A Systematic Review of Duolingo Language-Learning Application on English Language Skills for Second Language Learners

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Abstract

This systematic literature review (SLR) synthesizes the findings of articles extracted from the literature search on using the Duolingo language learning application as a pedagogical tool for developing language skills (e.g., vocabulary, grammar, listening, speaking, reading, and writing) in English as a Second Language (ESL) and English as Foreign Language (EFL) programs. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework was applied to retrieve articles by an appropriate keyword search on the Scopus and ERIC (Educational Resources Information Center) databases. Based on the inclusion/exclusion criteria and screening of texts, 19 open-access articles were identified for further contextual analysis. This study synthesizes the participant demographics, methods and methodologies of research, research design and findings. Most studies support that the Duolingo language learning application significantly improved various English language skills in second language (English) learners, such as oral communication, vocabulary, writing proficiency, etc., enrolled in various ESL and EFL programs. This SLR encourages teachers, teacher educators, and administration to effectively use Mobile-Assisted Language Learning (MALL) as a viable option. It will help the stakeholders to be better equipped in making informed decisions about the use of the Duolingo application in ESL/EFL contexts for second language (English) learners. Future studies may provide a comprehensive overview of the retrieved research on Duolingo for those pursuing ESL/EFL by considering a longer duration. This will help researchers identify research gaps in the area.

Keywords: Gamified learning, Duolingo, online learning, ICT in Education, EFL, ESL.

INTRODUCTION

Multilingual learning programs and courses, especially those offering foreign or globally dominant languages like English, have seen a rise in enrolment. Learners prefer these courses as they are mandatory for trans-boundary migration of students for further education or better job prospects in other countries. Language-based competency exams like TOEFL and IELTS that support migration, especially to some European countries, the US and Australia, are

gaining popularity. Offering multilingual programs has other benefits and challenges, as shown in Table 1.

TABLE 1. Benefits and Challenges of Multilingualism.

BENEFITS	CHALLENGES
Cognitive development and flexibility	Need for trained teachers
Improved academic achievement	Resource-intensive implementation
Enhanced memory and delayed dementia	Political resistance and policy issues
Cross-cultural understanding and empathy	Balancing local and global languages
Better career and economic opportunities	Funding and sustainability
Preservation of minority languages	Managing social dynamics in classrooms

Source: Parentapps Team. (2023, July 17). Retrieved from: https://ebinternacional.org/the-benefits-of-a-multilingual-education/

Digital Game-Based Learning (DGBL) and Mobile-Assisted Language Learning (MALL)

Many factors shape and influence the process of learning English as a second language (ESL). These include the exceptional skills of both teachers and students, their chosen methods and approaches, and the selection of media or other resources that best suit their needs (Sakkir & Syamsuddin, 2023).

To help students enhance their English LSRW skills, creative strategies must be used by teachers along with engaging materials. Students can enhance their own learning by enrolling in English classes, participating in extracurricular activities, or studying independently in their free time. English courses and supplemental instruction significantly contribute to students' proficiency and skill development. In the rapidly evolving digital era, technology 4.0 offers substantial benefits to both educators and learners. The integration of technology in education is widespread, with continuous efforts to increase access to digital learning through the internet. Mobile-Assisted Language Learning (MALL) has enhanced the possibilities for students to learn a foreign language independently and flexibly at any time by leveraging mobile technology (Reinders & Benson, 2017). With MALL, students can simulate, visualize, and engage with scientific systems and processes, while also supporting secure and prioritized internet access.

According to Kukulska-Hulme (2013), MALL is the incorporation of mobile devices into language learning, especially when mobility is advantageous. The expanded accessibility of

mobile technology enables learners to study a foreign language at their own pace and in any setting.

The digital age has led to a paradigm shift in education. Online learning is becoming an integral part of modern pedagogy. Hence, exploring innovative technologies that are reshaping the learning experience is imperative. Gamified learning is a pedagogical strategy that integrates game design elements into educational contexts. By leveraging game mechanics, such as points, badges, and levels, this approach enhances learner engagement and motivation. By transforming educational content into a game-like experience, gamified learning can foster a sense of achievement, provide immediate feedback, and encourage active participation. A gamified learning approach is effective in a wide range of subjects where students may find traditional methods less engaging.

Digital game-based learning (DGBL) has become a significant approach to language learning with its adaptive artificial intelligence embedded technology. The approach follows constructivist learning principles, which emphasize learners' active role in knowledge construction through hands-on experiences and meaningful interactions (Acquah and Katz, 2020). Leveraging the interactive elements of games, DGBL fosters engaging environments to promote active participation, knowledge building, and the development of essential skills. (Zou et al., 2021). DGBL provides learners opportunities for exploration, experimentation, and problem-solving. These are crucial for language acquisition (Li and Tsai 2013; Reinhardt and Sykes 2012).

Recent studies have shown an increase in the use of digital game-based pedagogies and integration of platforms such as Edpuzzle, Kahoot!, Nearpod, Quizizz and Quizlet in providing gamified learning experiences to develop academic competency in subjects such as social sciences, science, engineering, mathematics, and even language learning. Popular MALL applications like Duolingo allow self-paced practice and engaging exercises for English language learners, helping them progress toward fluency. Duolingo-like applications are specifically designed to allow learners to study anytime, anywhere, encouraging independent learning (Sakkir & Syamsuddin, 2023).

By examining existing literature systematically on the integration of such DGBL and MALL applications, we seek to understand how internet technology, with the help of computers and mobile phones in teaching and learning of English to develop vocabulary, grammar, and LSRW (listening, speaking, reading and writing) skills. Based on the findings of the SLR, this paper aims to identify the effectiveness of the Duolingo language learning application and its impact

on second language (English) learners in terms of their competencies and develop their skills in English.

RESEARCH QUESTIONS

Although researchers have previously explored the impact of gamified and digital game-based learning on academic achievement, there is a gap in systematic reviews on the findings of Duolingo on learners' competencies in language skills since the Covid-19 pandemic. Furthermore, examining the relationship between the Duolingo language learning app learning and learners' second language skills, specifically in English as a Second Language (ESL) and English as Foreign Language (EFL) settings, can provide valuable insights into the overall perception and effectiveness of this application. Hence, in this study, we have applied a systematic literature review to analyze the open-access journal articles from two reputed databases- SCOPUS and ERIC, to answer the following research questions:

RQ1: What publication trends and demographics of participants as seen in recent studies on the use of Duolingo for developing English language skills in second language (English) learners pursuing ESL and EFL courses? We wish to summarize information regarding year and country of publication, research method, design of study, sample size, and educational level in these studies.

