



Integrating Artificial Intelligence in English Learning: Implementation of Duolingo Application to Improve English Skills

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Abstract

This study aims to evaluate the effectiveness of using the artificial intelligence (AI)-based application Duolingo in improving the English language skills of grade X A students at Madrasah Aliyah Darut Tauhid. This study used a descriptive method involving 29 students as samples. Data were collected through interviews, observations, and questionnaires which were analyzed using descriptive analysis for qualitative data and simple statistical analysis for quantitative data. The results showed that the use of Duolingo significantly helped students improve their vocabulary and speaking skills, as revealed through interviews. Observations showed consistent usage patterns, with effective study duration several times a week. Analysis of questionnaire data revealed that students showed high enthusiasm, found the app effective, were motivated and engaged in learning. Nonetheless, students also identified advantages and disadvantages of the app, including limitations of features that do not fully support productive skills such as speaking. This research makes an important contribution to the literature related to AI-based learning and educational practice, by emphasizing the need for integration of apps like Duolingo into the curriculum to increase student motivation and engagement. However, this study has limitations in terms of population coverage, study duration, and perceptual measurement.

Keywords artificial intelligence; duolingo; english language learning; education technology; language skills

A. INTRODUCTION

The rapid advancement of artificial intelligence (AI) has significantly influenced various fields, including education (Erbaş & Maksuti, 2024). As a transformative force, AI has revolutionized language learning by providing adaptive and interactive experiences tailored to individual needs (Feng, 2024). Among the many AI-driven tools, language learning applications such as Duolingo have gained widespread popularity due to their ability to deliver personalized instruction and

foster consistent engagement (Tiwari et al., 2024). English, as a global lingua franca, holds an essential role in international communication, academic pursuits, and professional development. Consequently, effective methods to enhance English language skills have become a priority for educators and learners worldwide (Shi, 2024). However, despite the growing use of AI-powered applications, understanding their full potential in addressing the complexities of English language acquisition remains a pressing concern, necessitating further empirical investigation.

While the integration of artificial intelligence (AI) in language learning has shown significant potential, challenges in its application are still a major concern. One widely used AI-based app, Duolingo, has attracted attention as a language learning platform that offers an adaptive and interactive experience (Piesciorovsky & Analía, 2025). However, empirical research into the effectiveness of these apps in holistically improving English language skills is limited. Most previous studies tend to focus on measuring receptive skills such as reading and listening, while productive skills, particularly speaking and writing, are often neglected (Zholdas, 2024). In addition, users' high expectations of learning outcomes are often not in line with reality, especially in formal or semi-formal education contexts. This highlights the urgent need to explore in depth how apps like Duolingo can make a real impact in improving integrated English language skills (Jiang, 2024).

The primary objective of this study is to investigate the implementation of the Duolingo application as an AI-based language learning tool to enhance English skills. Specifically, the research aims to evaluate its effectiveness in supporting the development of core language competencies, including listening, speaking, reading, and writing (Olimat, 2024). By examining how this widely used application aligns with learners' needs and expectations, this study seeks to provide empirical insights into its pedagogical value. Furthermore, the study aspires to identify best practices and challenges associated with integrating Duolingo into English learning contexts (Ouyang et al., 2024), thereby contributing to a deeper understanding of how AI-driven applications can revolutionize language education. Ultimately, this research aims to offer evidence-based recommendations for educators, policymakers, and developers to optimize the use of AI technologies in fostering language acquisition and improving learning outcomes.

Despite the growing body of research on the integration of artificial intelligence (AI) in education (Azhiman & Halim, 2024), significant gaps remain in understanding its practical applications in specific contexts. Previous studies have often focused on the general potential of AI in learning environments, emphasizing its adaptability and personalization (Castro et al., 2024). However, limited attention has been given to investigating the effectiveness of specific AI-powered

applications, such as Duolingo, in enhancing English language skills. Moreover, while the existing literature has explored aspects of language learning technology, there is a lack of comprehensive studies examining how these tools impact all dimensions of language acquisition listening, speaking, reading, and writing particularly the productive skills of speaking and writing. This research addresses these gaps by offering an in-depth analysis of Duolingo's implementation in English language learning, contributing to a more nuanced understanding of how AI-driven applications can support and transform language education (Golub et al., 2024).

