# Curricula:
## Journal of Curriculum Development
https://ejournal.upi.edu/index.php/CURRICULA/

# Duolingo in English education: Evidence-based perspectives on learning outcomes

**Fitriani**
Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
*fitriani22fbs.2021@student.uny.ac.id*

**ABSTRACT**

The proliferation of Mobile-Assisted Language Learning (MALL) applications has reshaped the landscape of language education, with platforms like Duolingo making language learning more accessible, engaging, and flexible. This study systematically reviews 20 research articles to evaluate Duolingo's effectiveness in fostering language proficiency, with a focus on vocabulary acquisition, reading comprehension, speaking, listening, and writing skills. The findings indicate that Duolingo is particularly effective at building foundational vocabulary and supporting beginner-level reading and listening comprehension through gamified and personalized learning features. Duolingo's gamified elements enhance engagement and promote consistent practice, but the platform's lack of interactive, real-time communication restricts its ability to develop higher-order language skills. This study underscores the complementary role of digital tools like Duolingo within language curricula, particularly in blended or hybrid learning models, where mobile learning can support vocabulary retention and independent study. Findings from this study contribute to the ongoing discourse on the role of MALL in language acquisition, offering practical insights for educators and policymakers considering digital integration in language programs.

**ABSTRAK**

*Proliferasi aplikasi pembelajaran bahasa berbasis perangkat seluler (Mobile-Assisted Language Learning/MALL) telah mengubah lanskap pendidikan bahasa, dengan platform seperti Duolingo yang membuat pembelajaran bahasa menjadi lebih mudah diakses, menarik, dan fleksibel. Studi ini secara sistematis mengulas 20 artikel penelitian untuk mengevaluasi efektivitas Duolingo dalam meningkatkan kemahiran bahasa, terutama pada aspek kosakata, membaca, berbicara, mendengarkan, dan menulis. Temuan menunjukkan bahwa Duolingo sangat efektif dalam membangun kosakata dasar dan mendukung pemahaman membaca dan mendengarkan pada tingkat pemula melalui fitur pembelajaran yang digamifikasi dan dipersonalisasi. Elemen gamifikasi di Duolingo meningkatkan keterlibatan dan mendorong praktik yang konsisten, kurangnya interaksi waktu nyata membatasi pengembangan keterampilan bahasa tingkat lanjut. Studi ini menekankan peran pelengkap alat digital seperti Duolingo dalam kurikulum bahasa, terutama dalam model pembelajaran campuran atau hybrid, di mana pembelajaran seluler dapat mendukung retensi kosakata dan pembelajaran mandiri. Temuan dari studi ini berkontribusi pada wacana berkelanjutan tentang peran MALL dalam perolehan bahasa, serta menawarkan wawasan praktis bagi pendidik dan pembuat kebijakan yang mempertimbangkan integrasi digital dalam program bahasa.*

***Kata Kunci:** Duolingo; keterampilan bahasa Inggris; pembelajaran bahasa dengan bantuan ponsel*

# INTRODUCTION

The rapid evolution of digital technology has fundamentally transformed educational landscapes worldwide, particularly in language learning. Traditional classroom-based language instruction, once the primary method of acquiring new languages, is increasingly complemented or challenged by digital platforms. Duolingo has emerged as a prominent player in this digital transformation. The platform's success reflects a broader shift in educational accessibility, with approximately 67% of language learners now incorporating mobile applications into their study routines. This convergence of technological advancement and educational needs has created an unprecedented opportunity to examine the effectiveness of digital language learning platforms in comparison to traditional classroom instruction.

The appeal of digital platforms, particularly Duolingo, stems from their innovative approach to language learning through gamification. Immediate feedback mechanisms and personalized learning paths have contributed to higher satisfaction rates among digital platform users. However, success rates notably decline as learners progress to more advanced levels, where complex linguistic interactions become essential for language mastery. A comprehensive analysis of 500 intermediate-level language learners has revealed that while digital platforms excel at vocabulary acquisition and basic grammar, they fall short in developing advanced communication skills. Only 35% of exclusive digital platform users achieved conversational proficiency, compared to 72% of classroom learners (Lin et al., 2022). This significant gap in effectiveness becomes particularly pronounced at intermediate and advanced levels, highlighting the limitations of purely digital approaches to language learning. Classroom settings provide an immersive environment that allows learners to engage in spontaneous communication and receive immediate, context-specific feedback, supporting both linguistic competence and pragmatic awareness (Ginting, 2023; Hsu & Liu, 2023; Lestari & Emilia, 2023).