RQ2: What are the key findings reflected from recent studies on the use of the Duolingo language learning application for developing English language skills in second language (English) learners pursuing ESL and EFL courses on the following themes:

a. Emerging trends in using the Duolingo language learning application over recent years.

b. Outcomes suggesting effectiveness of Duolingo language learning on particular language skills (e.g., vocabulary, grammar, listening, speaking, reading, and writing).

c. Effect of Duolingo language learning platform on students' psychological states (motivation, enjoyment, learner autonomy, and engagement).

METHODOLOGY

PRISMA Framework and Systematic Search Strategy

This systematic review is based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). Two databases, SCOPUS and ERIC, were utilized for the search.

SCOPUS and ERIC databases were accessed using the University of Delhi on-campus access provided to the university students. The SCOPUS and ERIC databases were searched on 25th August 2025 for previous research articles. Both databases are well-reputed in the academic community, specializing in the field of education and contain several papers from reputed

journals in this discipline.

The Boolean operator-based keyword searched articles from the database were subjected to screening, analysis, interpretation and thematically summarizing. In the next phase, articles were subjected to abstract, keywords and title filtration, followed by a full-text analysis and screening. Eventually, the empirical studies related to ESL and EFL using Duolingo were extracted. PRISMA guidelines were followed (Moher et al., 2009).

Keyword Searched

Search keywords in SCOPUS (https://www.scopus.com/home.uri) under 'Article title, Abstract and Keywords:'

"Duolingo" AND ("English" OR "ESL" OR "EFL" OR "ELT")

Search Keywords in Educational Resources Information Center (ERIC), (https://eric.ed.gov/?q=) under broad search:

"Duolingo" AND ("English" OR "ESL" OR "EFL" OR "ELT")

Operators used on these databases, along with filters, screened and included only open-access journal articles in English and published since 2021, leaving us with 176 articles.

Operators used on these databases helped in the identification of 176 articles.

Identification, Eligibility, Screening and Identification

The inclusion and exclusion criteria for the identification and eligibility phases are given in Table 2.

TABLE 2. Keywords used in SCOPUS and ERIC databases searches.

Inclusion Criteria	Exclusion Criteria
Only journal articles	Any other type of publication
Articles in the English language only	Articles in languages other than English
Articles published since 2021	Articles published before 2021
Open access articles	Sources with no open-access version of articles

According to the inclusion criteria, only published open-access journal articles are selected from SCOPUS and ERIC databases after the keyword search. Books, chapters in books, conference proceedings, and other texts are excluded. This particular criterion is restricted to articles written in English and published since 2021. Only empirical research-based journal articles that are from the Social Sciences, Arts and Humanities, and Psychology fields of study were considered eligible. Non-empirical research, systematic reviews and thematic reviews were excluded. Based on the inclusion criteria, we were left with 47 studies for the title, keyword and abstract screening phase.

After applying the inclusion and exclusion criteria, 47 journal articles were selected, and using Zoterro, 5 duplicate and/or retracted articles were removed. This left us with 42 articles.

In the next phase of retrieving articles, the researcher went through the keywords, date of publication, abstract and titles, to enable the extraction of all relevant data during the data collection process, leaving us with 35 open-source articles.

The articles were further screened on the following criteria: (i) having a sample of second language (English) learners, (ii) having a sample of non-disabled students and those without neurodivergent disorders (iii) articles only related to developing language skills in ESL and EFL courses and programs using the Duolingo language learning application. Consequently, 16 more articles from the two bases were found irrelevant for this study and eliminated, leaving a total of 19 articles.
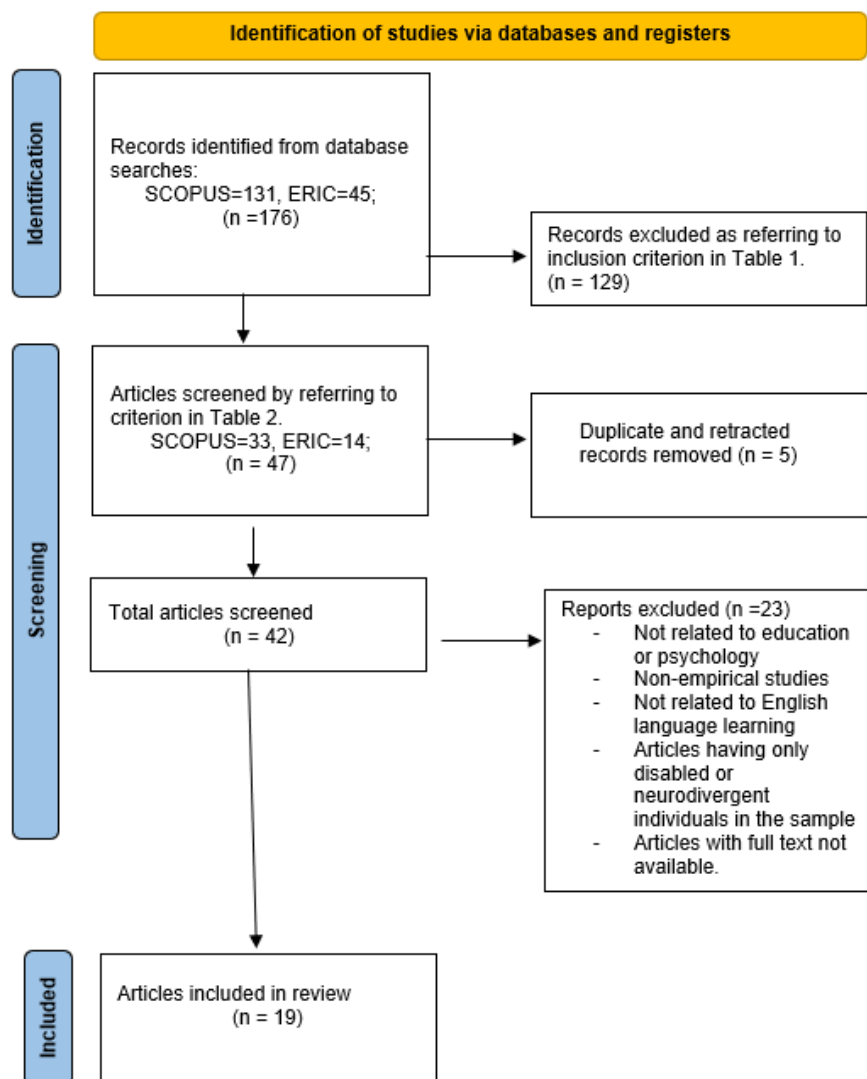

FIGURE 1. PRISMA 2020 flow diagram, adapted from Page et al. (2021), for systematic reviews.