Advances in artificial intelligence (AI) technology have opened up new opportunities to revolutionize language learning (Satterthwaite & Robbins, 2025), but there is still a significant gap in scientific understanding regarding the specific application of AI-based applications such as Duolingo in the context of English language education. This research stands out because it focuses on empirically analyzing the effectiveness of Duolingo in holistically improving English language skills (Rahma & Irianti, 2024), including receptive (listening and reading) and productive (speaking and writing) skills. This approach offers a new contribution to the literature that has previously mostly discussed the general potential of AI technology in learning without touching on the specific aspects of implementation of certain applications.

The results of this study are expected to provide valuable insights for educational practitioners to optimize technology in enhancing learning experiences (Almusfar, 2024), as well as for application developers to enhance AI-based features to meet dynamic learning needs. In addition, this research is also relevant for policy makers in strategizing the integration of technology into the formal education curriculum (Pujilestari, 2024). Thus, this research not only enriches the academic discussion on the role of AI technology in language learning, but also has significant practical implications for education and technology development.

B. METHOD

This study used a descriptive quantitative and qualitative (mixed-method) design to analyze the implementation of the Duolingo application in improving English language skills. The population of the study was class X A students at Madrasah Aliyah Darut Tauhid, with a purposively selected sample of 29 students. Data were collected through interviews to explore students' experiences, observations to record learning behaviors, and a Google Form-based questionnaire to obtain quantitative data related to students' perceptions. The research procedure included the preparation stage (preparation of instruments and training on the use of the application), implementation (use of the application, observation, distribution of questionnaires, and interviews), and data analysis. Qualitative data from interviews

and observations were analyzed descriptively, while quantitative data from questionnaires were analyzed using simple statistical techniques to provide an overview of student perceptions. This approach was designed to comprehensively evaluate the effectiveness of Duolingo.

C. RESULT AND DISCUSSION

The results of the descriptive analysis show that interviews with students revealed that the use of Duolingo helped them significantly in improving their English vocabulary and speaking skills (Indrasari et al., 2024). This is in line with technology-based learning theory which states that interactive features in AI-based applications can encourage language skill development (Chen, 2024). Observations also noted a consistent pattern of app usage, where students use Duolingo several times a week for a duration that is effective enough to support learning.

A simple statistical analysis of the questionnaire data reinforced these findings. In the first part, all students expressed their enthusiasm for learning English using AI-based apps like Duolingo. In the second section, the majority of students felt that the app was effective in improving their English skills. The third section shows that students feel motivated and more engaged in English learning when using the app. However, the data in the fourth section reflected that students were also aware of the advantages and disadvantages of the app, such as ease of access and features that support learning, but limited assessment of productive skills such as speaking. Finally, in the fifth section, almost all students agreed that Duolingo is an effective support tool for English learning at school, especially as a complement to conventional learning methods (Fakhrurriana et al., 2024).

Overall, the results of this study suggest that Duolingo can serve as an effective tool to support English language learning by providing a personalized, interactive learning experience and encouraging student engagement (Pikhart et al., 2024). However, it is important to consider the limitations of the app and provide proper guidance to students in order to maximize its benefits.

The questionnaire was used to obtain data on the effectiveness and perception of students in using Duolingo as a tool to improve skills in English. There were seventeen statements in the questionnaire. The data can be seen in the following figure and description.

