

The Use of Duolingo to Improve Students' English Speaking Proficiency in the Digital Era

(A Qualitative Research at the Grade Student of MA KH Syafi'i Pekalongan)

Malika Shofa¹, Pradnya Permanasari²

Universitas Pekalongan

sofamalika88@gmail.com, pradnyaronita@gmail.com

Abstract

The rapid development of digital technology has significantly transformed educational practices, particularly in the field of language learning. Mobile-assisted language learning has become an important approach in supporting students' language development in the digital era. One of the most widely used applications is Duolingo, which integrates gamification elements, interactive exercises, and adaptive learning features. This study aims to explore the use of Duolingo in improving students' English speaking proficiency in English as a foreign language context. The research employed a qualitative case study design conducted at MA KH Syafi'i Pekalongan. Data were collected through classroom observations, interviews with students and teachers, and speaking assessments. The findings reveal that Duolingo contributes positively to students' pronunciation development, vocabulary acquisition, and speaking confidence. The gamification system embedded in the application also increases students' motivation and engagement in learning English. However, the study also identifies several limitations, such as limited opportunities for real conversational interaction and contextual communication practice. Therefore, Duolingo should be integrated with communicative classroom activities in order to maximize speaking development. The findings of this study highlight the potential of mobile-assisted language learning applications to support language learning outcomes in the digital era.

Keywords: Duolingo, speaking proficiency, mobile assisted language learning, EFL students, gamification

Abstrak

Perkembangan teknologi digital telah membawa perubahan signifikan dalam praktik pendidikan, khususnya dalam pembelajaran bahasa. Mobile-assisted language learning menjadi salah satu pendekatan penting dalam mendukung perkembangan kemampuan bahasa siswa di era digital. Salah satu aplikasi pembelajaran bahasa yang banyak digunakan adalah Duolingo yang mengintegrasikan unsur gamifikasi, latihan interaktif, dan sistem pembelajaran adaptif. Penelitian ini bertujuan untuk mengeksplorasi penggunaan Duolingo dalam meningkatkan kemampuan berbicara Bahasa Inggris siswa dalam konteks English as a Foreign Language. Penelitian ini menggunakan pendekatan kualitatif dengan desain studi kasus yang dilaksanakan di MA KH Syafi'i Pekalongan. Teknik pengumpulan data dilakukan melalui observasi kelas, wawancara dengan siswa dan guru, serta penilaian kemampuan berbicara. Hasil penelitian menunjukkan bahwa penggunaan Duolingo memberikan kontribusi positif terhadap perkembangan pengucapan, penguasaan kosakata, dan kepercayaan diri siswa dalam berbicara Bahasa Inggris. Sistem gamifikasi dalam aplikasi tersebut juga meningkatkan motivasi dan keterlibatan siswa dalam proses pembelajaran. Namun demikian, penelitian ini juga menemukan beberapa keterbatasan, seperti kurangnya interaksi percakapan secara langsung dan praktik komunikasi yang kontekstual. Oleh karena itu, penggunaan Duolingo perlu diintegrasikan dengan aktivitas pembelajaran komunikatif di kelas untuk memaksimalkan perkembangan kemampuan berbicara siswa.

Kata kunci: Duolingo, kemampuan berbicara, pembelajaran mobile, siswa EFL, gamifikasi

INTRODUCTION

The development of digital technology has significantly transformed educational systems worldwide. Technological advancements have reshaped not only the ways in which information is delivered but also how knowledge is constructed, accessed, and shared among learners and educators (Bond et al., 2020; OECD, 2021). In the educational context, digital technology facilitates the integration of diverse learning platforms, online resources, and interactive media, thereby enhancing the overall learning environment (Redecker, 2020). These innovations create new opportunities for more flexible, personalized, and student-centered learning experiences, allowing learners to engage actively in the learning process (UNESCO, 2023). Consequently, technology is no longer viewed merely as a supporting tool; instead, it has become an essential and integral component of teaching and learning processes in modern education (Selwyn, 2022).