RESULTS

A total of 19 articles were extracted at the end of the selection process. The title of these articles, their author(s), publication year and country are summarized in Table 3.

TABLE 3. Nineteen selected articles, their author(s), publication year and country.

S. No.	Author(s)	Year	Country	Title
1	Abdellatif, M.S.; Alshehri, M.A.; Alshehri, H.A.; Hafez, W.E.; Gafar, M.G.; Lamouchi, A.	2024	Saudi Arabia	I am all ears: listening exams with AI and its traces on foreign language learners' mindsets, self-competence, resilience, and listening improvement
2	Ahmed, A.; Hassan, I.; Pallathadka, H.; Keezhatta, M.S.; Haryadi, R.N.; Al-Mashhadani, Z.I.; Attwan, L.Y.; Rohi, A.	2022	Iran	MALL and EFL Learners' Speaking: Impacts of Duolingo and WhatsApp Applications on Speaking Accuracy and Fluency
3	Alfuhaid, Sultan R.	2021	Saudi Arabia	The Utilisation of Duolingo to Enhance the Speaking Proficiency of EFL Secondary School Students in Saudi Arabia
4	Davudova, Enejan; Türel, Yalin Kiliç	2022	Turkey	Evaluation of Mobile Applications in Foreign Language Learning at Early Age
5	Ergün-Elverici, S.	2023	Turkey	Integrating Mobile Technologies: Two Stage Study on Academic Performance and Social Presence
6	Kaosayapandhu, Munchuree	2023	Thailand	Application for Grammar Skills: A Case Study of Thai EFL Undergraduates
7	Kazu, Ibrahim Yasar; Kuvvetli, Murat	2024	Turkey	Improve Speaking Skills with Duolingo's Mobile Game-Based Language Learning
8	Kic-Drgas, J.; Kılıçkaya, F.	2024	Poland and Turkey	Exploring novel approaches to digital self-regulated learning: a study on the use of mobile applications among Polish and Turkish EFL pre-service teachers

9	Lehan, V.; Hodovanets, N.; Muraviova, I.; Litvinova, M.; Baibakova, O.	2023	Ukraine	Formation of lexical competence in foreign philology (English) students during online education
10	Ma, Y.; Chen, M.	2024	China	AI-empowered applications effects on EFL learners' engagement in the classroom and academic procrastination
11	Olimat, K.N.	2024	Jordan	The Reality and Effects of Using Duolingo to Develop English Language Skills for EFL Learners in Jordan
12	Ouyang, Z.; Jiang, Y.; Liu, H.	2024	China	The Effects of Duolingo, an AI-Integrated Technology, on EFL Learners' Willingness to Communicate and Engagement in Online Classes
13	Pikhart, M.; Klimova, B.; Al-Obaydi, L.H.	2024	Czech Republic, Taiwan, and Iraq.	Exploring university students' preferences and satisfaction in utilizing digital tools for foreign language learning
14	Purwanto, Anton Adi; Syafryadin	2023	Indonesia	Students' Perception on Using Duolingo for Learning English Vocabulary
15	Qiao, H.; Zhao, A.	2023	China	Artificial intelligence-based language learning: illuminating the impact on speaking skills and self-regulation in Chinese EFL context
16	Teba, Sourou Corneille	2022	Benin Republic	Using Duolingo to Improve Beninese Secretarial Advanced Learners' Oral Communication Skills
17	Ünal, Erhan; Güngör, Fatih	2021	Turkey	The Continuance Intention of Users toward Mobile Assisted Language

				Learning: The Case of Duolingo
18	Zeng, C.; Fisher, L.	2024	China	Opening the "Black Box": How Out-of-Class Use of Duolingo Impacts Chinese Junior High School Students' Intrinsic Motivation for English
19	Zhou, S.	2024	China	Gamifying language education: the impact of digital game-based learning on Chinese EFL learners

Demographic Information of Studies

The demographic information of the 19 articles based on the country study was conducted, education level of participants, year of publication, and type of approach are covered in this section. The articles were further analyzed, interpreted and later thematically summarized.

Country-Wise Distribution of Studies

The 19 articles extracted were from sixteen countries and are listed in Table 2. They are displayed in the form of a bar graph in Figure 2. Of these, five studies were carried out in Turkey and China, two studies were carried out in Saudi Arabia, and one in Benin Republic, the Czech Republic, Indonesia, Iran, Iraq, Jordan, Poland, Taiwan, Thailand and Ukraine each.
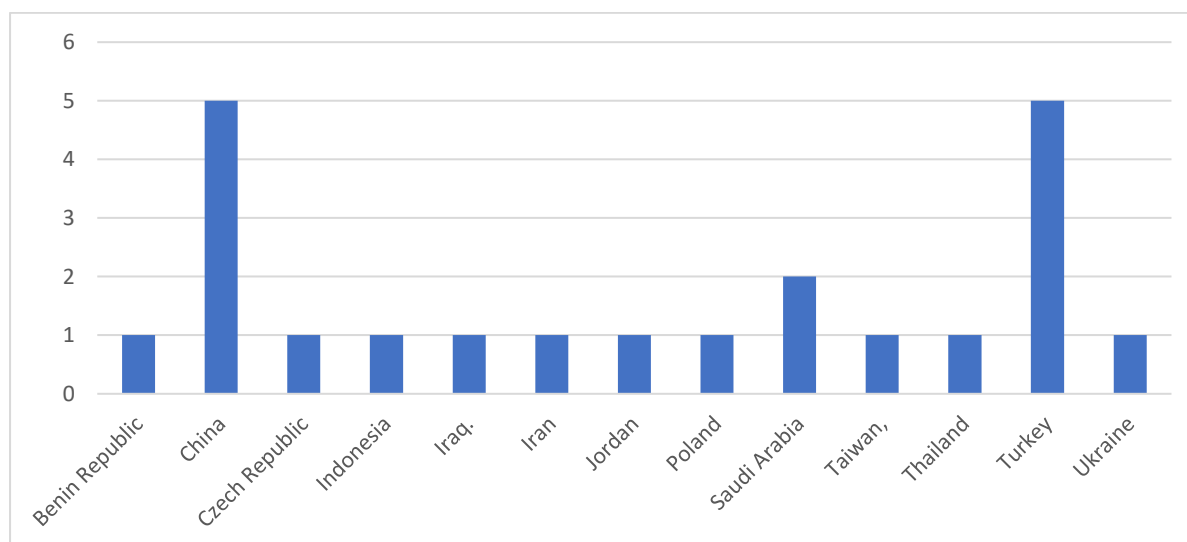