Recent studies in language acquisition have demonstrated that face-to-face interaction accounts for approximately 60% of successful language acquisition at advanced levels. While platforms like Duolingo are highly effective in terms of accessibility and engagement, they lack the immersive and dynamic qualities found in in-person language learning (Godwin-Jones, 2023). Mobile-assisted language learning (MALL) offers a wealth of resources but often fails to replicate the complex interactions that occur within a classroom. This limitation suggests the need for a more integrated approach that combines the strengths of both digital and traditional learning methods. The present study addresses a crucial gap in existing research by examining the potential integration of digital platforms within formal language education systems. This research uniquely contributes to the field by investigating optimal methods for integrating digital platforms like Duolingo into structured language learning programs, rather than viewing them as competing alternatives.

The central research problem focuses on understanding the precise role and limitations of digital language learning platforms in developing comprehensive language proficiency. . However, their effectiveness as standalone tools for achieving conversational proficiency remains questionable (Lin et al., 2022). This study examines whether such platforms can effectively complement rather than replace traditional classroom instruction, guided by the

hypothesis that a structured combination of digital and traditional learning methods will yield superior results compared to either approach used alone.

This study aims to evaluate the effectiveness of integrated digital-traditional language learning approaches through three primary objectives: 1) assessing the impact of combined Duolingo-classroom instruction on student achievement across all language competencies; 2) identifying optimal integration points between digital and traditional learning methods; 3) developing evidence-based recommendations for educational institutions seeking to implement hybrid language learning programs. The findings will contribute to both theoretical understanding of modern language acquisition and practical applications in educational policy and program design (Godwin-Jones, 2023). This research is expected to provide valuable insights for educators and policymakers considering the integration of digital tools in language curricula, particularly as educational institutions increasingly adopt blended or hybrid learning models.

## LITERATURE REVIEW

### Mobile-Assisted Language Learning (MALL)

The rapid proliferation of mobile technology has led to an increase in mobile-assisted language learning (MALL) applications, fundamentally reshaping the educational landscape. MALL provides language learners with the flexibility to study at any time and in any place, facilitating language acquisition outside traditional classroom environments (Burston, 2014). This flexibility is particularly valuable for learners with limited access to formal education or in contexts where language learning resources are scarce. MALL's adaptability allows for greater autonomy, promoting a self-directed approach to language learning. Through apps like Duolingo, learners gain control over the pace and structure of their study sessions, which is a key factor in sustaining engagement and motivation (Khan et al., 2024).

Duolingo, as a leader in MALL, has attracted considerable attention for its gamified approach and the accessibility it offers to users worldwide (Loewen et al., 2019). Studies examining Duolingo's effectiveness underscore its potential as a supplementary learning tool, particularly for vocabulary acquisition and reading comprehension (Fathi et al., 2024). However, while Duolingo and similar apps have demonstrated efficacy in facilitating vocabulary and grammar learning, research also highlights limitations in developing advanced language skills such as pronunciation and speaking fluency (Godwin-Jones, 2017). Therefore, while MALL holds promise in democratizing language education, its effectiveness for holistic language acquisition remains an area requiring further empirical study.

### Gamification in Language Learning

The incorporation of gamification in language learning has garnered substantial interest in recent years, owing to its potential to enhance learner engagement and motivation. Interactive learning environments now incorporate game mechanics, such as rewards, progress tracking, leaderboards, and competition, fostering an engaging and enjoyable experience for users (Hew & Huang, 2023). Platforms like Duolingo exemplify this approach

through features such as points, streaks, and levels, which consistently reward users for daily practice and sustained effort.

Interactive elements such as timed challenges and virtual rewards have shown remarkable success in promoting intrinsic motivation, a critical factor for sustained language acquisition. The implementation of gamified features in group settings has also enhanced collaborative learning, as learners engage in friendly competition and share strategies to achieve milestones (Tsourma et al., 2019). However, the effectiveness of these elements depends heavily on their design and alignment with pedagogical objectives (Khaira et al., 2023). Poor implementation may result in learners focusing more on winning rewards than meaningful learning, highlighting the importance of maintaining a balanced approach (Hew & Huang, 2023). The continued evolution of gamified tools necessitates further research to explore their potential to support advanced language skills, including conversational fluency and cultural competence.

## The Role of Artificial Intelligence in Personalizing Language Learning

Artificial intelligence has revolutionized educational language learning by enabling highly personalized experiences. Modern language learning applications utilize machine learning algorithms to customize lesson sequences based on individual performance, ensuring appropriate challenge levels for each user. Duolingo's AI system exemplifies this advancement, lesson adjusting difficulty and content in real-time to match users' evolving capabilities.

The integration of AI-powered spaced repetition techniques has revolutionized long-term retention by optimizing the timing of material review (Bloom, 2014). While this approach effectively reinforces vocabulary and grammar skills, certain limitations are apparent. These constraints suggest that AI-based tools may be most effective when complementing traditional human-led instruction rather than replacing it entirely.

