

INTEGRATING AI-DRIVEN VOCABULARY GAMES FROM DUOLINGO TO SUPPORT BASIS WRITING INSTRUCTION IN THE EFL CLASSROOM

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Abstract

This study examined the efficacy of using the artificial intelligence (AI) program Duolingo in writing teaching for English as a Foreign Language (EFL), with a focus on enhancing students' descriptive text writing skills. The study addressed students' poor writing skills and limited vocabulary, which often made it difficult for them to articulate concepts effectively. This study's primary goal was to investigate how using Duolingo could improve students' writing abilities, their educational experiences, and teachers' opinions of its use. This study used a Classroom Action Research (CAR) design and a mixed methods approach with a qualitative predominance. While qualitative data were collected through teacher interviews and classroom observations, quantitative data were collected through writing assessments (descriptive texts). The study's findings demonstrated that utilising Duolingo greatly enhanced students' performance, especially in vocabulary, sentence structure, and text usage. After using Duolingo to write, students were more motivated, eager, and self-aware, according to a qualitative data, while teachers reported higher classroom involvement and learning efficacy. In conclusion, Duolingo was a useful tool that helped students build their vocabulary and improve their writing skills when it was methodically incorporated into writing instruction. By offering a workable methodology for incorporating AI-based apps into classroom learning, this study contributed to the field of EFL teaching. To further corroborate these findings, future studies should investigate other text genres and employ various research designs.

Keywords— Artificial Intelligence, Basis Writing Skills, Classroom Action Research, Duolingo, EFL Classroom, Mixed Method, Vocabulary Learning

Introduction

The use of artificial intelligence (AI)-based language learning programs has significantly increased globally, according to advances. More than 500 million people use language-learning apps like Duolingo, Kahoot, Quizlet, and Memrise globally, according to edtech industry reports. These apps have AI algorithms that can modify difficulty levels, give immediate feedback, and repeat vocabulary based on user behaviour (Mohammed & Jesudas, 2025). This phenomenon represents a paradigm change in language learning, moving away from teacher-centered instruction and toward learner-centred, technology-enhanced instruction. This tendency is consistent with Indonesia's Merdeka Belajar strategy and school digital transformation, which promote the use of technology in formal education (Elida et al., 2025).

However, learning English as a foreign language (EFL) still faces serious challenges, especially in productive skills such as writing (Gamal & Daud, 2025a; Yu, 2025). Various studies have shown that limited productive vocabulary is a major factor in the low quality of students' writing, both in terms of idea coherence, lexical accuracy, and grammatical complexity (Sumanding et al., 2024). Writing in a foreign language is not simply a mechanical activity, but a complex cognitive process that involves processing written and spoken language, and the systematic organisation of ideas. Therefore, learning innovations that can strengthen understanding in a contextual and constructive manner are urgently needed in the EFL context (Seddik, 2025).

The problems with EFL instruction are not just language-related, they also involve with student participation and motivation. Traditional methods, including word memorisation and tedious writing assignments, frequently produce a less interesting learning environment (Laksanasut, 2025). This circumstance emphasises the requirement for more captivating strategies created especially to address the traits of the digital generation. Gamification is one such method that has evolved into an instructional technique that improves students' motivation, engagement, and language retention. By incorporating elements such as points, levels, challenges, and immediate feedback, especially when integrated with AI systems that adapt to individual learners' needs, gamification offers a more personalised and effective learning experience (Salmanova, 2025). Despite being a popular tool for learning grammar and vocabulary, Duolingo's integrated writing practice is still quite limited. In reality, Duolingo is more commonly used on its own or as extra practice, without a direct educational link to the objectives of writing instruction in the classroom (Asmar et al., 2025).

(Castro & Moreno, 2024) reported that gamification and AI integration in language instruction had a positive impact on students' reading comprehension and motivation, but there were still few that specifically linked them to basic writing skills in formal EFL contexts. Learning German Vocabulary Through Game-Based Learning and Gamification in the Liletrad Journal used a quasi-experimental design and demonstrated a significant increase in retention of vocabulary and learning motivation, but they did not reduce the transfer of vocabulary to writing. According to (Abdalkader, 2023), an experiment on the impact of AI on EFL students' self-regulation and fluency yielded positive results, but it did not thoroughly examine the learning process. (Rouabhia & Kheder, 2024) suggested that using Duolingo can improve students' writing skills, but they did not systematically link this to the production of written texts in formal education.