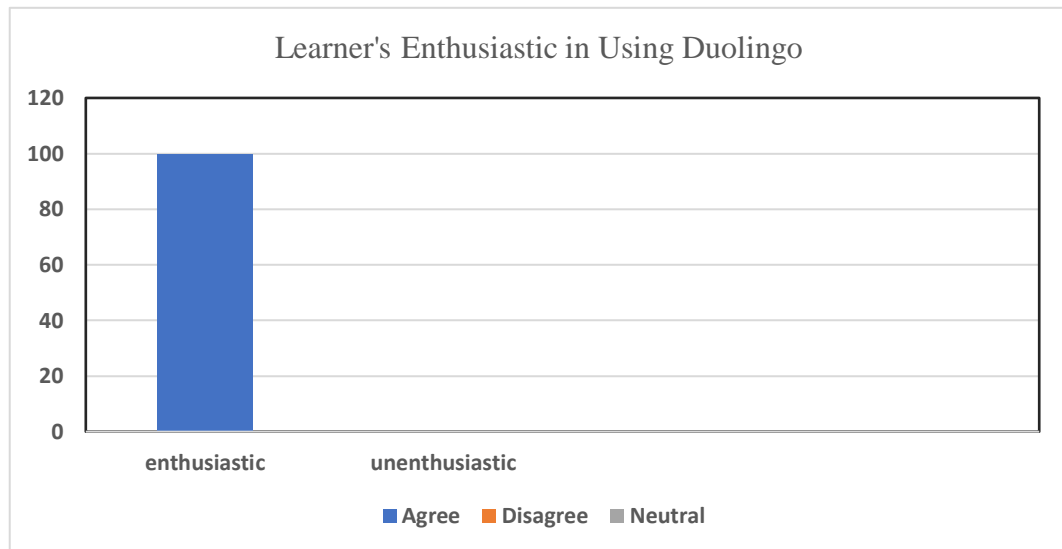
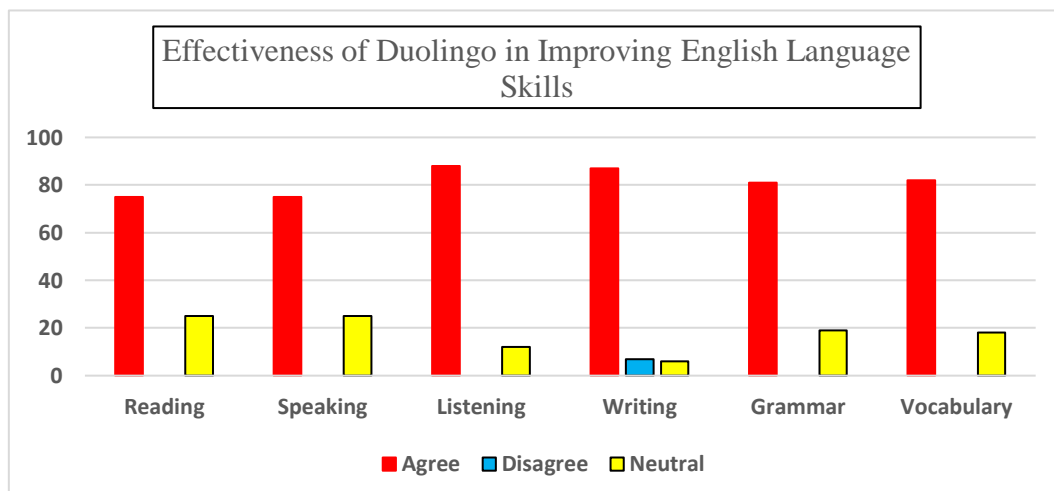


Figure 1. Learner's Enthusiastic in Using Duolingo

Based on the data in the “Learner's Enthusiastic in Using Duolingo” graph, the majority of respondents showed a very high level of enthusiasm towards using the Duolingo application for learning. The Enthusiastic category reaches the highest number, which is 100%, the Unenthusiastic category is in a very small number and the Neutral Response is barely represented. This graph indicates that most students feel enthusiastic about using Duolingo as a learning tool, with only a few feeling unenthusiastic or neutral.