FIGURE 2. Number of articles published based on the country of study

Year-Wise Distribution of Studies

The list of selected articles based on year of publication is shown in Table 3 and shown on a bar graph in Figure 3. In summary, a majority of studies (nine) were published in 2024. Five articles

were published in 2023, three in 2022, and two in 2021. No studies have been published on the two databases in 2025 (until August). The reason lesser number of studies in the early years is attributed to the onset of the COVID-19 pandemic. Ever since, the use of technology and distance learning has shown an increasing trend, and it can be reflected in the articles getting published over the years.
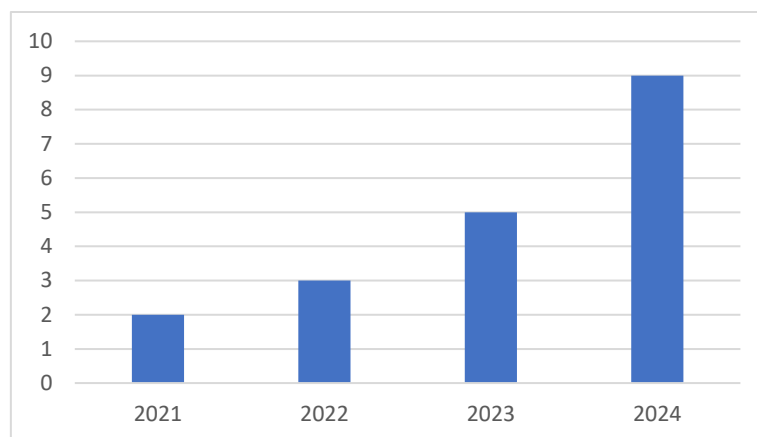

FIGURE 3. Number of articles based on their publication year

Research Method Used

The details of the school level of the sample selected, sample size and method used in the identified 19 articles for this systematic review are given in Table 4.

TABLE 4. Author, school level, sample size and method used in 19 articles selected under this study.

Sr. No.	Author (s)	Educational Level	Sample Size	Method (Qualitative or Quantitative or Both)
1	Abdellatif et al. (2024)	Higher Education	57	Quantitative
2	Ahmed et al. (2022)	Middle Level	90	Quantitative
3	Alfuhaid (2021)	Senior Secondary	28	Quantitative
4	Davudova et al. (2022)	Primary Level	87	Both
5	Ergün-Elverici (2023)	Senior Secondary	32	Both
6	Kaosayapandhu (2023)	Senior Secondary	128	Quantitative
7	Kazu et al. (2024)	Senior Secondary	76	Both

8	Kic-Drgas et al. (2024)	Higher Education	206	Quantitative
9	Lehan et al. (2023)	Higher Education	2,500	Quantitative
10	Ma and Chen (2024)	Higher Education	350	Quantitative
11	Olimat (2024)	Higher Education	500	Quantitative
12	Ouyang et al. (2024)	Higher Education	80	Quantitative
13	Pikhart et al. (2024)	Higher Education	148	Qualitative
14	Purwanto et al. (2023)	Middle Level	25	Quantitative
15	Qiao et al. (2023)	Higher Education	93	Quantitative
16	Teba (2022)	Other	50	Both
17	Ünal et al. (2021)	Higher Education	379	Quantitative
18	Zeng et al. (2024)	Middle Level	20	Qualitative
19	Zhou (2024)	Higher Education	70	Both

Distribution of studies across different school levels

In most of the studies, focused on the higher educational institutional level. One (5%) study focused on the primary school level. Three (15%) studies covered the middle school level. One (5%) study covered secondary school and three studies (15%) covered senior secondary school levels each. Most of the studies, i.e., ten (or 50%) covered a higher educational level. One study mentioned samples were drawn from vocational and technical institutes beyond the purview of school and higher-level institutions. Figure 4 shows the demographic distribution of participants studied across different school levels in the form of a pie chart.
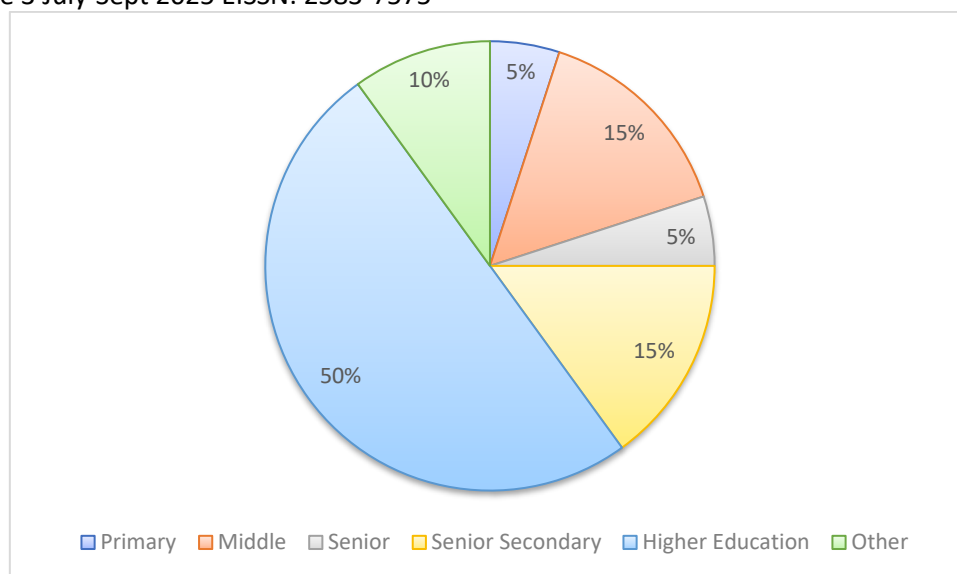
FIGURE 4. Demographic Distribution of Participants Based on their Educational Level across Studies

