2019). Although Anggrawan & Satria (2020), received feedback from 2 experts about an online grammar module, the suggestions merely focused on the students' learning process and outcomes, but not on how the module can improve the instructors' teaching strategies.

## **Discussion**

The finding for the first research question underscores the predominance of the Learning Management System (LMS) or Virtual Learning Environment as the primary platform for examples and studies related to grammar education. The evidence presented across various investigations consistently demonstrates positive outcomes for students' grammar proficiency (Windsor, 2021; Kuzima & Vincela, 2021; Anggrawan & Satria, 2020; Lin, 2023)

Moreover, the remaining studies echoed comparable positive results using other WBL platforms (Mayanondha & Soontornwipast, 2020; Pratama et al., 2022; Villessèche, 2019; Rokhayani et al., 2022; Khodabandeh & Soleimani, 2018; Sangeetha, 2023; Hendriani et al., 2023). This collective body of research points out the efficacy and utility of online platforms in enhancing grammar acquisition among students, with implications for educational practice and pedagogy.

Subsequently, the finding for the second research question emphasizes the predominant focus on undergraduate students within university-based research endeavors, highlighting the dedication of researchers to higher education studies (Hendriani et al., 2023; Villessèche, 2019; Windsor, 2021; Kuzmina & Vinčela, 2021; Lin, 2023; Rokhayani et al., 2022; Sangeetha, 2023; Pratama et al., 2022; Anggrawan & Satria, 2020; Ali, 2018; Mustafa & Hajan, 2022; Nurhayati, 2019). However, with only 2 studies that researched school and employed individuals (Khodabandeh & Soleimani, 2018; Mayanondha & Soontornwipast, 2020), and 1 study by Anggrawan & Satria (2020), that conducted one-on-one assessments on 2 experts about an online grammar module, the visible absence of investigation on these groups of learners raises concerns about the inclusivity and comprehensiveness of current research practices. Moreover, the oversight of participants at the pre-university or foundation level neglects a critical stage in academic development, potentially overlooking valuable insights into the transition from secondary education to higher learning institutions. Moving forward, researchers should broaden their scope and incorporate a more diverse range of participants to ensure a comprehensive understanding of educational dynamics at various stages of academic progression.

Lastly, the findings for the third research question exhibit that digital pedagogies in grammar education largely impact students' grammar achievement in a significant way (Mayanondha & Soontornwipast, 2020; Lin, 2023; Khodabandeh & Soleimani, 2018; Ali, 2018; Sangeetha, 2023; Rokhayani et al. 2022). This shows that digital pedagogies may have a substantial influence on students' grammar achievement, demonstrating a significant impact within grammar education. Integrating digital tools effectively can markedly enhance students' understanding and application of grammar concepts, as supported by Akhter, Zafar & Saba (2022), Khalil (2018), and Pinto-Llorente, Sánchez-Gómez, García-Peñalvo, & Casillas-Martín (2017). While much of the literature emphasizes the impact of digital pedagogy on students' learning outcomes, Villessèche's (2019), study uniquely recognizes its benefits for instructors as well. Their research underscores how a web-based learning (WBL) platform can serve as a valuable and effective pedagogical tool, particularly in grammar education. This presents a significant gap in existing research in fully exploring the integration of WBL as a pedagogical tool, especially in the context of grammar education.

## **Conclusion**

In summary, this systematic review has examined studies concerning web-based learning (WBL) and grammar education for non-native English learners, addressing a gap in the existing systematic reviews on these topics. Utilizing Scopus, Web of Science (WoS), and Educational Resources Information Centre (ERIC) databases, 14 articles meeting the specified inclusion and exclusion criteria were identified for inclusion in the review. The primary findings accentuate two emerging trends in grammar education through WBL:



1. This review identifies six types of web-based learning, which are learning management system (LMS) or virtual learning environment (VLE), social networking sites (SNS), interactive web-based modules, communication tools, project-based learning tools, and general websites offering linguistic inputs. Additionally, an unspecified category was included. Among these, the most prevalent form of web-based learning is via LMS or VLE. This insight enables educators and practitioners to tailor their approaches by selecting appropriate platforms for teaching grammar. Furthermore, these forms of web-based learning can serve as supplementary resources in education.
2. Another focus in this review is the prevalence of university-based research that involved undergraduate students, indicating researchers' commitment to higher education studies. However, the limited attention given to school and employed individuals, with only two studies addressing these groups, builds concerns about the inclusivity and breadth of current research practices. Furthermore, the absence of investigation into participants at the pre-university or foundation level disregards a focal phase in academic growth, potentially overlooking valuable insights into the transition from secondary to higher education.
3. The final part of this review highlights how literature in the past ten years largely focuses on students' grammar achievement when discussing the impact of digital pedagogical tools. While these studies provide valuable insights into how students benefit from technology in language learning, there is a noticeable gap in the research regarding how these tools can enhance grammar instructors' teaching practices. Understanding how digital tools can support instructors in delivering grammar instruction more efficiently is necessary for developing comprehensive approaches to language education. Research in this area could explore how digital tools help instructors by personalizing instruction, providing immediate feedback, and creating engaging learning experiences, ultimately benefiting both instructors and students alike.

To conclude, this systematic review contributes to the growing body of research by offering a comprehensive overview of how web-based learning (WBL) is applied to English grammar education, with a special focus on learning management systems (LMS) and virtual learning environments (VLE). This insight yields educators and practitioners with valuable guidance in selecting suitable platforms for teaching grammar and stresses the potential of web-based learning as supplementary resources in education. However, while the review highlights the prevalence of university-based research involving undergraduate students, it also discloses a notable gap in attention towards school and employed individuals, with limited research at pre-university or foundation levels. Furthermore, there exists an evident gap in research concerning how digital pedagogical tools can improve the teaching methods of grammar instructors. This limitation raises concerns about the inclusivity and scope of current research practices. To address these gaps and ensure a more comprehensive understanding of educational dynamics across various academic stages, researchers must widen their scope to incorporate a more diversified range of participants. By adopting inclusive approaches, researchers can contribute to the advancement of educational research, thereby facilitating more robust insights into the evolving outlook of learning technologies and practices. It can also motivate further exploration into how digital tools can enhance grammar instruction, aiming to create a more well-rounded understanding of technology's role in education across diverse learner demographics.

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