

Improving Student Vocabulary Mastery Through Application Duolingo Game At Second Semester Universitas Muhammadiyah Sidenreng Rappang

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ARTICLE INFO ABSTRACT

*Keywords: Duolingo,
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This study investigated the effectiveness of the Duolingo application in improving the vocabulary mastery of second-semester students at Universitas Muhammadiyah Sidenreng Rappang. Vocabulary is an essential component of English language learning because adequate vocabulary knowledge supports students' ability to understand and use English effectively. The study involved 28 second-semester students and employed vocabulary tests consisting of a pre-test and a post-test to measure students' achievement before and after the implementation of Duolingo as a learning medium. The students received learning activities using the Duolingo application, while the collected data were analyzed using descriptive and inferential statistics. The findings revealed a substantial improvement in students' vocabulary mastery. The students' mean score increased from 50.17 in the pre-test to 81.60 in the post-test, while the standard deviations were 7.51 and 6.94, respectively. Furthermore, the statistical analysis showed a p-value of 0.00, which was lower than the significance level of 0.05. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted, indicating a statistically significant improvement in students' vocabulary mastery after the treatment. These findings demonstrate that the Duolingo application can serve as an effective technology-based learning medium for improving students' English vocabulary mastery. Its interactive and game-based activities provide students with opportunities to practice vocabulary in a more engaging learning environment. Therefore, Duolingo can be integrated as a supplementary learning tool in English vocabulary instruction at the university level.

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INTRODUCTION

Vocabulary is one of the fundamental components of language learning and plays an essential role in the development of students' English proficiency. Language learners need sufficient vocabulary to understand spoken and written language and to communicate their ideas effectively. Vocabulary knowledge supports the four major language skills: listening, speaking, reading, and writing. Students with adequate vocabulary are generally better able to understand messages, express their thoughts, comprehend texts, and participate in communication. Conversely, limited vocabulary can become a major obstacle to successful English learning. The thesis underlying this study similarly emphasizes that vocabulary mastery contributes to the development of the four English language skills and is necessary for both oral and written communication.

Vocabulary mastery involves more than simply memorizing a list of English words and their Indonesian equivalents. Students need to understand the meanings, pronunciation, spelling, grammatical functions, and appropriate uses of words in different contexts. Vocabulary knowledge therefore develops gradually through repeated exposure and meaningful practice. The source thesis explains that vocabulary mastery can be reflected in students' ability to understand and produce words in their daily language use. It also emphasizes that vocabulary learning includes pronunciation, meaning, spelling, usage, and the grammatical characteristics of words. Consequently, vocabulary instruction should provide students with opportunities not only to recognize new words but also to practice and retrieve them repeatedly.

The importance of vocabulary becomes even more apparent in English as a foreign language (EFL) contexts. Students may have learned grammatical rules but still experience difficulty communicating when they do not possess enough vocabulary. Vocabulary provides the linguistic resources needed to construct sentences, understand information, and communicate meaning. The theoretical discussion in the thesis refers to the well-known principle that while limited grammatical knowledge restricts what learners can say, a lack of vocabulary can prevent meaningful communication altogether. It further explains that vocabulary knowledge contributes to fluency, comprehension, academic achievement, thinking, and communication. These considerations indicate that vocabulary instruction deserves considerable attention in English language teaching.

Despite its importance, vocabulary learning can be challenging for students. Learning a large number of unfamiliar words through conventional classroom activities may become monotonous, particularly when instruction depends heavily on teachers explaining vocabulary and students memorizing words. The thesis identifies this problem by describing vocabulary instruction that primarily relied on the whiteboard, where vocabulary was written and then read together by students. Such activities were considered monotonous and provided limited opportunities for active student participation. Consequently, students' vocabulary learning outcomes remained unsatisfactory. This condition suggests a need for instructional media that can increase students' participation while providing meaningful and repeated vocabulary practice.

One potential solution is the integration of digital technology into vocabulary instruction. Technology-based learning allows students to interact with learning materials in ways that may differ from traditional classroom instruction. Digital applications can provide exercises involving text, sound, images, repetition, immediate responses, and game-like activities. In vocabulary learning, these features are particularly relevant because students need repeated exposure to words and opportunities to recognize and use them. The thesis itself highlights the role of instructional media in bridging students' understanding and making vocabulary learning more interesting and active. Thus, the appropriate use of digital learning applications may support teachers in creating a more engaging environment for vocabulary learning.