Distribution of Studies Based on Research Method

In the selected studies, all three research approaches were used: qualitative, quantitative and a combination of both/mixed method. As shown in Figure 5 in the form of a pie chart, there were 13 (or 68%) quantitative studies, whereas 2 (or 11%) studies used a quantitative approach. Also, 4 (or 21%) of the studies used a mixed-methods approach.
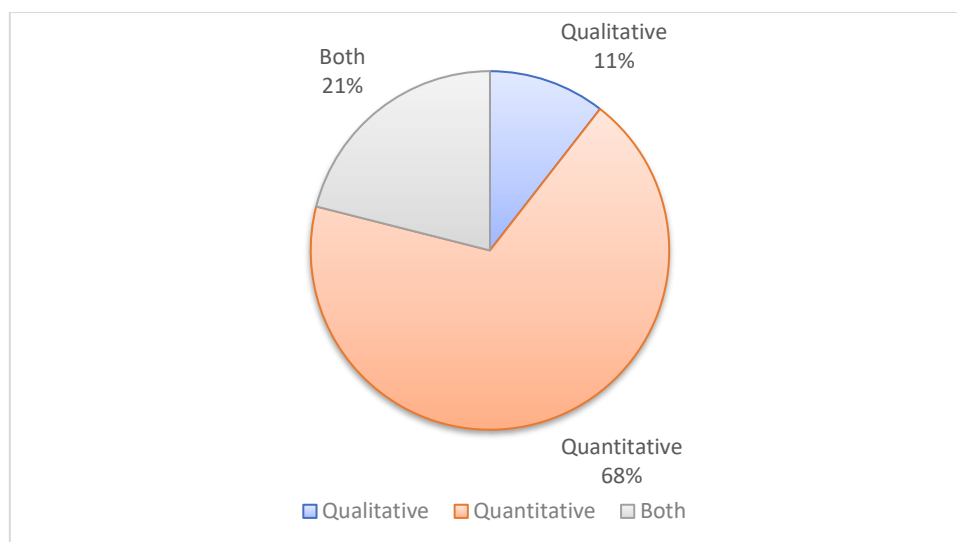

FIGURE 5. Distribution of Research Methods Employed Across the Studies

Applications and/or Software Used along with Duolingo and Research Design

Table 5 depicts the applications and/or software used along with Duolingo and the design of research employed in each study. Most of the studies showed experimental research designs.

TABLE 5. Summary of software(s)/application(s) or game(s) used and the research designs incorporated in the studies.

Sr. No.	Author(s)	Game(s) or software(s) or online application(s) used	Research Design
1	Abdellatif et al. (2024)	Duolingo and Nearpod	Quasi-experimental
2	Ahmed et al. (2022)	Duolingo and WhatsApp	Quasi-experimental
3	Alfuhaid (2021)	Duolingo	Experimental design
4	Davudova et al. (2022)	Duolingo and Memrise	Experimental design and thematic analysis
5	Ergün-Elverici (2023)	Duolingo	Experimental design and descriptive content analysis
6	Kaosayapandhu (2023)	Duolingo	Quasi-experimental design
7	Kazu et al. (2024)	Duolingo	Quasi-experimental design and thematic analysis
8	Kic-Drgas et al. (2024)	Duolingo, Quizlet, Cambly, Babbel, Busuu, and others.	Survey design.
9	Lehan et al. (2023)	Kahoot!, Moodle, Duolingo, Google Forms, Lingohut, Quizlet and others	Systematic and logical analysis.
10	Ma and Chen (2024)	ChatGPT, POE, and Duolingo and other AI-based applications	Quasi-experimental
11	Olimat (2024)	Duolingo	Descriptive (quantitative) analysis
12	Ouyang et al. (2024)	Duolingo	Quasi-experimental
13	Pikhart et al. (2024)	Duolingo, ChatGPT, and Google Translate; digital games	Thematic analysis
14	Purwanto et al. (2023)	Duolingo	Descriptive (quantitative) analysis
15	Qiao et al. (2023)	Duolingo	Randomized controlled trial (RCT)
16	Teba (2022)	Duolingo	Quazi-experimental

17	Ünal et al. (2021)	Duolingo	Cross-sectional survey
18	Zeng et al. (2024)	Duolingo	Case Study with inductive and deductive analysis
19	Zhou (2024)	Duolingo	Experimental design and thematic analysis

Parameters/Domains of the Study

In Table 6, a list of parameters that were analyzed to test different skills for a second language (English) in different studies is presented

TABLE 6. Summary of parameters/domains observed under the studies.

Sr. No.	Author(s)	Parameters/Domains of Study
1	Abdellatif et al. (2024)	Language learners' mindsets, self-competence, resilience, and listening skills.
2	Ahmed et al. (2022)	Speaking accuracy and fluency
3	Alfuhaid (2021)	Speaking proficiency: pronunciation, grammar, vocabulary, comprehension, and fluency.
4	Davudova et al. (2022)	English achievement: listening, speaking, reading, and writing skills.
5	Ergün-Elverici (2023)	Academic performance in listening, speaking, reading, and writing skills, and social presence.
6	Kaosayapandhu (2023)	Verb tense knowledge; frequency of Duolingo use, completion of levels, perceived achievement in Duolingo, and enjoyment.
7	Kazu et al. (2024)	Speaking proficiency; emotional and cognitive dimensions such as learner engagement, and motivation.
8	Kic-Drgas et al. (2024)	Self-regulated learning, motivation, attitude, enjoyment and others
9	Lehan et al. (2023)	Lexical competence
10	Ma and Chen (2024)	Affective, cognitive, and behavioural engagement; academic procrastination.
11	Olimat (2024)	English language skills (listening, reading, writing, and speaking).

12	Ouyang et al. (2024)	Willingness to communicate (WTC) and engagement in English as a foreign language (EFL).
13	Pikhart et al. (2024)	Vocabulary acquisition, skill development (listening, speaking, writing, reading), and overall satisfaction with the digital resources.
14	Purwanto et al. (2023)	Students' perceptions towards Duolingo, vocabulary, students' enthusiasm for Duolingo app in vocabulary, students' ambition on vocabulary learning, the strengths of Duolingo, and the negatives of Duolingo.
15	Qiao et al. (2023)	Speaking skills (fluency, vocabulary, accuracy, and pronunciation) and self-regulation.
17	Teba (2022)	Oral Communication Skills: Fluency, Pronunciation, Grammar and Vocabulary
18	Ünal et al. (2021)	Students' continuance intention to use mobile-assisted language learning (MALL), perceived usefulness, perceived ease of use, attitude, subjective norms, student readiness, instructor readiness, perceived behavioral control, self-efficacy, learning autonomy, satisfaction, and confirmation.
19	Zeng et al. (2024)	Intrinsic Motivation
20	Zhou (2024)	Enjoyment, ideal self-perception, and intrinsic motivation.

Summary of Findings from the Studies

Abdellatif et al. (2024) found that EFL learners who participated in AI-based listening exams demonstrated significant improvements in their mindsets, self-competence, resilience, and listening skills. The AI-driven exams integrated through Duolingo and Nearpod provided an engaging and adaptive learning experience. It provided personalized feedback and adaptive questions to target individual weaknesses. Overall, the learners showcased more positive learning mindsets, enhanced self-perceived competence, and measurable improvement in listening comprehension.