Figure 2. Effectiveness of Duolingo in Improving English Language Skills

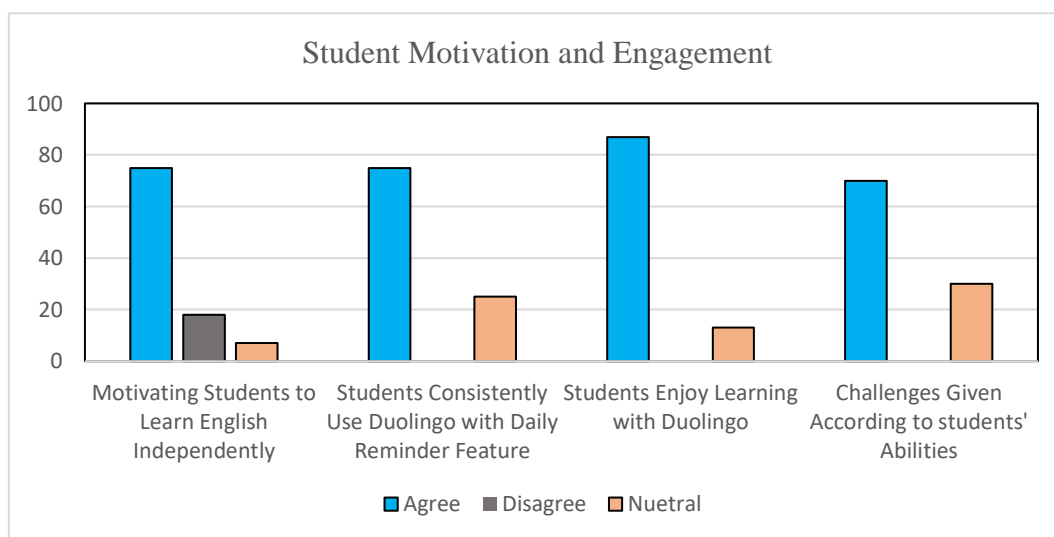


Based on the “Effectiveness of Duolingo in Improving English Language Skills” chart, the majority of respondents stated that Duolingo is effective in improving various English language skills. For Reading and Speaking skills, around 80% of respondents agreed, while the other 20% were neutral, with no one disagreeing. In Listening skills, agreement reached the highest rate of 90%, with 10% of respondents

being neutral and none disagreeing. Writing, Grammar, and Vocabulary skills each received 85% agreement, with 10-15% neutral responses, and only 5% of respondents disagreeing on Writing skills.

Overall, listening skills received the most positive ratings with the highest level of agreement, followed by Writing, Grammar, and Vocabulary which showed significant effectiveness. However, there were a few neutral responses on some skills, especially Reading and Speaking, as well as a small number of disagreeing responses on Writing skills. This data shows that the majority of respondents consider Duolingo to be a very effective tool to support English language learning.