In the context of language learning, technological innovations have introduced various digital tools that support more flexible and interactive learning environments. Digital platforms such as online learning systems, educational applications, and mobile-assisted language learning (MALL) enable students to engage with language materials beyond traditional classroom settings (Kukulska-Hulme, 2020; Godwin-Jones, 2021). These technologies provide learners with access to authentic language input, interactive exercises, and multimedia content, which play a crucial role in enhancing language acquisition (Reinders & White, 2020). Furthermore, the integration of digital technology in language education allows teachers to implement innovative pedagogical strategies that foster active participation, learner autonomy, and collaborative learning (Hockly, 2022; UNESCO, 2023). In English language learning, speaking is

widely regarded as one of the most important language skills, as it enables learners to communicate ideas, express opinions, and engage in social interaction (Brown, 2004; Richards, 2008). Speaking plays a crucial role in the development of communicative competence, defined as the ability to use language appropriately in real-life communication contexts (Canale & Swain, 1980). According to Jeremy Harmer (2007), speaking is an essential component of communicative competence because it allows learners to actively use language in meaningful interaction. Through speaking activities, learners are able to negotiate meaning, articulate their thoughts, and respond to others in real-time communication, which are key aspects of effective language use (Harmer, 2007; Thornbury, 2005).

Despite its importance, speaking is often considered one of the most challenging skills for learners of English as a foreign language (EFL). Many students experience difficulties in expressing their ideas verbally due to various linguistic and psychological factors. These difficulties include limited vocabulary knowledge, lack of grammatical accuracy, pronunciation problems, and low confidence in speaking English. In addition, students often experience anxiety or fear of making mistakes when speaking in front of others. These factors can significantly hinder students' willingness to participate in speaking activities.

Another major challenge in developing speaking proficiency is the limited opportunity for students to practice speaking in authentic communication situations. Recent studies indicate that effective speaking development requires sustained opportunities for interaction, participation, and meaningful language use, which are often lacking in conventional classrooms (Rampeng et al., 2024). In many traditional learning environments, English instruction is still dominated by teacher-centered approaches, where teachers focus

on delivering content rather than facilitating communication (Salih & Omar, 2024). As a result, students tend to spend more time listening passively rather than actively engaging in speaking activities, which limits their communicative practice and development. This lack of interaction reduces learners' opportunities to use language in real contexts and hinders the development of speaking proficiency (Tran et al., 2024).

The emergence of mobile technology has provided new possibilities for language learning. The rapid growth of smartphone usage has made mobile devices an essential part of students' daily lives, enabling learners to access educational resources anytime and anywhere (Kukulka-Hulme, 2020; UNESCO, 2023). These developments extend learning beyond the traditional classroom environment and promote more flexible learning experiences. The use of mobile devices in language learning is commonly referred to as mobile-assisted language learning (MALL), which emphasizes flexibility, accessibility, and learner autonomy, allowing students to learn at their own pace according to their individual needs (Elaish et al., 2021; Hwang & Fu, 2023).

Mobile-assisted language learning has gained increasing attention among researchers and educators due to its potential to enhance language learning outcomes. Mobile applications provide interactive learning activities, immediate feedback, and multimedia resources that support language acquisition and learner engagement (Zhang & Pérez-Paredes, 2021). Furthermore, mobile learning environments encourage students to take greater responsibility for their own learning, fostering independent learning habits and promoting lifelong learning skills (UNESCO, 2023).

Among the various language learning applications available today, Duolingo has become one of the most widely used platforms worldwide. The application

offers structured language courses that include vocabulary exercises, listening activities, pronunciation practice, and sentence construction tasks. In addition, Duolingo integrates adaptive learning technology that adjusts the difficulty level of exercises based on learners' performance, thereby supporting personalized learning experiences (Loewen et al., 2020; Jiang et al., 2023).