Ahmed et al. (2022) studied both the Duolingo and WhatsApp applications' effectiveness in improving the speaking fluency and accuracy of EFL learners, although no significant difference between the two applications was found in their effectiveness. Groups receiving instructions through the two applications outperformed those who received traditional classroom instruction. This suggests that using online applications is more engaging to EFL learners and can improve their

motivation and reduce learning anxiety.

Alfuhaid's (2021) study found that integrating Duolingo into the learning process significantly improved the speaking proficiency of EFL students. After four months, the learners using Duolingo significantly performed better than the control group in speaking skills. This improvement was attributed to increased confidence and reduced anxiety through practice. It also demonstrated enhancement in vocabulary range and grammatical accuracy. The researcher concluded that technology integration is a valuable tool for enhancing EFL students' language skills.

Davudova et al. (2022) compared the effectiveness of mobile applications, Duolingo and Memrise. Both led to a significant positive effect on students' overall English achievement, especially in reading and writing skills. Duolingo was effective in enhancing the listening, speaking, reading and writing skills of learners, while Memrise was even more effective in developing listening, reading, and writing skills as compared to Duolingo. Students and parents generally viewed these applications as fun and effective for learning English. The study suggests that incorporating mobile applications into foreign language learning can improve academic success and student engagement.

Ergün-Elverici's (2023) research revealed that integrating Duolingo into English classes had a positive impact on students' academic performance, particularly in writing, listening, and speaking. It also indicated a significant increase in social presence among students in the experimental group. Analysis of qualitative data from follow-up interviews revealed that students found Duolingo entertaining and accessible while also benefiting from parental consent and teacher guidance. The findings suggest that mobile technologies like Duolingo can be valuable tools for enhancing language learning and also helpful in socialization.

Kaosayapandhu (2023) studied verb tense knowledge in Duolingo users who demonstrated a significant improvement. The frequency of Duolingo use, perceived achievement, and perceived enjoyment positively influenced performance among the user group. The implication is that Duolingo is a potentially useful supplement to classroom learning, although its effects may change over time as users become habituated.

Kazu et al. (2024) also found that using Duolingo significantly improved the speaking proficiency of language learners compared to traditional classroom-based instruction. The gamification and interactive exercises within Duolingo played a crucial role in enhancing oral fluency. The research highlights the importance of integrating technology and gamified approaches into language education to foster learner engagement, motivation, and ultimately, improved speaking skills.

Kic-Drgas et al. (2024) found that Duolingo was the most widely used application among Polish and Turkish EFL pre-service teachers for self-regulated language learning. The study also revealed a shift

in learning patterns following the pandemic, with an increase in the use of online applications. Although some cultural and gender differences were observed in the use of these applications, the findings suggest that online applications offer promising opportunities to enhance and support self-regulated learning experiences in English language acquisition.

Lehan et al. (2023)- in their study found that teachers use various ICT tools like Kahoot!, Moodle, Duolingo, Google Forms, Lingohut, and Quizlet to enhance lexical competence in distance learning. The study showed that specific exercises like translation of international words, communicative exercises, and word comparison led to the majority of students (95.5%) perceiving a positive impact of ICTs on their lexical competence development.

Ma and Chen (2024) study found that AI-empowered applications significantly enhanced learner engagement (affective, cognitive, and behavioral) and reduced academic procrastination among EFL learners. This study too advocates for their integration in diverse educational settings, emphasizing learner-centered approaches.

Olimat (2024), through descriptive analysis of responses to questionnaires from Jordanian EFL learners revealed that they were aware of the effectiveness of Duolingo in developing their English language skills (listening, reading, writing, and speaking abilities). The users also agreed that Duolingo was able to make them more confident in using English, manage stress and even develop their non-verbal communication skills.

In their study, Ouyang et al. (2024) found that using Duolingo significantly improved EFL learners' willingness to communicate and engagement in online classes. showing significant gains in affective, cognitive, and behavioral engagement in participants. Furthermore, the experimental group demonstrated improvement in both communication skills and overall engagement with a statistically significant increase in their willingness to speak, read, write, comprehend, and communicate in English.

EFL college students from the Czech Republic, Taiwan, and Iraq were found to utilize digital resources like Duolingo, ChatGPT, and Google Translate in diverse ways for language learning in a study conducted by Pikhart et al. (2024). These tools are used for vocabulary acquisition, skill development, and language exploration. While students generally expressed satisfaction with these resources, challenges such as connectivity issues and content variety were identified. The study highlights the positive impact of digital tools on language learning experiences, emphasizing the need for ongoing improvement and personalized learning paths.

Purwanto et al. (2023) found that a majority of students were encouraged to learn English vocabulary through the Duolingo application. Students found the app easy to navigate through, making them

more interested and excited about learning new words. Duolingo also helped prevent boredom and encouraged new learning methods. Overall, the students' perception of using Duolingo was positive and helpful for enhancing vocabulary during English learning.

Qiao et al. (2023) studied the AI-based instruction while using the Duolingo application. Their study revealed significant improvement in second language speaking skills (fluency, vocabulary, accuracy, and pronunciation) and self-regulation among Chinese EFL students compared to traditional instruction. Speaking anxiety had a noticeable negative effect on fluency and pronunciation. The findings suggest that AI technology has the potential to optimize language learning experiences and promote learners' autonomy and metacognitive strategies in the speaking domain.

Duolingo as a supplement to traditional ESP courses, significantly improved the oral proficiency of Beninese secretarial students in technical and vocational programs in a study carried out by Teba (2022). The intervention given allowed learners to use Duolingo for 15 minutes daily for three months, leading to a statistically significant improvement in their learning. The adaptive features of AI, as per learner needs, resulted in self-regulated autonomous learning in most of the participants. The study also demonstrated that most of the teachers were not comfortable with the use of technology in the classroom. The study encourages teachers to invest in their professional development to effectively integrate such technologies to overcome the deficiencies in the traditional classroom.

Ünal et al. (2021) found that perceived behavioral control, attitude, subjective norms, satisfaction, and perceived usefulness significantly affected university students' continuance intention to use MALL after 24 weeks of experience with Duolingo. Perceived behavioral control was the most influential factor. Self-efficacy and learning autonomy influenced perceived behavioral control.

Zeng et al. (2024) observed use of Duolingo outside of class among Chinese junior high school. The study found positive impacts on students' intrinsic motivation (IM) for learning English. The researchers propose a 'motivational transfer' mechanism, where activity-specific IM for using Duolingo, driven by the psychological needs for autonomy and competence, gets transferred and associated with learning English. The study supports the idea that mobile-assisted language learning (MALL) apps like Duolingo can be an effective tool to stimulate language learning motivation beyond the classroom, suggesting that this acquired motivation while using the app can be transferred to classroom learning.