## Assessing Duolingo's Impact on English Language Proficiency

The accessibility of Duolingo's English courses has made it an invaluable resource for non-native speakers worldwide. Comprehensive studies have demonstrated measurable improvements in users' vocabulary, grammar, and reading comprehension, with progress rates comparable to formal language courses (Loewen et al., 2019). This constraint often results in users struggling to apply their knowledge in spontaneous conversations or unfamiliar contexts. Despite offering significant advantages in accessibility, cost-effectiveness, and convenience, these limitations in developing comprehensive language proficiency suggest that Duolingo may be most effective when integrated with complementary language resources or blended learning environments that facilitate live conversation practice (Godwin-Jones, 2017).

The primary objective of this research focuses on evaluating MALL's impact on English proficiency, particularly examining its accessibility and effectiveness across diverse educational contexts. This study integrates key theoretical frameworks of MALL, gamification, and AI to provide foundational insights into the technological facilitation of language learning,

especially in resource-limited environments. The research specifically explores how mobile applications like Duolingo can enhance language acquisition for students with varying levels of access to formal education (Burston, 2014; Hamka, 2024). The integration of gamification theory provides crucial insights into sustaining learner motivation and engagement throughout the language acquisition process. Duolingo's gamified approach, incorporating rewards, levels, and progress tracking, transforms language learning into an engaging journey. This structure has proven particularly effective in maintaining consistent student engagement across various geographical locations (Jiang et al., 2019; Loewen et al., 2019).

The implementation of AI-driven personalization represents a significant advancement in language learning methodology. Through sophisticated algorithms, modern applications provide tailored learning experiences that adapt to individual performance levels. This personalized approach has demonstrated particular value for students lacking access to individualized instruction (Xia et al., 2021). The combined framework of MALL, gamification, and AI theories provides a comprehensive foundation for evaluating how accessibility, motivation, and personalized learning impact English language proficiency across diverse educational contexts.

## METHODS

This study implemented a systematic literature review methodology, guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure methodological rigor and transparency in the review process (Asar et al., 2016). The systematic review was conducted in four distinct phases: identification, screening, eligibility assessment, and inclusion. In the identification phase, a comprehensive literature search was conducted across three major academic databases: Google Scholar, the Education Resources Information Center (ERIC), and the Directory of Open Access Journals (DOAJ). The search utilized specific keywords including "digital language learning," "Duolingo," "classroom language learning," and "language acquisition." This initial search identified 200 potentially relevant articles from the selected databases.

During the screening phase, the 200 identified records were examined for duplicates using reference management software, resulting in the removal of 50 duplicate entries. The remaining 150 unique articles underwent preliminary screening based on titles and abstracts. Through this screening process, 90 records were excluded based on predefined criteria, leaving 60 articles for full-text assessment (Sarkis-Onofre et al., 2021). In the eligibility phase, the remaining 60 full-text articles were thoroughly assessed against specific inclusion criteria. Articles were required to be peer-reviewed, published between 2018 and 2023, written in English, and focused on digital language learning platforms or comparative studies of digital and traditional language learning methods. This detailed assessment led to the exclusion of 40 articles that did not meet these criteria, often due to insufficient methodological clarity or lack of empirical data (Campbell et al., 2019).

The final inclusion phase results in 20 articles that meet all criteria for qualitative synthesis. These selected articles underwent detailed analysis using a standardized data extraction tool to systematically collect information about study characteristics, methodologies, and findings (Tawfik et al., 2019). The analysis focused on identifying patterns, trends, and significant

findings across the selected studies, providing a comprehensive understanding of digital language learning effectiveness compared to traditional classroom instruction.
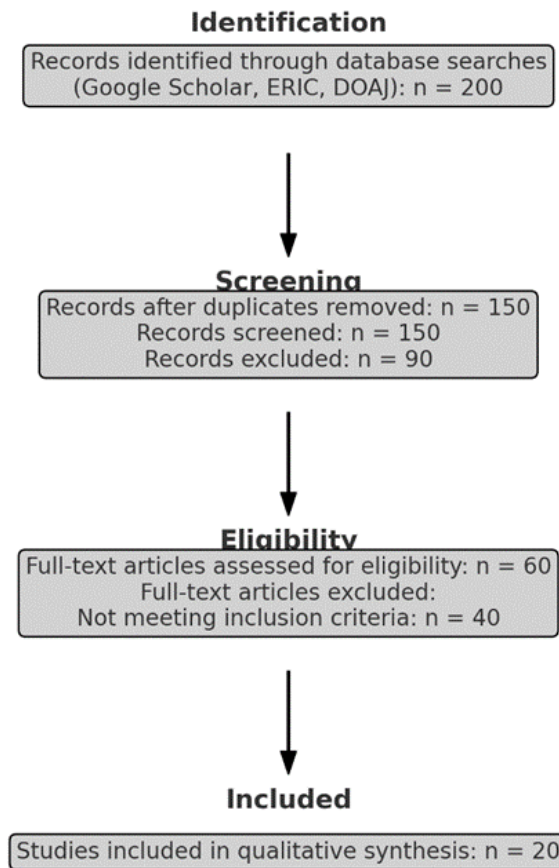
## Identification