Figure 3. Student Motivation and Engagement

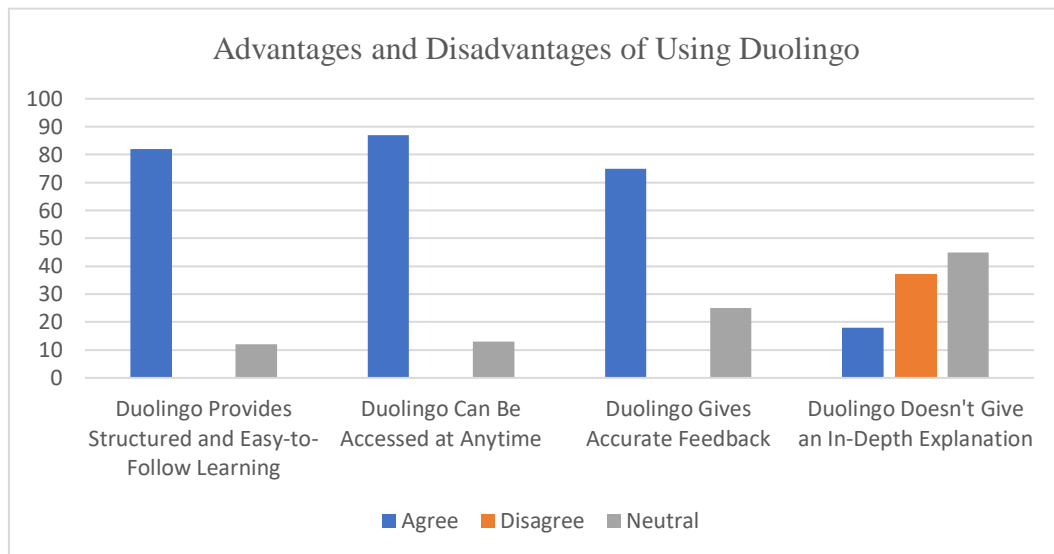


Based on the “Student Motivation and Engagement” graph, the majority of respondents gave positive responses to various aspects of student motivation and engagement in using Duolingo. On the indicator Motivating Students to Learn English Independently, about 75% of respondents agreed, 15% disagreed, and 10% were neutral. For the indicator Students Consistently Use Duolingo with Daily Reminder Feature, 75% of respondents agreed, while 25% were neutral, with no disagreeing responses. On the Students Enjoy Learning with Duolingo indicator, agreement reached the highest rate of 90%, with 10% of respondents being neutral and none disagreeing. Meanwhile, on the Challenges Given According to Students' Abilities indicator, 70% of respondents agreed, and 30% were neutral, with no disagreeing responses.

Overall, this graph shows that Duolingo successfully motivates students to learn independently, increases consistency of app usage through the daily reminder feature, and creates a fun learning experience. However, there were some neutral responses, particularly regarding the daily reminder feature and challenges that

match students' abilities. This suggests there is room for improvement on these aspects.

Figure 4. Advantages and Disadvantages of Using Duolingo



Based on the “Advantages and Disadvantages of Using Duolingo” graph, the majority of respondents gave positive responses to the advantages of Duolingo, although there were some recognized disadvantages. On the indicator Duolingo Provides Structured and Easy-to-Follow Learning, 80% of respondents agreed, 20% were neutral, and no one disagreed. For the indicator Duolingo Can Be Accessed at anytime, the agreement reached 85%, with 15% neutral response, with no one disagreeing. On the Duolingo Gives Accurate Feedback indicator, about 75% of respondents agreed, 20% were neutral, and 5% disagreed. Meanwhile, on the indicator Duolingo Doesn't Give an In-Depth Explanation, 30% of respondents agreed that this was a shortcoming of the app, 40% were neutral, and 30% disagreed with the statement.

Overall, this graph shows that Duolingo is highly valued for its accessibility, organized learning structure, and accurate feedback (Erizara & Wijirahayu, 2024). However, some respondents acknowledged the app's limitations in providing in-depth explanations, as seen from the distribution of responses on the last indicator. This suggests that although the app excels in many aspects, there is room for further development, especially regarding the explanation of the material.

The results of this study confirm that Duolingo app, as an artificial intelligence (AI)-based learning platform, is able to support students' English skills development through an interactive and personalized approach (Ferdyan & Halim, 2024). Findings from interviews showed that students perceived significant improvements in vocabulary and speaking skills, reflecting the effectiveness of Duolingo's

interactive features such as adaptive repetition and context-based reinforcement (Rouabhia & Kheder, 2024). Observations of usage patterns also indicated students' consistency in utilizing the app several times a week, with the duration being effective enough to facilitate language learning. This pattern is in line with previous research which shows that regular frequency of use of educational technology can significantly improve learning outcomes (Jaxongirmirzo, 2024).