Zhou (2024) found that digital game-based learning (DGBL) significantly increased enjoyment and the ideal self-perception towards English learning among learners. Participants in the DGBL group, who used Duolingo, showed greater gains in these areas compared to the control group, which

received traditional EFL instruction. The ideal self of students was found to predict higher enjoyment during gameplay. Qualitative results also highlighted increased engagement, perceived learning improvements, and a sense of autonomy fostered by DGBL, as it gave a sense of enjoyment and helped develop a positive self-concept of EFL learners.

FINDINGS AND DISCUSSIONS

Of the 19 articles extracted from sixteen countries maximum were from Turkey and China with five each. Most of the studies, i.e., ten (or 50%), on ESL and EFL were carried out at higher educational levels. The trend in these studies has largely followed a quantitative approach. There were 13 (or 68%) quantitative studies screened out since 2021, most of which have followed an experimental design.

AI-driven DGBL tools are a prominent theme emerging across the research for enhancing the EFL experience towards self-learning. AI-powered listening exams enhanced learners' self-perceived competence, resilience, and listening comprehension through adaptive question design and personalized feedback (Abdellatif et al., 2024). AI-enhanced applications increased learner engagement across affective, cognitive, and behavioral dimensions while significantly reducing procrastination (Ma and Chen, 2024). Furthermore, AI can play a significant role in improving speaking skills—fluency, vocabulary, and pronunciation—while also enhancing self-regulation and autonomy (Qiao et al., 2023). These studies underline that AI applications foster holistic growth, help in skill acquisition with motivational and psychological development and also make good tools for individualized assessment.

Duolingo, as a MALL platform, can particularly work well in developing oral communication. Alfuhaid (2021) found that learners using Duolingo showed notable improvement in speaking proficiency, vocabulary range, and grammatical accuracy, with learners experiencing greater confidence and reduced anxiety. Similarly Duolingo's gamified exercises enhanced speaking proficiency and oral fluency more effectively than traditional instruction. (Ouyang et al., 2024; Kazu et al., 2024). Study conducted by Teba (2022) demonstrated significant oral proficiency gains for ESP learners using the app as a supplement to courses. Ahmed et al. (2022) also showed that Duolingo and WhatsApp reduced anxiety and enhanced speaking skills compared with traditional classrooms.

Gamification and mobile platforms positively impact of motivation, learner autonomy, and engagement. Zeng et al. (2024) demonstrated the idea of "motivational transfer," showing how intrinsic motivation to use Duolingo is carried over to general motivation for learning English. Zhou (2024) found that digital game-based learning using Duolingo significantly increased

enjoyment, engagement, and ideal send language learners' self-concepts. Similarly, Duolingo was associated with perceived usefulness, satisfaction, sustained interest and behavioral control (Purwanto et al. 2023; Ünal et al. 2021). Collectively, these studies highlight that motivation, enjoyment, and autonomy are key outcomes of gamified and mobile learning environments.

MALL can also improve areas of academic and linguistic competence. Davudova et al. (2022) demonstrated that Memrise supported gains particularly in reading and writing, often outperforming Duolingo in these areas. Ergün-Elverici (2023)too reported that Duolingo integration significantly improved writing, listening, and speaking, while also strengthening learners' social presence in class. Kaosayapandhu (2023) reported notable improvement in verb tense knowledge among frequent Duolingo users. Lehan et al. (2023) also highlighted in their study that ICT platforms like Duolingo, Moodle, Kahoot!, and Quizlet positively contributed to lexical competence development in distance learning settings. Olimat (2024) found that English learners perceived Duolingo to be effective across all four language skills- listening, speaking, reading, and writing.

Cross-cultural perspectives revealed diverse contextual patterns in MALL adoption. Kic-Drgas et al. (2024) observed this among pre-service teachers, where cultural and gender differences shaped learning habits using Duolingo. Pikhart et al. (2024) also observed cross-national differences in the use of the app between users of the Czech Republic, Taiwan, and Iraq, reflecting opportunities while also highlighting barriers such as infrastructure. These findings suggest cultural differences and contextual challenges can influence application use. Hence, the teachers play a key role in effectively helping learners adopt MALL apps in their study habits as per the cultural feasibility. At large, learners benefited from Duolingo due to the flexibility, engagement, and motivational benefits it offered.

In summary, the studies show that mobile-assisted and AI-based language learning applications (especially Duolingo) substantially improve language skills by encouraging learners' autonomy. They are particularly effective for speaking skills, expanding vocabulary, and engagement. They may be less effective than human instruction for pronunciation and reading. Contextual factors (culture, pandemic shifts) also needed to be considered since they correlated with the extent of adoption and success of outcomes. Challenges like connectivity and limited content variety are also widely reported.

CONCLUSION AND SUGGESTION FOR FUTURE WORK

In this study on systematic review, using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, a total of 19 studies published since 2021

were synthesised on the AI and mobile-assisted language learning (MALL) tool 'Duolingo,' an application for developing language competencies. These studies were thematically represented into categories that highlight their core contributions and areas of second language, English, learners. The findings from this systematic review largely suggest that the use of digital games is a valuable tool for developing English language skills in students pursuing ESL and EFL courses by second language (English) learners.

Teachers must allow the use of MALL in the classroom and encourage the autonomy of learners. Schools and teachers should invest in resource allocation and professional development to effectively integrate such technologies to overcome the deficiencies in traditional classroom teaching such as repeated boring tasks and inadequate testing and evaluation systems.

MALL works best as a complement rather than a substitute for classroom learning. Hence, teachers must utilize the application to maximize its benefits in developing English proficiency among diverse learners.