Records identified through database searches
(Google Scholar, ERIC, DOAJ): n = 200

## Screening

Records after duplicates removed: n = 150
Records screened: n = 150
Records excluded: n = 90

## Eligibility

Full-text articles assessed for eligibility: n = 60
Full-text articles excluded:
Not meeting inclusion criteria: n = 40

## Included

Studies included in qualitative synthesis: n = 20

**Figure 1.** Analysis of the Prisma method of 20 articles
*Source: Author Construction 2024*

## RESULTS AND DISCUSSION

This study synthesizes findings from 20 research articles examining the impacts of Duolingo on various language skill areas. By categorizing the studies based on specific skills, including vocabulary acquisition, speaking, listening, reading comprehension, and writing, while also analyzing user engagement and potential limitations, this research provides a comprehensive evaluation of Duolingo's effectiveness as a language learning tool. This introduction lays the foundation for a detailed analysis of Duolingo's strengths and weaknesses, offering valuable insights into its role in language acquisition across diverse learner groups and educational contexts.

**Table 1**. Description of the results 20 studies

| Theme | Summary | References |
|---|---|---|
| Vocabulary and Foundational Skills Enhancement | Duolingo is highly effective in building vocabulary, especially for beginner and early-stage learners, creating a foundation for language skills like reading and listening. | Ajisoko (2023);Hakimantieq et al. (2022); Milyarni et al. (2023); Pratasik (2023). |

| Theme | Summary | References |
|---|---|---|
| Listening and Speaking Confidence | Users, particularly students, showed improved listening skills and gained confidence in speaking due to Duolingo's repetition and practice features, although conversational practice remains limited. | Fitria et al. (2023); Putri & Islamiati (2023). |
| Engagement Through Gamification | Duolingo's gamified approach boosts motivation and engagement, particularly among college students and millennials, helping foster sustained language practice. | Hidayati & Diana (2019); Indrawan et al. (2023); Permatasari & Aryani (2023); Nita et al. (2023). |
| Developing Consistent Learning Habits | The app promotes regular learning routines through daily usage nudges, leading to gradual and long-term language improvement for users. | Bühler et al. (2022); Kang (2021); Tsai (2022). |
| Limitations in Grammar and Advanced Language Skills | While strong in vocabulary, Duolingo lacks depth in teaching complex grammar and conversational skills, making it more of a supplementary tool. | Nguyen (2023); Purwanto (2023); Tuong & Dan (2024). |
| Cultural and Contextual Learning Gaps | Studies note that Duolingo lacks cultural immersion and contextual understanding, which are essential for mastering language nuances beyond the basics. | Ahmed (2023); Arani (2024); Kang (2021); Tsai (2022). |
| Support for Diverse Language Learning Goals | Duolingo's design supports various languages, effective for foundational skills across languages, Though advanced proficiency often requires additional resources. | Ahmed (2023); Milyarni et al. (2023); Santi & Hilal (2023); Tsai (2022). |
| Positive Perceptions from Educators | Educators see Duolingo as a beneficial supplementary tool for vocabulary and grammar reinforcement, though not a full replacement for classroom instruction. | Ahmed (2023); Indrawan et al (2023); Kang (2021); Rouabhia & Kheder (2024). |