One application that can be used for this purpose is Duolingo. Duolingo is a digital language-learning platform that provides various activities for language practice. The thesis

describes Duolingo as an application that can be accessed through digital devices and used to facilitate foreign-language learning. More specifically, its learning activities include exercises such as guessing pictures, connecting words, constructing sentences, translation, dictation, and pronunciation practice. These activities can provide students with different forms of exposure to English vocabulary instead of requiring them to learn vocabulary exclusively through conventional memorization.

The game-like characteristics of Duolingo are also relevant to vocabulary learning. Students can interact with exercises, receive feedback, and progress through learning activities. The thesis explains that users can obtain experience points while completing language-learning activities and that the application incorporates structured lessons and practice. From an instructional perspective, these characteristics may encourage students to participate actively in the learning process. Vocabulary practice can therefore become an activity in which learners respond to tasks, recognize words, connect forms with meanings, and repeatedly encounter previously learned vocabulary.

Another relevant characteristic of Duolingo is its support for vocabulary monitoring and practice. According to the thesis, learners can view words encountered during lessons, observe their previous practice, practice words individually, and see examples of words used in sentences. Such features are consistent with the principle that vocabulary development requires repeated encounters with words. Rather than encountering a new word only once, students can return to previously studied vocabulary and strengthen their understanding through additional exercises. For university students, this flexibility can extend vocabulary learning beyond the limitations of classroom time.

The use of game-based activities for vocabulary instruction also has support within the previous studies reviewed in the thesis. Earlier research discussed in the document reported improvements in vocabulary learning through puzzles, crossword games, bingo, and anagram games. For example, the reviewed studies indicated that game-oriented vocabulary activities could contribute to vocabulary achievement and, in some cases, increase students' interest and motivation. Another study summarized in the thesis reported an increase from a mean pre-test score of 55.45 to 81.21 in the first post-test and 87.09 in the second-cycle post-test after the implementation of anagram games. These findings provided a rationale for investigating a digital game-based application such as Duolingo in vocabulary instruction.

Within the context of Universitas Muhammadiyah Sidenreng Rappang, the vocabulary mastery of second-semester students constituted the central concern of this research. The population consisted of 28 second-semester students in the 2019–2020 academic year, all of whom were included in the research sample. The study focused on whether the use of the Duolingo application could contribute to improvement in their English vocabulary mastery. This focus is important because students in an English-learning environment require sufficient vocabulary to support their subsequent development in more complex language skills.

Based on these considerations, integrating Duolingo into vocabulary instruction represents an attempt to combine language learning with accessible digital technology and game-based activities. The application offers students opportunities to encounter vocabulary through different exercises and to practice words repeatedly in an interactive environment. Nevertheless, the effectiveness of an instructional medium should be demonstrated through empirical evidence rather than assumed solely from its technological features. Therefore, it was necessary to examine students' vocabulary achievement before and after learning through the Duolingo application.

Accordingly, this study, entitled "Improving Student Vocabulary Mastery through Application Duolingo Game at Second Semester Universitas Muhammadiyah Sidenreng Rappang," aims to determine whether the use of the Duolingo application improves the vocabulary mastery of second-semester students at Universitas Muhammadiyah Sidenreng Rappang. The original research objective specifically emphasizes determining the use of an

Android-based application for improving the English vocabulary skills of second-semester students. By comparing students' vocabulary achievement before and after the implementation of Duolingo, this research is expected to provide empirical evidence concerning its potential as a technology-based medium for vocabulary instruction and contribute to the development of more interactive approaches to English language learning at the university level.

LITERATURE REVIEW

Vocabulary is one of the fundamental components of language learning because it provides the words learners need to understand and communicate meaning. Vocabulary is not merely a collection of isolated words but an essential part of the language system. Adequate vocabulary knowledge enables learners to comprehend spoken and written texts and to express their ideas effectively. It also supports the development of the four major language skills: listening, speaking, reading, and writing. Therefore, vocabulary mastery is an important foundation for achieving proficiency in English.