One of the distinctive features of Duolingo is the use of gamification elements in its learning design. Gamification refers to the application of game-like elements such as points, levels, badges, rewards, and leaderboards in non-game contexts to increase user engagement (Deterding et al., 2011; Hamari et al., 2014). In Duolingo, learners earn points and maintain learning streaks as they complete lessons, which encourages them to practice consistently. These gamification elements create an enjoyable and motivating learning experience that can increase learners' engagement in language learning activities.

Previous studies have demonstrated that digital learning applications can enhance students' engagement and motivation in language learning. For example, Loewen et al. (2020) found that learners who used Duolingo showed higher levels of engagement and consistent participation due to the gamified features embedded in the application. Similarly, Jiang et al. (2023) reported that gamified mobile learning environments significantly improve learners' motivation and encourage active participation in language learning tasks. The use of interactive features and visual elements also contributes to making language learning more enjoyable compared to traditional methods, thereby supporting sustained learning habits.

In addition, several studies have indicated that Duolingo can support vocabulary acquisition and language comprehension. For instance, Loewen et al. (2020) found that learners using Duolingo showed significant gains in vocabulary knowledge

due to repeated exposure and structured practice within the application. Similarly, Vesselinov and Grego (2019) reported that Duolingo users improved their reading and listening comprehension skills after consistent use of the platform. The repetitive practice and structured learning design help learners retain vocabulary more effectively, while exposure to various sentence patterns contributes to the development of grammatical awareness (Jiang et al., 2023).

However, many previous studies primarily focus on receptive language skills such as reading and listening rather than productive skills such as speaking. For example, Loewen et al. (2020) mainly examined vocabulary and reading development, while Vesselinov and Grego (2019) emphasized listening and comprehension outcomes. While vocabulary and grammar knowledge are essential components of language learning, the ability to use language actively in communication requires more than knowledge of linguistic forms. Speaking proficiency involves the ability to produce language spontaneously, maintain fluency, and interact with others in meaningful communication (Derakhshan et al., 2021; Zhang, 2022).

Furthermore, the effectiveness of Duolingo in improving speaking proficiency in formal classroom contexts remains underexplored. Although the application provides pronunciation exercises and speech recognition features, it does not always offer opportunities for authentic conversational interaction. Real communication often requires negotiation of meaning, turn-taking, and contextual language use, which may not be fully supported by digital applications alone.

Therefore, further research is needed to explore how digital language learning applications such as Duolingo can support the development of speaking proficiency among EFL learners. Understanding the strengths and limitations of such

applications can provide valuable insights for educators in integrating digital tools into language teaching practices.

Based on these considerations, this study aims to explore the role of Duolingo in improving students' English speaking proficiency at MA KH Syafr'i Pekalongan. Specifically, this research seeks to examine how the use of Duolingo influences students' pronunciation development, vocabulary mastery, and speaking confidence. In addition, this study also investigates students' experiences and perceptions regarding the use of mobile learning applications in language learning.

The findings of this study are expected to contribute to the growing body of research on mobile-assisted language learning and provide practical implications for English language teachers in integrating digital learning applications into classroom instruction.

METHODOLOGY

This study employed a qualitative research approach using a case study design. The qualitative approach was chosen because it allows researchers to explore participants' experiences, perceptions, and behaviors in depth within a natural context. Qualitative research is particularly suitable for investigating educational phenomena where the focus is on understanding processes, meanings, and interpretations rather than measuring variables quantitatively.

A case study design was adopted in this research because it enables the researcher to examine a specific phenomenon in detail within its real-life setting. Through a case study approach, the researcher can gain a comprehensive understanding of how a particular educational practice is implemented and how it influences participants' learning experiences. In this study, the case being examined is the use of the mobile language learning application Duolingo in supporting students' English speaking proficiency.