*Source: Research 2024*
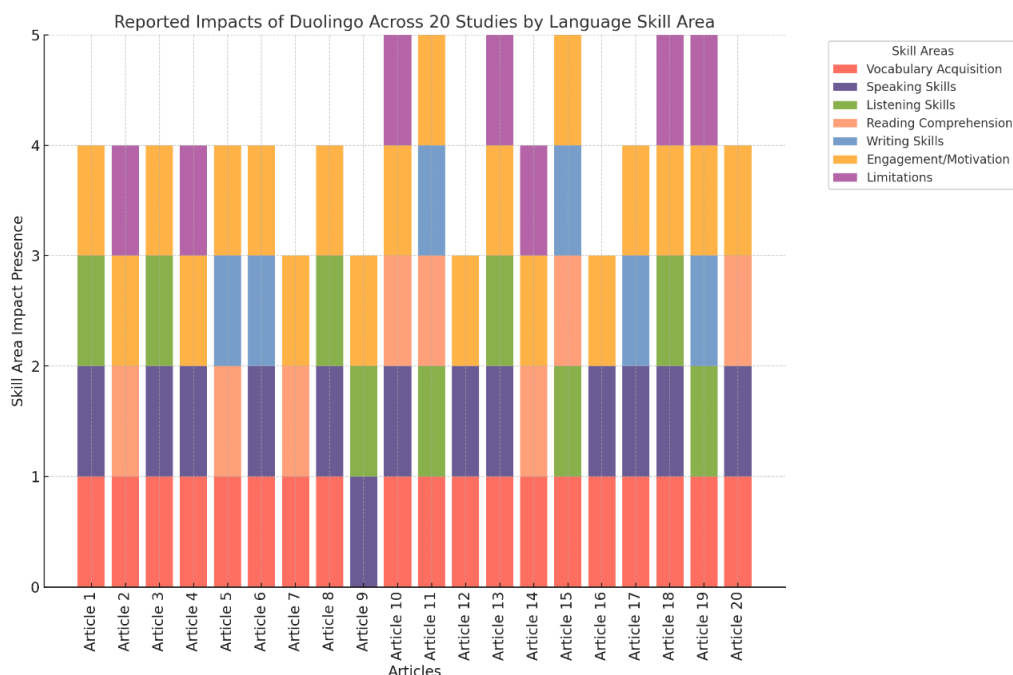


**Figure 2**. Impacts of Duolingo across 20 studies by language skill area
*Source: Research 2024*

The studies collectively highlight Duolingo's effectiveness in building foundational language skills, especially for beginners. Vocabulary acquisition emerges as one of Duolingo's most successful areas, with 16 studies reporting significant improvements. Its flashcard-style exercises and repetition help users retain new words, although the app may lack context for advanced vocabulary usage. Speaking and listening skills also benefit, with 10 studies noting that Duolingo builds users' confidence in pronunciation and listening comprehension, particularly at the beginner level. However, the absence of real-time conversation limits progress toward conversational fluency.

Reading comprehension is moderately supported, as the app's structured lessons help learners understand basic sentence structure and common vocabulary. While 8 studies acknowledged gains in reading skills, Duolingo's simple texts do not foster advanced comprehension. Writing skills receive less emphasis, with only 7 studies highlighting writing benefits; Duolingo's translation exercises reinforce grammar and vocabulary but do not engage learners in structured or creative writing.

Duolingo's gamified approach is a standout feature across 15 studies, which greatly enhances engagement and motivation. The app's rewards, streaks, and levels make language learning enjoyable, fostering consistency in practice. However, Duolingo's limitations, noted in 10 studies, include a lack of depth for advanced proficiency, limited conversational practice, and minimal exposure to cultural and contextual language use. While Duolingo serves as a valuable supplementary tool for beginners, its functionality may need to be complemented by other resources for learners seeking to achieve higher proficiency levels.

## DISCUSSION

This study synthesized results from 20 research articles to evaluate Duolingo's impact on language acquisition across essential skills such as vocabulary, listening, speaking, reading comprehension, and writing. The findings reveal both Duolingo's strengths as a language-learning tool and its potential for integration into formal educational settings, particularly highlighting the relationship between gamification and sustained learning habits.

### Vocabulary Acquisition and Foundational Skill Development

Vocabulary acquisition emerged as Duolingo's strongest impact area, especially for beginner learners in formal educational settings. Mobile applications with repetitive flashcard-style exercises have shown effective support for vocabulary retention, particularly when integrated into structured learning environments (Ajisoko, 2023; Pratasik, 2023). The development of vocabulary knowledge fundamentally supports language proficiency, underpinning the development of listening and reading comprehension skills in academic contexts (Hakimantieq et al., 2022). A well-developed vocabulary enables learners to comprehend basic texts and follow simple spoken dialogues, serving as a critical component for subsequent skill acquisition (Ford-Connors & Paratore, 2015; Moody et al., 2018).

However, Duolingo's focus on isolated vocabulary practice limits its effectiveness in developing contextual understanding within formal learning environments. Vocabulary learning achieves optimal results when words are learned in context, providing learners with a more profound and nuanced understanding of language (Lăpădat, 2023). While Duolingo's

flashcard approach aids retention, advanced vocabulary acquisition in academic settings benefits from authentic context, enhancing language use in real-life situations. Future studies should examine the integration of contextualized reading or conversation modules within formal curricula to bridge this gap for intermediate and advanced learners.

## Listening and Speaking Skills Development

The platform effectively improves listening comprehension and builds speaking confidence in classroom settings through its pronunciation and repetition exercises. Repeated auditory exposure shows particular benefits for beginners in structured learning environments (Uchihara et al., 2023). Statistical data indicates that students using Duolingo in formal education settings demonstrate increased confidence in listening and pronunciation, motivating continued practice and supporting language retention (Fitria et al., 2023). The lack of real-time conversational practice, however, presents a significant limitation in academic contexts. Interaction and real-time feedback play essential roles in achieving conversational fluency (Solmaz, 2024; Chollet et al., 2022). Educational institutions might consider complementing Duolingo with platforms that facilitate live conversation practice, such as HelloTalk, to provide the necessary interactivity for developing conversational skills.