Vocabulary can be categorized according to how words are understood and used. One common classification distinguishes between productive and receptive vocabulary. Productive vocabulary refers to words that learners can actively use when speaking or writing, whereas receptive vocabulary consists of words that learners can recognize and understand when listening or reading. Vocabulary can also be classified into listening, speaking, reading, and writing vocabulary according to the language skill in which the words are employed. These classifications indicate that vocabulary mastery involves both understanding words and being able to use them appropriately in communication.

Vocabulary mastery is more complex than simply memorizing word meanings. Learners need to understand various aspects of a word, including its pronunciation, spelling, meaning, grammatical function, and appropriate use in context. Vocabulary mastery can therefore be understood as learners' ability to recognize, understand, recall, and appropriately use words in both receptive and productive language activities. It develops gradually as learners repeatedly encounter and practice words in meaningful contexts.

The Importance of Vocabulary in English Learning

Vocabulary plays a central role in English language learning. Without sufficient vocabulary, students may experience difficulty understanding texts, following conversations, communicating ideas, or producing meaningful written sentences. Vocabulary knowledge is closely connected with language comprehension and production. Learners with a broader vocabulary have greater linguistic resources for expressing their thoughts and interpreting information conveyed by others.

Vocabulary mastery also contributes to fluency and comprehension. Students who recognize more words can generally process language more efficiently because they do not need to stop frequently to determine the meaning of unfamiliar vocabulary. In speaking and writing, adequate vocabulary provides learners with more options for communicating ideas accurately and appropriately. Consequently, improving vocabulary mastery can contribute to students' overall English language development.

Vocabulary learning requires continuous practice and repeated exposure. Encountering a word only once may not be sufficient for students to retain and use it effectively. Students need opportunities to encounter words repeatedly, understand their meanings, recognize their forms, and use them in different contexts. Effective vocabulary instruction should therefore provide systematic activities that encourage repetition, retrieval, and meaningful application of newly learned words.

Duolingo as a Language-Learning Application

The development of digital technology has provided new possibilities for language teaching and learning. One digital platform that can be used to facilitate vocabulary learning is

Duolingo. Duolingo is a language-learning application developed by Luis von Ahn and Severin Hacker. It provides language-learning activities through web-based and mobile platforms and allows learners to practice a foreign language through various interactive exercises.

Duolingo provides several types of language activities that can support vocabulary development. These include guessing pictures, connecting words, constructing sentences, translation, dictation, and pronunciation exercises. Through these activities, students are exposed to vocabulary in different forms and contexts. The variety of exercises may help learners establish connections between word forms, meanings, pronunciation, and usage.

Another important characteristic of Duolingo is its game-based learning system. Learners complete lessons and exercises while obtaining experience points and progressing through learning activities. Game-based elements can make vocabulary practice more interactive because students are required to respond directly to tasks rather than passively receive information. Such activities can potentially encourage students to spend more time practicing vocabulary.

Duolingo also enables learners to practice previously encountered words. Students can review vocabulary, complete exercises, and encounter words in sentences. Repeated exposure is particularly important in vocabulary acquisition because learners need multiple encounters with words before those words become firmly established in their memory. Thus, Duolingo can function as a supplementary learning medium that provides opportunities for vocabulary practice both inside and outside the classroom.

Game-Based Learning in Vocabulary Instruction

Game-based learning has been widely employed as an alternative approach to vocabulary instruction. Games can create opportunities for students to identify, recall, match, arrange, and use vocabulary while completing specific tasks. Such activities can transform vocabulary practice from repetitive memorization into a more participatory learning process.

Previous research has demonstrated the potential contribution of games to vocabulary development. Sulistyowati (2012), for example, investigated the use of puzzles for improving students' vocabulary mastery and reported improvement in students' vocabulary achievement. Purba (2013) examined crossword games in vocabulary instruction and found that vocabulary learning through crossword activities produced positive results. Jauhari (2015) also investigated bingo-game techniques and reported improvement in students' vocabulary mastery.

Similarly, Rosada (2016) investigated the implementation of anagram games in vocabulary instruction. The results showed an increase in students' mean scores from 55.45 in the pre-test to 81.21 in the first post-test and 87.09 in the second-cycle post-test. The findings also indicated increased student interest and motivation during vocabulary learning. These studies suggest that game-based activities can provide useful opportunities for learners to practice and reinforce vocabulary.