Other research showed a strong correlation between vocabulary proficiency and writing quality, although it did not yet integrate AI technology in a pedagogical way. According to (Gamal & Daud, 2025), there is a strong positive correlation between vocabulary and writing skills; however, the study's findings are unbiased without the use of technological interventions. According to (Yu, 2025), adaptive AI tools increase students' productivity through quantitative experiments, but they are not integrated into written curricula. (Seddik, 2025; Zhao, 2025) used mixed approaches to examine students' attitudes and behaviours about AI, but their main focus was on general motivation and perception rather than on the improvement of basic writing skills in a structured manner.

The main gaps identified are the lack of research directly testing vocabulary transfer from an AI platform to written text production in formal classes and the lack of studies that combine quantitative and qualitative data in a balanced manner. Furthermore, quantitative trials have been the predominant methodological approach in earlier research, which makes them less suited to capturing the dynamics of the learning process and the pedagogical difficulties teachers encounter when incorporating AI into writing instruction. There is currently very little mixed methods research in this area that combines quantitative and qualitative data. Consequently, there is still a lack of a comprehensive understanding regarding the efficacy and educational implications of AI-based vocabulary games (Phanwiriyarat et al., 2025). Based on this observation, research is needed that not only quantifies the increase in writing skills data statistically, but also investigates how students experience and improve their learning process through AI-based games. In addition to providing a more comprehensive and humanistic analysis, mixed methods research can also

yield a contextualised pedagogical model for integrating Duolingo into EFL classroom instruction. Based on these considerations, this study addresses the following research questions:

1. Does the integration of AI-driven vocabulary games from Duolingo have a significant impact on the improvement of EFL students' writing quality, particularly in terms of vocabulary and sentence structure?
2. How do EFL students perceive the use of AI-driven vocabulary games from Duolingo in supporting their writing activities?

Research Method

This study utilises a mixed-methods, embedded explanatory design, emphasising qualitative aspects, with quantitative data supporting the qualitative findings. This approach is applicable to AI integration in EFL learning, enabling statistical analysis of writing performance improvements and deeper insight into student experiences. Quantitative data are collected through writing tests, which support Classroom Action Research to progressively observe changes in students' writing skills, while qualitative data are derived from students' observations and teacher interviews. Data integration occurs during the interpretation phase to investigate the impact of AI-based vocabulary games on writing learning (Creswell & Clark, 2017). This study examines 8th-grade students at an SMP/MTs Negeri 7 in Medan enrolled in English as a Foreign Language (EFL) instruction. Participants are characterised by their high writing proficiency, familiarity with descriptive texts, access to the Duolingo application, and lack of prior exposure to systematic AI integration in curricula. It highlights the initial disparity between their writing abilities and receptiveness.

The research tools used include a writing test, a classroom observation tool, and semi-structured interviews. Writing tests are used to assess students' ability to write descriptive texts against several criteria, including vocabulary, grammar, organisation, and mechanics. Observation sheets are used to assess students' activities during class, including participation level, involvement, and vocabulary use. Furthermore, the interview is used to gather information from teachers on the effectiveness of Duolingo and the challenges students encounter during the learning process. The goal of using diverse instruments is to ensure that the data collected is valid and reliable (Creswell & Creswell, 2017).

Data collection is conducted through three main techniques. First, a writing assessment is conducted to measure students' ability to write descriptive texts across three stages: pre-research, during the research (Cycle I), and at the end of the research (Cycle II). This assessment evaluates students' performance in terms of vocabulary, grammar, organisation, and mechanics. Second, classroom observation is conducted during the learning process to examine students' participation, involvement, activities, and responses when using Duolingo. This observation provides insight into classroom dynamics and how students apply vocabulary in writing activities. Third, teacher interviews are conducted in a semi-structured manner to explore teachers' perceptions of Duolingo, the effectiveness of instruction, and the difficulties encountered in implementing writing instruction. Qualitative data are analysed using thematic analysis, including data reduction, coding, theme categorisation, theme review, and conclusion drawing (Braun & Clarke, 2012). This analysis focuses on key aspects, including student experience, learning difficulties, and the impact of using Duolingo on writing skills. Meanwhile, quantitative data are analysed using descriptive statistics to examine average writing scores at each stage (pre-research, Cycle I, and Cycle II) in order to identify improvements in students' writing ability.

Vocabulary, grammar, organisation, and mechanics are the four main components that are emphasised in the descriptive text at each stage of the study. Grammar focuses on the structural accuracy of words used to express ideas, while vocabulary emphasises the accuracy and variety of words students use. While mechanics emphasises the use of punctuation, spelling, and writing in accordance, organisation focus on the integration and clarity of the flow of the ideas in a paragraph. In the context of qualitative analysis, these aspects are also analysed using thematic analysis (Braun & Clarke, 2012), in which students' writing data is analysed, categorised, and directed toward specific themes such as vocabulary, improving sentence structure, and strengthening writing coherence. As a result, writing evaluation is not only quantitative, using

scores, but also qualitative, identifying patterns and changes in students' abilities in greater depth.