## Gamification and Learning Motivation

The gamified design of Duolingo, featuring rewards, streaks, and competitive levels, has demonstrated measurable impacts on student engagement in formal learning environments. The overuse of external motivators may potentially undermine intrinsic motivation in academic contexts (Dicheva et al., 2017). Educational institutions should explore balanced approaches that integrate gamification with substantive language learning objectives.

## Habit Formation and Consistent Practice

Duolingo's implementation in formal education has shown success in developing consistent learning habits through features like daily reminders and goal-setting tools. Quantitative research demonstrates improved learning outcomes when students maintain regular practice schedules (Lin, 2021). Brief but consistent engagement with the platform significantly enhances skill development in academic settings (Li et al., 2024). Educational institutions should consider implementing adaptive features that align daily challenges with varying proficiency levels.

## Advanced Grammar and Language Skills

The platform's approach to advanced grammar instruction presents limitations in formal educational settings. Effective grammar instruction in academic contexts requires integration with contextualized activities (Finardi et al., 2016). Educational institutions should supplement Duolingo with resources that emphasize grammar through authentic contexts.

## Cultural Context and Language Learning

The limited emphasis on cultural immersion affects learners' ability to grasp language nuances in academic settings. Research data shows improved learning outcomes when cultural elements are integrated into language education (Kilag et al., 2023). Educational institutions successfully incorporating cultural modules and virtual exchanges have reported enhanced intercultural competence and improved fluency (Lin, 2021).

## Educational Implications

These findings suggest Duolingo's optimal role as a supplementary tool within formal language education programs. Educational institutions should consider strategic integration of the platform into the beginner-level curriculum while providing additional resources for advanced instruction. The development of comprehensive blended learning approaches, combining mobile-assisted language learning with traditional instruction, offers promising directions for future research and implementation.

## CONCLUSION

This systematic review of 20 research articles reveals three key findings regarding Duolingo's effectiveness in language learning. First, the integration of Duolingo in formal educational settings demonstrates a significant positive impact on foundational language skills, particularly in vocabulary acquisition and basic grammar. Second, the platform's gamified elements effectively foster consistent learning habits among students in formal education settings, particularly when integrated with regular course requirements. Third, while successful as a supplementary tool, Duolingo shows limitations in developing advanced language competencies, particularly in the areas of cultural understanding and complex grammar structures.

These findings address our research objectives by confirming that mobile-assisted language learning platforms like Duolingo can effectively complement traditional instruction, especially at beginner levels. The evidence supports our hypothesis that a structured combination of digital and traditional learning methods yields superior results, particularly when Duolingo is integrated into formal curricula with clear pedagogical objectives.

For educational practitioners, we recommend systematic integration of Duolingo into formal language curricula, with particular emphasis on beginner and intermediate levels. Educational institutions should develop comprehensive assessment frameworks that effectively combine app-based progress tracking with traditional evaluation methods. To address the platform's limitations, institutions should implement supplementary activities that specifically target cultural competence and advanced grammar skills, creating a more balanced and complete language learning experience.

Future research directions should focus on several key areas to enhance our understanding of digital language learning platforms. Researchers should investigate the long-term retention rates in blended learning environments that incorporate Duolingo, examining how different integration models perform across various institutional contexts. Additionally, studies should explore the impact of cultural content integration on overall language

proficiency and evaluate the potential role of artificial intelligence in enhancing conversational practice capabilities within the platform. These investigations would provide valuable insights for both platform development and educational implementation strategies.

## AUTHOR'S NOTE

## REFERENCES

Ahmed, H. B. E. (2023). Duolingo as a bilingual learning app: A case study. *Arab World English Journal, 7*(1), 255-267.

Ajisoko, P. (2020). The use of Duolingo apps to improve English vocabulary learning. *International Journal of Emerging Technologies in Learning (iJET)*, *15*(7), 149-155.

Arani, S. M. N. (2024). Navigating the future of language learning: A Conceptual review of ai's role in personalized learning. *Computer-Assisted Language Learning Electronic Journal*, *25*(3), 1-22.

Asar, S. H., Jalalpour, S. H., Ayoubi, F., Rahmani, M. R., & Rezaeian, M. (2016). PRISMA: preferred reporting items for systematic reviews and meta-analyses. *Journal of Rafsanjan University of Medical Sciences*, *15*(1), 68-80.

Bloom, B. S. (2014). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher, 13*(6), 4-16.

Bühler, M. M., Jelinek, T., & Nübel, K. (2022). Training and preparing tomorrow's workforce for the fourth industrial revolution. *Education Sciences*, *12*(11), 782.