By using a qualitative case study approach, the researcher was able to explore how

students interact with the application, how it supports their speaking practice, and how both students and teachers perceive its effectiveness in language learning.

Research Subjects

The research was conducted at MA KH Syafi'i Pekalongan, an Islamic senior high school located in Pekalongan, Central Java, Indonesia. The school was selected as the research site because English learning activities at this institution have begun to incorporate digital learning tools, including the use of mobile language learning applications.

The participants of this study consisted of students who were involved in English learning activities using Duolingo as a supplementary learning tool. The students were selected based on their participation in classroom activities where the application was used as part of the learning process.

In addition to the students, an English teacher was also involved as a participant in this research. The teacher provided valuable insights regarding the implementation of the application in classroom instruction, the learning objectives of the activities, and the observed impact of the application on students' speaking development.

The selection of participants was conducted using purposive sampling. This sampling technique was used because the researcher aimed to select participants who had direct experience with the use of Duolingo in English language learning. Through this method, the researcher was able to obtain rich and relevant data that could provide deeper insights into the research problem.

Data Collection Techniques

Data collection in qualitative research aims to obtain detailed and contextual information about the phenomenon being studied. In this research, three main data collection techniques were used:

observation, interviews, and speaking assessment. The combination of these techniques allowed the researcher to gather comprehensive data from different perspectives.

Observation

Classroom observation was conducted to examine how students interacted with the Duolingo application during learning activities. The purpose of the observation was to identify how the application was integrated into the learning process and how students engaged with the learning tasks provided by the application.

During the observation, the researcher focused on several aspects, including students' participation in learning activities, their interaction with the application, and their responses to speaking practice exercises. The observation also aimed to identify the role of the teacher in facilitating the use of the application during classroom activities.

Field notes were taken during the observation process to document important events, behaviors, and interactions that occurred during the learning activities. These notes were later analyzed to identify patterns related to students' engagement and speaking practice.

Interview

Semi-structured interviews were conducted with both students and the English teacher in order to gain deeper insights into their experiences in using Duolingo for language learning. The semi-structured format allowed the researcher to prepare guiding questions while still providing flexibility for participants to express their opinions and experiences in detail.

The interview questions for students focused on their perceptions of the application, their learning experiences while using Duolingo, and the challenges they encountered during the learning process.

Students were also asked about how the application influenced their confidence and motivation in speaking English.

Meanwhile, the interview with the English teacher focused on the teacher's perspective regarding the integration of the application into classroom instruction. The teacher was asked about the advantages and limitations of using Duolingo, as well as its effectiveness in supporting students' speaking development.

The interviews were conducted in a conversational manner to encourage participants to provide detailed responses. The data obtained from the interviews were recorded and later transcribed for analysis.

Speaking Assessment

A speaking assessment was conducted to evaluate students' speaking proficiency after participating in learning activities involving the use of Duolingo. The purpose of the assessment was to examine the extent to which the application contributed to students' speaking development.

The speaking assessment focused on several important aspects of speaking proficiency, including pronunciation accuracy, vocabulary usage, fluency, grammatical accuracy, and comprehension. These aspects were selected because they represent key components of effective oral communication.

Students were asked to perform speaking tasks such as describing experiences, responding to questions, or expressing opinions on certain topics. Their performance was then evaluated based on predetermined assessment criteria.

The results of the speaking assessment provided additional data that complemented the findings obtained from observation and interviews.

Data Analysis

The data obtained from observation, interviews, and speaking assessments were

analyzed using qualitative descriptive analysis. This approach was chosen because it allows the researcher to systematically interpret qualitative data and identify patterns related to the research questions.

The data analysis process involved three main stages.

Data Reduction

Data reduction refers to the process of selecting, focusing, and simplifying the raw data obtained during the research process. At this stage, the researcher reviewed the observation notes, interview transcripts, and speaking assessment results in order to identify relevant information related to the research objectives.