Results and Discussion

Result

This study was conducted in one classroom consisting of approximately 30 students with varying levels of ability, focusing on improving students' ability to write descriptive texts through the integration of Duolingo in Classroom Action Research. The findings indicate that the use of Duolingo, combined with changes in teaching style, can improve students' writing performance, enhance their understanding of language structure, and increase learning engagement, particularly among students with lower proficiency.

Writing Test Result

The pre-observation results showed that students' ability to write descriptive texts was still limited. The main problem was a lack of vocabulary, which made it difficult for students to describe objects clearly and coherently. In addition, students tended to be passive and lacked confidence. The pre-test results confirmed this condition. The average score was 62, with the highest score of 80 and the lowest score of 45, indicating that most students were still in the low category. After using Duolingo in Cycle I, students' writing skills improved, particularly in vocabulary and topic. However, the progress was not fairly distributed, as some pupils continued to struggle with grammar and thought structuring. Students' writing skills improved dramatically in Cycle II, following a more methodical integration of Duolingo into the instructional strategy. Students demonstrated higher language use, clearer idea formulation, and better organisation. This suggests that merging AI-based word games with adaptive teaching methodologies can help students improve their writing skills.

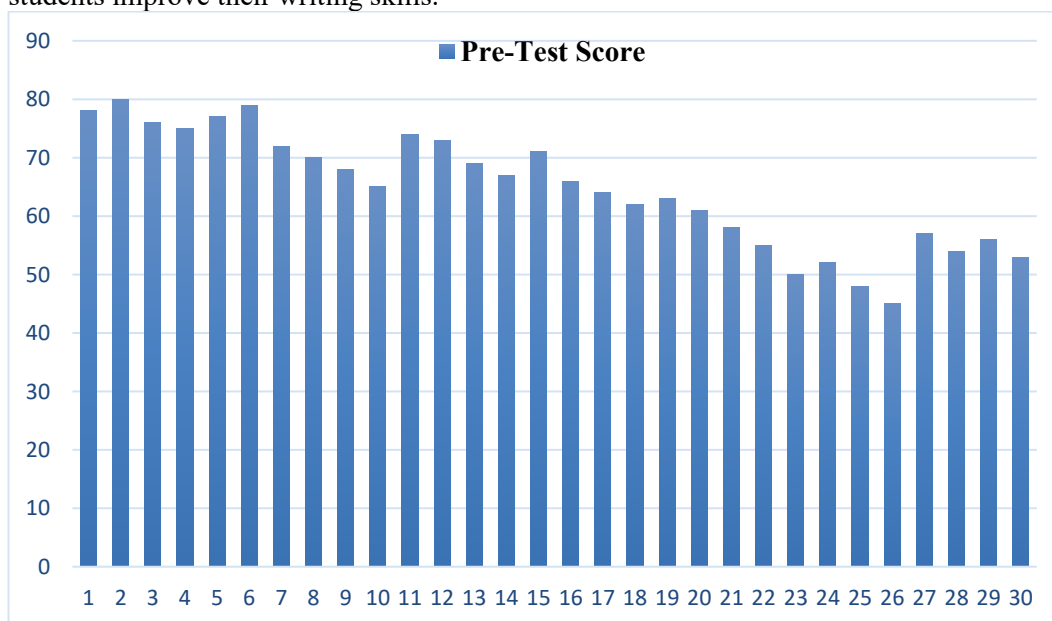


Figure 1. Students' Pre-Test Scores

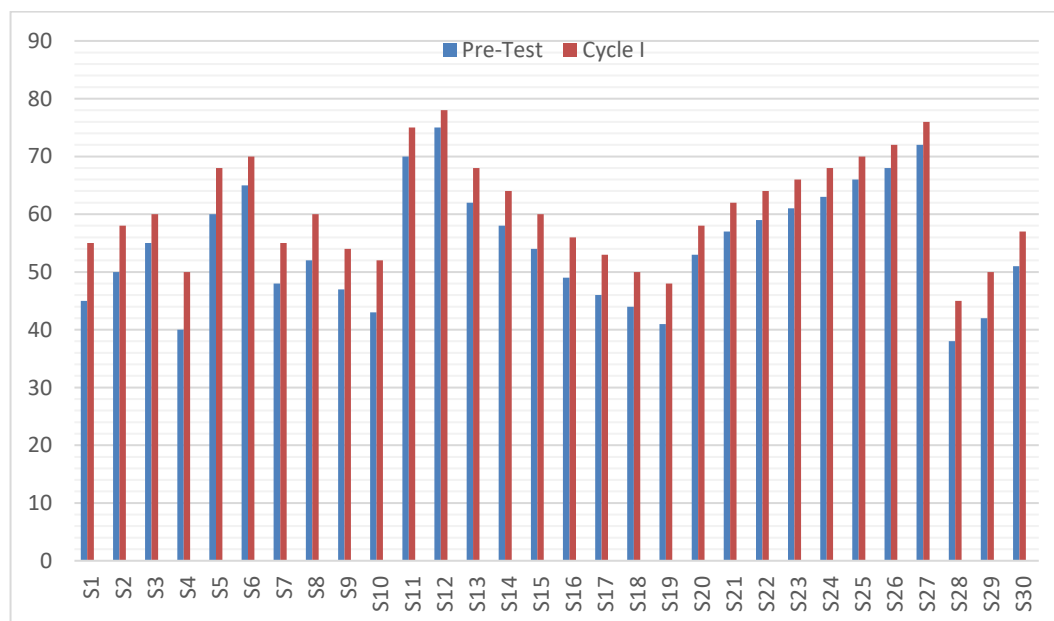


Figure 2. Comparison between Pre-Test and Cycle I Scores

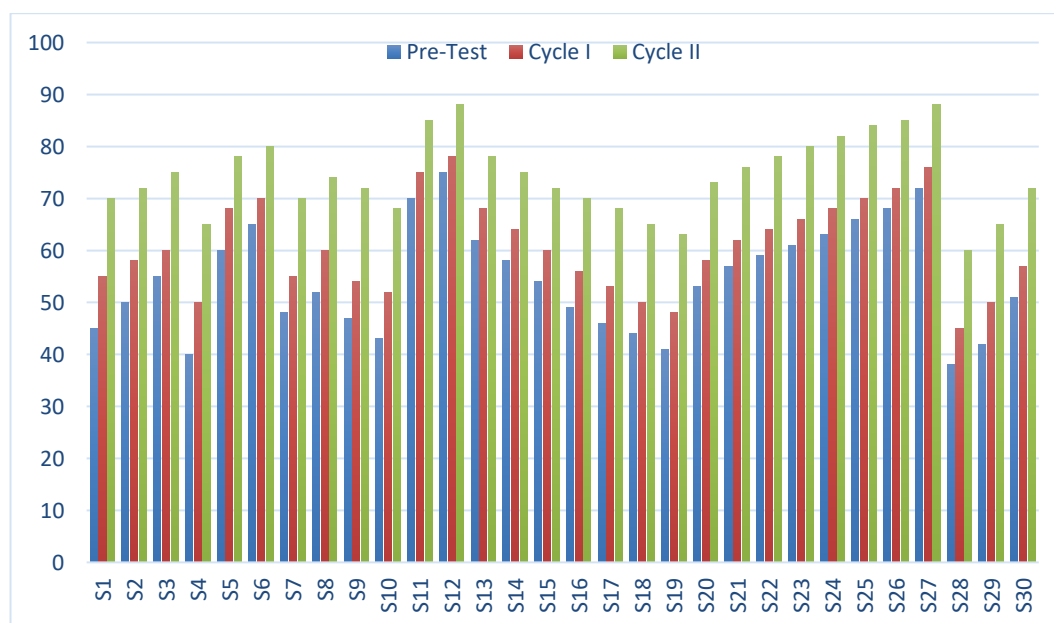


Figure 3. Improvement of Students' Scores from Pre-Test to Cycle II

Student Observation

Based on classroom observations, students' behaviour changed gradually throughout the research process. In the pre-test phase, students were passive and lacked confidence. During Cycle I, students began to engage in the learning process, especially when using Duolingo. In Cycle II, students became more active, confident, and independent in writing activities.