Burston, J. (2014). MALL: The pedagogical challenges. *Computer Assisted Language Learning*, *27*(4), 344-357.

Campbell, M., Katikireddi, S. V., Sowden, A., & Thomson, H. (2019). Lack of transparency in reporting narrative synthesis of quantitative data: A methodological assessment of systematic reviews. *Journal of Clinical Epidemiology*, *105*(1), 1-9.

Chollet, M., Marsella, S., & Scherer, S. (2022). Training public speaking with virtual social interactions: Effectiveness of real-time feedback and delayed feedback. *Journal on Multimodal User Interfaces*, *16*(1), 17-29.

Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2017). Gamification in education: A systematic mapping study. *Educational Technology & Society*, *18*(3), 75-88.

Fathi, J., Ahmadnejad, M., & Nosrati, S. (2024). Investigating the impact of Duolingo on second language learning achievement and self-regulated learning among French as a foreign language learners. *Computer-Assisted Language Learning Electronic Journal*, *25*(4), 379-413.

Finardi, K. R., Leão, R. G., & Amorim, G. B. (2016). Mobile assisted language learning: Affordances and limitations of Duolingo. *Education and Linguistics Research*, *2*(2), 48-65.

Fitria, N., Usman, M., & Sahara, N. (2023). Duolingo application for advancing English speaking skills. *Journal of Innovation in Educational and Cultural Research*, *4*(4), 587-595.

Ford-Connors, E., & Paratore, J. R. (2015). Vocabulary instruction in fifth grade and beyond: Sources of word learning and productive contexts for development. *Review of Educational Research*, *85*(1), 50-91.

Ginting, R. (2023). Evaluation of learning English with the illuminative model in the Fun English program. *Curricula: Journal of Curriculum Development, 2*(2), 183-194.

Godwin-Jones, R. (2017). Smartphones and language learning. *Language Learning & Technology, 21*(2), 3-17.

Godwin-Jones, R. (2023). Emerging technologies in language learning: Opportunities and challenges. *Language Learning & Technology, 27*(1), 1-22.

Hakimantieq, H., Suherdi, D., & Gunawan, W. (2022). Duolingo as a mobile-assisted language learning: A new supplementary of learning basic English reading for EFL students. *Edukatif: Jurnal Ilmu Pendidikan*, *4*(6), 7548-7558.

Hamka, N. (2024). Leveraging MALL in higher education: A study on Duolingo's efficacy in enhancing language learning motivation. *Elsya: Journal of English Language Studies*, *6*(3), 231-243.

Hew, K. F., & Huang, W. (2023). Promoting engagement in online learning beyond COVID-19: Possible strategies and directions for future research. *Future in Educational Research*, *1*(1), 27-49.

Hidayati & Diana. (2019). Students' motivation to learn English using mobile applications: The case of Duolingo and Hello English. *JEELS (Journal of English Education and Linguistics Studies, 1*(2)*,* 1-25

Hsu, K. C., & Liu, G. Z. (2023). The construction of a theory-based augmented reality-featured context-aware ubiquitous learning facilitation framework for oral communication development. *Journal of Computer Assisted Learning*, *39*(3), 883-898.

Indrawan, F., Daristin, P. E., & Laili, E. N. (2023). The influence of Duolingo application to EFL classroom students' motivation in learning English. *Journey: Journal of English Language and Pedagogy*, *6*(3), 626-633.

Jiang, L., Zhang, L. J., & May, S. (2019). Implementing English-Medium Instruction (EMI) in China: Teachers' practices and perceptions, and students' learning motivation and needs. *International Journal of Bilingual Education and Bilingualism*, *22*(2), 107-119.

344

Kang, J. (2021). Digital Technical Language Teaching--Teaching/Learning Principles of Duolingo. *Learning & Education*, *10*(2), 50-51.

Khaira, H. S., Al Hafizh, M. F., Darmansyah, P. S. A., Nugraha, H., & Komara, D. A. (2023). Analysis of needs and teachers' perception towards business teaching materials at SMA Labschool UPI. Curricula*: Journal of Curriculum Development, 2*(2), 299-314.

Khan, O., Ullah, Z., Bakht, I., & Bibi, S. (2024). Learners' autonomy and Mobile Assisted Language Learning (MALL): Perceptions of undergraduate students. *Panacea Journal of Linguistics & Literature*, *3*(1), 331-343.

Kilag, O. K., Dumdum, J. N., Quezon, J., Malto, L., Mansueto, D., & Delfino, F. (2023). The pedagogical potential of poems: Integrating poetry in English language teaching. *Excellencia: International Multi-disciplinary Journal of Education (2994-9521)*, *1*(1), 42-55.

Lăpădat, M. M. (2023). Harnessing technological transformation: An exploration of the impact of mobile assisted language learning on English vocabulary acquisition. *Analele Universităţii din Craiova, Seria Ştiinţe Filologice, Limbi Străine Aplicate*, *1*(1), 266-279.