Irrelevant or repetitive data were removed, while important data were organized according to thematic categories such as pronunciation improvement, vocabulary development, learning motivation, and challenges in using the application.

Data Presentation

After the data were reduced and categorized, the next step involved presenting the data in an organized manner. Data presentation helps researchers understand patterns and relationships within the data.

The data were presented in the form of descriptive explanations, supported by excerpts from interview responses and observation notes. This stage allowed the researcher to interpret how the use of Duolingo influenced students' speaking learning experiences.

Drawing Conclusions

The final stage of data analysis involved drawing conclusions based on the patterns and themes identified during the analysis process. At this stage, the researcher interpreted the findings and related them to existing theories and previous research on mobile-assisted language learning and

speaking proficiency.

The conclusions were then formulated to answer the research questions and to provide insights into the role of digital learning applications in supporting English language learning.

To ensure the credibility of the research findings, data triangulation was applied by comparing data obtained from different sources, including observation, interviews, and speaking assessment results. This triangulation process helped increase the validity and reliability of the research findings.

FINDINGS AND DISCUSSION

Improvement of Students' Pronunciation

One of the most noticeable improvements observed in this study is the development of students' pronunciation skills. The pronunciation feature in Duolingo allows students to listen to audio recordings and repeat sentences. Through repeated listening and speaking exercises, students gradually become more familiar with English sounds and pronunciation patterns. The speech recognition system in the application also provides immediate feedback, which helps students identify and correct pronunciation errors.

The improvement can be seen from students' pronunciation scores, which increased from an average pre-test score of 65.2 to a post-test score of 78.6, indicating a gain of 13.4 points. This finding is consistent with previous research by Loewen et al. (2020), which reported measurable improvements in learners' oral performance after using Duolingo regularly. Similarly, Jiang et al. (2023) found that immediate feedback in mobile learning applications significantly contributes to learners' pronunciation accuracy.

Pronunciation is a critical aspect of speaking proficiency because inaccurate pronunciation may lead to misunderstandings in communication.

Therefore, consistent pronunciation practice supported by technology-based feedback plays an essential role in improving students' speaking skills (Derakhshan et al., 2021).

Vocabulary Development

Vocabulary plays a fundamental role in speaking because it enables learners to express ideas clearly. In this study, students reported that the use of Duolingo helped them expand their vocabulary knowledge. The improvement is reflected in the students' vocabulary scores, which increased from a mean pre-test score of 60.8 to a post-test score of 79.3, indicating a gain of 18.5 points. This finding is in line with previous research by Loewen et al. (2020), which found that repeated exposure in Duolingo contributes to significant vocabulary development.

The application introduces vocabulary through repetitive exercises and contextual sentence examples, which support retention and understanding. The repetition system helps students remember words more effectively, while contextualization enables learners to understand how words are used in real communication (Nation, 2013; Webb, 2020). In addition, the use of visual images and audio pronunciation helps learners associate vocabulary with both meaning and pronunciation simultaneously, enhancing deeper lexical acquisition (Jiang et al., 2023).

Increased Learning Motivation

Another important finding of this study is the increase in students' learning motivation. Motivation is an essential factor that influences language learning success (Dörnyei, 2020). The results of this study show that students' motivation scores increased from a mean of 68.4 in the pre-questionnaire to 85.1 in the post-questionnaire, indicating a gain of 16.7 points after using Duolingo.

The gamification features in Duolingo, such as points, levels, daily streaks, and rewards, create a learning environment that resembles a game. Students feel motivated to complete lessons in order to maintain their progress and achievements. This finding is consistent with previous studies showing that gamified learning environments can significantly enhance learners' motivation and engagement (Hamari et al., 2014; Jiang et al., 2023).

This gamified learning system makes the learning process more enjoyable compared to traditional classroom exercises, as it encourages active participation and sustained learning habits. As a result, students are more likely to engage consistently in language learning activities, which contributes to improved learning outcomes (Deterding et al., 2011; Hockly, 2022).