Table 1. Student Observation Results

No	Aspect Observed	Indicators	Pre-test	Cycle I	Cycle II	Notes
1	Participation	Student participates in writing activity	2	3	4	Initially passive, became more active in Cycle II
2	Confidence	Student shows confidence in writing	1	3	5	Started to write with less hesitation
3	Attention	Student pays attention to teacher	2	3	5	More focused during Duolingo activities
4	Vocabulary Use	Student uses appropriate vocabulary	1	2	4	Vocabulary improved gradually
5	Understanding	Student understands descriptive text	2	3	4	Better understanding of text structure
6	Use of Duolingo	Student can use Duolingo properly	1	3	4	Initially confused, later more independent
7	Independence	Student works independently	1	3	4	Less dependent on teacher in Cycle II
8	Collaboration	Student interacts with peers	2	4	5	Some improvement, but still limited

These findings indicate that students experienced behavioural and learning improvement throughout the research process. Differences between students with varying skill levels were also revealed by the observation data. High-ability students showed consistent progress, especially in sentence construction and vocabulary. Students with medium ability demonstrated notable progress in concept organisation and comprehension of descriptive text structure. While their growth was still in its early stages, students with poor ability made the greatest gains, particularly in fundamental vocabulary and simple sentence structure.

In addition, the teacher interview provided deeper insight into students' development during the implementation of Duolingo. Before the research was conducted, the teacher stated that students' writing ability was still low, particularly in vocabulary and grammar, and they lacked confidence in writing. The teacher also stated that Duolingo was effective in helping students understand vocabulary and sentence structure gradually, although teacher guidance remained essential to achieve optimal results.

Table 2. Transcript Teachers' Interview

R: Good morning, Ma'am. I would like to ask about your opinion regarding students' writing ability before this research was conducted. How was their ability at that time?

T: Good morning. Well, before the research, most of the students still had low ability in writing. They found it difficult to make even simple sentences. Many of them were not confident, and they were afraid of making mistakes.

R: What were the main difficulties faced by students in writing descriptive text?

T: The main problem was vocabulary. They didn't have enough words to express their ideas. Besides that, grammar was also an issue. Even when they had ideas, they didn't know how to arrange them into correct sentences. So their writing was often incomplete or unclear.

R: After implementing Duolingo in the classroom, what changes did you notice in the learning process?

T: I noticed that students became more interested in learning. When they used Duolingo, they looked more engaged because it felt like playing a game. It helped them learn new vocabulary more easily, and they started to understand basic sentence patterns through repetition.

R: Did you observe any changes in students' behavior during the research?

T: Yes, there were noticeable changes. At first, they were passive and quiet. But during Cycle I, some students started to participate more. By Cycle II, many of them became more active and confident. Even students who were usually quiet began to try writing and asking questions.

R: In your opinion, is this method effective for improving students' writing ability? Why?

T: I think it is quite effective, especially for students who have low ability. Duolingo helps them build vocabulary step by step, and the repetition makes them more familiar with sentence structures. However, the teacher's role is still important to guide them and explain the material more clearly.

Discussion

The data show that students' writing skills improved between the pre-test and Cycle II, particularly in vocabulary and subject growth. This shows that pupils were more effective at generating ideas and expressing them clearly in descriptive texts. This is compatible with the view that writing has several components, including vocabulary, grammar, organization, and mechanics. Furthermore, the findings emphasise the importance of teaching practices in promoting technological integration. The improvement seen in Cycle II was affected not only by the usage of Duolingo, but also by modifications in teaching approach like as guided practice, individual feedback, and student-centered learning. This supports the scaffolding principle, in which pupils are gradually coached until they can complete activities independently. Furthermore, the use of Duolingo as a digital learning medium increased students' motivation and engagement. Through AI-driven vocabulary games, students were able to learn vocabulary interactively and repeatedly, which helped them understand basic sentence structures. This reflects the concept of autonomous and interactive learning, where students actively participate in their own learning process. Overall, the integration of AI-based vocabulary games from Duolingo, combined with appropriate teaching strategies, can improve students' writing performance, motivation, and participation in the EFL classroom.

Conclusion

Based on the research findings, it can be concluded that using AI-driven vocabulary games through Duolingo effectively increases EFL students' proficiency in fundamental writing, as evidenced by the improvement in students' writing ability from pre-observation to pre-test and a more significant increase in the post-test, particularly in vocabulary, grammar, and organisation, along with a quantitative increase in writing scores. This improvement indicates that students are able to develop their ideas more clearly and use language more appropriately in descriptive texts.

In addition, students also showed improvements in their attitudes towards learning, including greater motivation, engagement, and self-confidence in writing in English throughout the learning process. Theoretically, these findings support the concept of gamification and AI-based education in enhancing student engagement and learning outcomes, while practically Duolingo can be used as an alternative learning tool in EFL classrooms to support the development of writing skills in a more interactive and adaptive way. Furthermore, the results of this study provide prospects for further research to apply different research methods, such as experimental or longitudinal designs, explore various text types including narrative and argumentative writing, and consider other factors such as student motivation and engagement to further develop the implementation of AI-based learning in language education.

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