REFERENCES

Abdellatif, M. S., Alshehri, M. A., Alshehri, H. A., Hafez, W. E., Gafar, M. G., & Lamouchi, A. (2024). I am all ears: listening exams with AI and its traces on foreign language learners' mindsets, self-competence, resilience, and listening improvement. *Language Testing in Asia, 14*(54). https://doi.org/10.1186/s40468-024-00329-6

Acquah, E. O., & Katz, H. T. (2020). Digital game-based L2 learning outcomes for primary through high-school students: A systematic literature review. *Computers & Education, 143,* Article 103667. https://doi.org/10.1016/j.compedu.2019.103667

Ahmed, A. A. A., Hassan, I., Pallathadka, H., Keezhatta, M. S., Haryadi, R. N., Al Mashhadani, Z. I., Attwan, L. Y., & Rohi, A. (2022). MALL and EFL Learners' Speaking: Impacts of Duolingo and WhatsApp Applications on Speaking Accuracy and Fluency. *Education Research International,* 2022, 1-10. https://doi.org/10.1155/2022/6716474

Alfuhaid, S. R. (2021). The Utilisation of Duolingo to Enhance the Speaking Proficiency of EFL Secondary School Students in Saudi Arabia. *English Language Teaching, 14*(11), 9-15. https://doi.org/10.5539/elt.v14n11p9

Davudova, E., & Türel, Y. K. (2022). Evaluation of mobile applications in foreign language learning at an early age. *Journal of Educational Technology & Online Learning, 5*(3), 738-753. http://doi.org/10.31681/jetol.1158662

Ergün-Elverici, S. (2023). Integrating Mobile Technologies: Two-Stage Study on Academic Performance and Social Presence. *Sustainability, 15*(16), 12505. https://doi.org/10.3390/su151612505

Kaosayapandhu, M. (2023). Application for grammar skills: A case study of

Thai EFL undergraduates. *PASAA, 67*, 309-329.

Kazu, I. Y., & Kuvvetli, M. (2024). Improve speaking skills with Duolingo's mobile game-based language learning. *Asian Journal of Education and Training, 10*(1), 62-75. https://doi.org/10.20448/edu.v10i1.5488

Kic-Drgas, J., & Kılıçkaya, F. (2024). Exploring novel approaches to digital self-regulated learning: a study on the use of mobile applications among Polish and Turkish EFL pre-service teachers. *Education Tech Research Dev, 72*, 3453-3470. https://doi.org/10.1007/s11423-024-10374-w

Kukulska-Hulme, A. (2013). *Re-Skilling Language Learners for a Mobile World.* The International Research Foundation for English Language Education (TIRF). Monterey, USA. https://www.tirfonline.org/english-in-the-workforce/mobile-assisted-language-learning/

Lehan, V., Hodovanets, N., Muraviova, I., & Litvinova, M., & Baibakova, O. (2023). Formation of lexical competence in foreign philology (English) students during online education. *Multidisciplinary Science Journal, 5*. https://doi.org/10.31893/multiscience.2023ss0506

Li, M.C. & Tsai, C.C. (2013). Game-Based Learning in Science Education: A Review of Relevant Research. *Journal of Science Education and Technology, 22*(6), 877-898. https://www.learntechlib.org/p/155330/.

Ma, X., & Zhang, H. (2024). Predictability of Duolingo English mock test for Chinese college-level EFLs: using assessment use argument. *Frontiers in Education, 8*, 1275518. https://doi.org/10.3389/feduc.2023.1275518

Moher, D., Liberati, A., Tetzlaff, J., and Altman, D. G. (2009). Preferred reporting

Olimat, K. N. (2024). The Reality and Effects of Using Duolingo to Develop English Language Skills for EFL Learners in Jordan. *World Journal of English Language, 14*(5), 627-637. https://doi.org/10.5430/wjel.v14n5p627

Ouyang, Z., Jiang, Y., & Liu, H. (2024). The effects of Duolingo, an AI-integrated technology, on EFL learners' willingness to communicate and engagement in online classes. *International Review of Research in Open and Distributed Learning, 25*(3).

Page, M.J., McKenzie, J.E., Bossuyt, P., Boutron, I., Hoffmann, T.C., Mulrow, C.D., et al. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Medicina Fluminensis Syst. Rev. 57*, 444–465. https://doi.org/10.21860/medflum2021_264903

Parentapps Team. (2023, July 17). The benefits of a multilingual education - EBI Blog. *Escuela Bilingüe Internacional - Spanish Immersion School EBI*. https://ebinternacional.org/the-benefits-of-a-multilingual-education/

Pikhart, M., Klimova, B., & Al-Obaydi, L. H. (2024). Exploring university students' preferences and satisfaction in utilizing digital tools for foreign language learning. *Frontiers in Education, 9*, 1412377.

https://doi.org/10.3389/feduc.2024.1412377

Purwanto, A. A., & Syafryadin. (2023). Students' Perception on Using Duolingo for Learning English Vocabulary. *Journal of English Teaching, 9*(1), 70-82. https://doi.org/10.33541/jet.v9i1.4506

Qiao, H., & Zhao, A. (2023). Artificial intelligence-based language learning: illuminating the impact on speaking skills and self-regulation in Chinese EFL context. *Frontiers in Psychology, 14*, 1255594. https://doi.org/10.3389/fpsyg.2023.1255594

Reinders, H., & Benson, P. (2017). Research agenda: Language learning beyond the classroom. *Language Teaching, 50*(4), 561–578

Reinhardt, J. & Sykes, (2012). Conceptualizing Digital Game-Mediated L2 Learning and Pedagogy: Game-Enhanced and Game-Based Research and Practice. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching. New Language Learning and Teaching Environments*, 32-49. Palgrave Macmillan. https://doi.org/10.1057/9781137005267_3

Sakkir, Geminastiti & Syamsuddin, Nur. (2023). Students' Perceptions of Duolingo Mobile Assisted Language Learning (MALL) in Learning English Vocabulary. *EduLine: Journal of Education and Learning Innovation. 3*. 381-388. 10.35877/454RI.eduline1970.

Teba, S. C. (2022). Using Duolingo to Improve Beninese Secretarial Advanced Learners' Oral Communication Skills. *European Journal of Educational Sciences,*

9(1), 25-38. https://doi.org/10.19044/ejes.v9no1a25

Ünal, E., & Güngör, F. (2021). The continuance intention of users toward mobile assisted language learning: The case of DuoLingo. *Asian Journal of Distance Education, 16*(2), 197-218. https://doi.org/10.5281/zenodo.5811777

Zarrinabadi, N. (eds) Technology and the Psychology of Second Language Learners and Users. New Language Learning and Teaching Environments. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-34212-8_17

Zeng, C., & Fisher, L. (2024). Opening the "Black Box": How Out-of-Class Use of Duolingo Impacts Chinese Junior High School Students' Intrinsic Motivation for English. *ECNU Review of Education, 7*(2), 283-307. https://doi.org/10.1177/20965311231171606

Zhou, S. (2024). Gamifying language education: the impact of digital game-based learning on Chinese EFL learners. *Humanities and Social Sciences Communications, 11*(1518). https://doi.org/10.1057/s41599-024-04073-3

Zou, B., Liviero, S., Hao, M., Wei, C. (2020). Artificial Intelligence Technology for EAP Speaking Skills: Student Perceptions of Opportunities and Challenges. In: Freiermuth, M.R.,