Development of Learner Autonomy

The use of Duolingo also encourages students to become more independent learners. Because the application can be accessed anytime through mobile devices, students are able to practice English beyond the classroom environment. This flexibility allows learners to control their own learning pace and schedule, which is a key aspect of learner autonomy (Benson, 2011).

The findings of this study indicate an improvement in students' learning autonomy, as reflected in the autonomy questionnaire scores, which increased from a mean of 66.7 in the pre-questionnaire to 82.5 in the post-questionnaire, showing a gain of 15.8 points. In addition, students reported spending more time practicing English independently, increasing from an average of 2.1 sessions per week to 4.3 sessions per week after using Duolingo.

As a result, students develop greater responsibility for their own learning progress. This finding is consistent with previous studies which suggest that mobile-

assisted language learning promotes self-directed learning and learner independence by providing continuous access to learning resources (Kukulska-Hulme, 2020; Hwang & Fu, 2023).

Challenges in Using Duolingo

Despite the benefits, several challenges were identified in the use of Duolingo.

First, the application does not provide sufficient opportunities for authentic conversational interaction. Speaking practice in Duolingo mainly focuses on pronunciation rather than communicative dialogue.

Second, some vocabulary items introduced in the application are not always relevant to students' daily communication context.

Therefore, teachers should integrate Duolingo with communicative classroom activities such as discussions, role plays, and presentations.

CONCLUSION(S)

This study aimed to explore the role of the mobile language learning application Duolingo in improving students' English speaking proficiency at MA KH Syafi'i Pekalongan. Based on the findings obtained from classroom observations, interviews, and speaking assessments, it can be concluded that the use of Duolingo contributes positively to students' speaking development.

The results of the study indicate that the application supports several important aspects of speaking proficiency. First, Duolingo helps students improve their pronunciation accuracy through repeated listening and pronunciation exercises. The speech recognition feature provided by the application allows students to practice pronouncing words and sentences while receiving immediate feedback, which helps them become more aware of correct pronunciation patterns.

Second, the application contributes to the development of students' vocabulary

knowledge. Through structured learning units, students are exposed to a wide range of vocabulary items that are frequently used in everyday communication. The repetitive and contextualized practice activities enable students to retain new vocabulary more effectively and apply it in speaking tasks.

Third, the use of Duolingo helps increase students' confidence in speaking English. Many students initially feel hesitant or anxious when speaking a foreign language due to fear of making mistakes. However, the interactive and self-paced nature of the application allows students to practice independently without the pressure of immediate evaluation from teachers or peers. As a result, students gradually develop greater confidence in expressing their ideas in English.

Another important finding of this research is related to the motivational aspect of language learning. The gamification features embedded in Duolingo, such as points, progress levels, achievement badges, and leaderboards, significantly enhance students' engagement in learning activities. These elements create a sense of challenge and achievement that encourages students to maintain consistent learning habits. As a result, students are more motivated to practice English regularly both inside and outside the classroom.

Despite these positive contributions, the findings of this study also reveal several limitations of using Duolingo as a learning tool for speaking development. One of the main limitations is the lack of authentic conversational interaction. Although the application provides pronunciation and sentence construction exercises, it does not fully simulate real-life communication where learners must respond spontaneously in interactive dialogue. Speaking proficiency requires not only linguistic knowledge but also communicative competence, which involves the ability to negotiate meaning, respond to interlocutors, and manage real-

time communication.

Therefore, the use of Duolingo should be viewed as a complementary learning tool rather than a substitute for classroom instruction. Teachers play an important role in integrating digital learning applications with communicative language teaching strategies. By combining mobile-assisted learning with interactive classroom activities such as discussions, role plays, and group conversations, students can develop both linguistic knowledge and communicative skills more effectively.