A simple statistical analysis of the questionnaire data reinforced these results, with the majority of students expressing high enthusiasm towards learning using Duolingo. This enthusiasm reflects not only an enjoyable learning experience but also active student engagement, which is a key element in constructivist learning theory (Jumaah, 2024). Moreover, the effectiveness of the app in supporting students' English language skills, as stated by the majority of respondents, confirms the role of AI in providing adaptive and purposeful learning experiences (Wang et al., 2024). Thus, this study confirms the great potential of AI-based apps like Duolingo in supporting modern language learning needs.

The results of this study support the theory of technology-based language learning which states that artificial intelligence (AI)-based applications such as Duolingo can facilitate personalized learning, allowing students to learn at their own pace and needs (Vega et al, 2024). Duolingo's effectiveness in improving vocabulary and speaking skills, as found through interviews, as well as students' enthusiasm and motivation identified from questionnaires, demonstrate the potential of this app in enhancing learning engagement which is often a challenge in traditional methods (Kazu & Kuvvetli, 2024). Practically, these findings suggest that Duolingo can be integrated as a learning support tool in formal classrooms to complement conventional methods. Student feedback on the strengths and weaknesses of the app provides guidance for the developers to improve features, especially in supporting productive abilities such as speaking and writing skills, so these findings contribute both theoretically and practically to the development of technology-based language learning.

This study has several limitations that need to be considered in interpreting the results. First, the focus on one population, 29 students of class X A at Madrasah Aliyah Darut Tauhid, limits the generalizability of the findings to a wider population. The results obtained may not reflect students' experiences in educational environments with different demographic or cultural backgrounds. Secondly, the relatively short duration of the study only provides an initial picture of the effectiveness of the Duolingo app. The long-term impact of using this app on the development of students' English language skills cannot be evaluated in depth. Third, although the questionnaire provided quantitative data on students'

perceptions, this instrument tends to measure subjective aspects and does not include objective data such as language skills test results. These limitations suggest that the results of the study should be viewed as an initial step that requires further study to gain a more comprehensive understanding of the effectiveness of Duolingo in the context of English language education.

Further research is recommended to expand the population to a more diverse range of educational levels and demographic backgrounds, in order to increase the generalizability of the findings. In addition, the duration of the study should be extended to observe the long-term impact of using Duolingo on students' English skill development. The use of more complex measurement methods, such as pre-test and post-test, is also important to complement the perception data with more objective results. Future research could explore the integration of AI-based apps with conventional learning methods to optimize their effectiveness (Yusuf et al., 2024). Studies on developing app features based on student feedback are also needed to improve the quality and appeal of Duolingo as a language learning tool.

This research highlights the importance of considering the social and ethical implications of implementing AI-based technologies such as Duolingo in English language learning. Accessibility of technology is a key issue, especially in areas with limited digital infrastructure, so initiatives are needed to ensure equity in learning for students from different socio-economic backgrounds. In addition, data privacy of students using AI-based applications is crucial; developers must ensure the protection of personal data according to applicable security standards and provide transparency regarding the use of such data. While AI apps have the potential to reduce the education gap by providing flexible and personalized learning experiences, these technologies should be positioned as supporting tools that complement traditional learning methods, rather than replacing the role of teachers in creating meaningful learning experiences.

D. CONCLUSION

This research shows that the application of Duolingo, as an artificial intelligence-based learning application, is effective in improving students' English language skills, particularly in terms of vocabulary acquisition and speaking skills. Interview and observation results reveal that consistent use of the app provides an interactive learning experience and supports student motivation. Further analysis of questionnaire data confirmed students' enthusiasm for technology-based learning, their positive perceptions of the app's effectiveness, and increased learning engagement and motivation. However, students also recognized the advantages and disadvantages of the app, suggesting that Duolingo is more suitable as a supportive tool that complements traditional learning methods. Overall, this study makes a

significant contribution to the literature supporting the use of AI-based technologies in education, while highlighting the potential application of Duolingo in a formal education context.

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