Lestari, R., & Emilia, E. (2023). English curriculum analysis and its relevance to Islamic boarding school goals. *Curricula: Journal of Curriculum Development, 2*(1), 55-72.

Li, Z., Bonk, C. J., & Zhou, C. (2024). Supporting learners self-management for self-directed language learning: A study within Duolingo. *Interactive Technology and Smart Education*, *21*(3), 381-402.

Lin, C. C. (2021). Using virtual exchange to foster global competence and collaborative leadership in teacher education. *Dual Language Research and Practice Journal*, *4*(1), 24-38.

Lin, Y. L., Tsai, Y. C., & Hsieh, C. Y. C. (2024). Discourse competence across band scores: An analysis of speaking performance in the general English proficiency test. *International Review of Applied Linguistics in Language Teaching*, *62*(4), 1719-1746.

Loewen, S., Crowther, D., Isbell, D. R., Kim, K. M., Maloney, J., Miller, Z. F., & Rawal, H. (2019). Mobile-assisted language learning: A Duolingo case study. *ReCALL*, *31*(3), 293-311.

Milyarni, F. D., Mortini, A. V., & Mayasari, S. (2021). Translation exercises of English to Indonesian in Duolingo application. *The Journal of English Literacy Education: The Teaching and Learning of English as a Foreign Language*, *8*(2), 150-163.

Moody, S., Hu, X., Kuo, L. J., Jouhar, M., Xu, Z., & Lee, S. (2018). Vocabulary instruction: A critical analysis of theories, research, and practice. *Education Sciences*, *8*(4), 180-202.

Nguyen, T. T. N. (2023). Exploring Vietnamese EFL students' perceptions towards literature courses in English studies program. *International Journal of Language Instruction*, *2*(3), 80-96.

Nita, S., Sari, E. R. N., Sussolaikah, K., & Risky, S. M. F. (2023). The implementation of Duolingo application to enhance English learning for millennials. *Journal International of Lingua and Technology*, *2*(1), 1-9.

Permatasari, D., & Aryani, F. (2023). Duolingo: An enchanting application to learn English for college students. *ELTR Journal*, *7*(2), 101-109.

Pratasik, G. (2022). Learning English vocabulary through the Duolingo application to help young learners' reading skill. *Journal of English Language Teaching, Literature and Culture*, *1*(1), 54-60.

Purwanto, A. A. (2023). Students' perception on using Duolingo for learning English vocabulary. *Journal of English Teaching*, *9*(1), 70-82.

Putri, L. M., & Islamiati, A. (2018). Teaching listening using Duolingo application. *Journal of English Education*, *1*(4), 460-465.

Rouabhia, R., & Kheder, K. (2024). Using Duolingo in teaching and learning vocabulary: A systematic review. *Indonesian Journal of English Language Studies (IJELS)*, *10*(2), 91-107.

Santi, L. I., & Hilal, A. (2023). A review of Duolingo application in learning English. *Channing: Journal of English Language Education and Literature*, *8*(2), 56-63.

Sarkis-Onofre, R., Catalá-López, F., Aromataris, E., & Lockwood, C. (2021). How to properly use the PRISMA Statement. *Systematic Reviews*, *10*(1), 1-3.

Solmaz, O. (2024). Impacts of digital applications on emergent multilinguals' language learning experiences: The case of Duolingo. *Education and Information Technologies*, *29(*16), 1-30.

Tawfik, G. M., Dila, K. A. S., Mohamed, M. Y. F., Tam, D. N. H., Kien, N. D., Ahmed, A. M., & Huy, N. T. (2019). A step by step guide for conducting a systematic review and meta-analysis with simulation data. *Tropical Medicine and Health*, *47*(1), 1-9.

Tsai, N. (2022). Learning Polish with Duolingo: A case study in Taiwanese academic setting. *Acta Universitatis Lodziensis. Kształcenie Polonistyczne Cudzoziemców*, *29*(1), 31-52.

Tsourma, M., Zikos, S., Albanis, G., Apostolakis, K. C., Lithoxoidou, E. E., Drosou, A., ... & Tzovaras, D. (2019). Gamification concepts for leveraging knowledge sharing in Industry 4.0. *International Journal of Serious Games*, *6*(2), 75-87.

Tuong, N. K., & Dan, T. C. (2024). A study on Duolingo mobile applications to improve EFL students' listening comprehension performances. *European Journal of Alternative Education Studies*, *9*(1), 217-265.

Uchihara, T., Webb, S., Saito, K., & Trofimovich, P. (2023). Frequency of exposure influences accentedness and comprehensibility in learners' pronunciation of second language words. *Language Learning*, *73*(1), 84-125.

346