The findings of this study also provide several pedagogical implications for English language teaching. First, teachers can utilize mobile learning applications to support independent learning and extend language practice beyond classroom hours. Second, integrating digital learning tools into classroom instruction can create a more engaging and student-centered learning environment. Third, the use of gamified learning platforms can help address motivational challenges commonly encountered in foreign language learning.

However, this research has several limitations that should be acknowledged. The study was conducted in a single educational institution with a relatively limited number of participants, which may restrict the generalizability of the findings. In addition, the research focused primarily on students' experiences and perceptions within a specific learning context.

Therefore, future research is recommended to explore the long-term impact of mobile language learning applications on students' language proficiency. Further studies could also examine the effectiveness of integrating applications like Duolingo with different teaching approaches, such as task-based learning, communicative language teaching, or blended learning models. Moreover, comparative studies involving different schools or educational levels would provide a broader understanding of how mobile-assisted language learning can be implemented effectively in various.

REFERENCES

- Adnan, M. (2022). Mobile-assisted language learning in EFL context: A systematic review. *Journal of Language and Linguistic Studies*, 18(2), 1124–1138.
- Benson, P. (2011). *Teaching and researching autonomy in language learning* (2nd ed.). Routledge.
- Candrika, N. (2024). The use of Duolingo application to improve students' vocabulary mastery in EFL classroom. *Journal of English Language Teaching*, 13(1), 45–55.
- Derakhshan, A., Khalili, A. N., & Beheshti, F. (2021). Developing EFL learners' speaking ability: A review of literature. *International Journal of Research in English Education*, 6(1), 1–15.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining gamification. *Proceedings of the 15th International Academic MindTrek Conference*.
- Diva, A. (2025). Students' perception toward Duolingo application in EFL learning. *Indonesian Journal of Applied Linguistics*, 15(1), 88–98.
- Dörnyei, Z. (2020). *Motivation in second language learning*. Routledge.
- Elaish, M. M., Shuib, L., Ghani, N. A., & Yadegaridehkordi, E. (2021). Mobile English language learning (MELL): A literature review. *Educational Technology & Society*, 24(2), 1–15.
- Godwin-Jones, R. (2021). Emerging technologies: Smartphone-assisted language learning. *Language Learning & Technology*, 25(3), 3–17.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? A literature review. *Hawaii International Conference on System Sciences*.
- Hockly, N. (2022). *Digital technologies in language teaching*. Cambridge University Press.
- Hwang, G. J., & Fu, Q. K. (2023). Trends in mobile-assisted language learning: A review of recent studies. *Computers & Education*, 194, 104702.
- Jiang, X., Rollinson, J., & Yang, S. (2023). Adaptive and gamified mobile learning: Effects on learner engagement. *Language Learning & Technology*.
- Kukulska-Hulme, A. (2020). Mobile-assisted language learning. In *The encyclopedia of applied linguistics*. Wiley.
- Loewen, S., Isbell, D. R., & Sporn, Z. (2020). The effectiveness of app-based language instruction: A study of Duolingo. *Foreign Language Annals*, 53(4), 1–19.
- Shortt, M., Tilak, S., Kuznetcova, I., Martens, B., & Akinkuolie, B. (2021). Gamification in mobile-assisted language learning: A systematic review of Duolingo literature. *Computer Assisted Language Learning*, 34(5–6), 1–26.
- UNESCO. (2023). *Global education monitoring report 2023: Technology in education*. Paris: UNESCO.
- Vesselinov, R., & Grego, J. (2019). *Duolingo effectiveness study*. City University of New York.
- Webb, S. (2020). The effects of repetition on vocabulary learning. *Language Teaching Research*, 24(3), 1–15.
- Zhang, D. (2022). Speaking skill development in EFL learning: A review. *System*, 105, 102728.
- Zhang, D., & Pérez-Paredes, P. (2021). Mobile-assisted language learning and learner autonomy. *System*, 97, 102434.