Conceptual Framework

The conceptual framework of this study consists of three interconnected stages: input, process, and output. The input refers to students' initial vocabulary knowledge before the implementation of the learning treatment. The process refers to vocabulary instruction through the Duolingo application, while the output refers to students' vocabulary mastery after participating in the learning activities.

The study involves two main variables. The independent variable is the use of the Duolingo application, while the dependent variable is students' vocabulary mastery. Students initially complete a pre-test to determine their vocabulary ability before treatment. They then participate in vocabulary-learning activities using Duolingo and subsequently complete a post-test.

The theoretical assumption underlying this framework is that repeated and interactive vocabulary practice through Duolingo can contribute to students' vocabulary development. By providing various exercises and game-based learning activities, Duolingo gives students opportunities to encounter, recognize, recall, and practice English words. Therefore, the present

study examines whether the implementation of Duolingo can significantly improve the vocabulary mastery of second-semester students at Universitas Muhammadiyah Sidenreng Rappang.

METHOD

Research Design

This study employed a quantitative research approach to investigate the improvement of students' vocabulary mastery through the use of the Duolingo application. The study compared students' vocabulary achievement before and after the implementation of Duolingo as a learning medium. The independent variable was the use of the Duolingo application, while the dependent variable was students' vocabulary mastery. The research procedure involved administering a pre-test, providing vocabulary-learning treatment through Duolingo, and administering a post-test. The difference between the students' pre-test and post-test scores was analyzed to determine whether the use of Duolingo contributed to a significant improvement in vocabulary mastery.

Population and Sample

The population of this study consisted of second-semester students at Universitas Muhammadiyah Sidenreng Rappang in the 2019–2020 academic year. The population consisted of one class with a total of 28 students. All students were involved as the research sample. The participants consisted of 23 female students and 5 male students.

The inclusion of all students in the class enabled the study to obtain data representing the vocabulary achievement of the second-semester students involved in the learning process.

Research Instruments

The instruments used to collect the data were a vocabulary mastery test and a questionnaire. The vocabulary mastery test was administered twice: before and after the implementation of Duolingo. The pre-test was used to determine students' initial vocabulary mastery, whereas the post-test was administered to identify their vocabulary achievement after receiving the treatment.

The vocabulary test consisted of 25 questions and was completed within 60 minutes. The test contained ten multiple-choice questions, ten sentence-arrangement questions, and five picture-based questions. These items were used to measure students' ability to recognize, understand, and apply English vocabulary.

A questionnaire was also administered after the treatment to obtain information about students' responses toward vocabulary learning through Duolingo. The questionnaire consisted of 20 statements, comprising ten positive and ten negative statements. Five response alternatives were provided: Strongly Agree, Agree, Not Sure, Disagree, and Strongly Disagree.

Data Collection Procedure

The data collection procedure consisted of four stages: pre-test, treatment, post-test, and questionnaire administration.

First, the pre-test was administered to identify students' vocabulary mastery before the implementation of Duolingo. The results of the pre-test provided baseline data concerning students' initial vocabulary achievement.

Second, students participated in vocabulary-learning activities using the Duolingo application. The treatment was conducted over four meetings. During the learning activities, students were introduced to the application and provided with instructions for completing vocabulary exercises. The learning process included motivation, explanation of learning procedures, presentation of vocabulary materials, practice activities, and opportunities for students to ask questions about unfamiliar vocabulary.

Third, after completing the treatment, students were given a post-test. The post-test was intended to determine whether students' vocabulary mastery had improved after participating

in vocabulary-learning activities using Duolingo. The results were then compared with the pre-test scores.

Finally, the questionnaire was distributed after the treatment to collect additional information regarding students' responses to the implementation of Duolingo in vocabulary learning.

Data Analysis

The data obtained from the vocabulary tests were analyzed quantitatively using descriptive and inferential statistical procedures. For the vocabulary test, each correct answer was assigned a score of 1, while each incorrect answer received a score of 0. The raw scores were subsequently converted into a scale ranging from 0 to 100.

The students' vocabulary scores were classified into five achievement categories: Very Good (86–100), Good (71–85), Fair (56–70), Poor (41–55), and Very Poor (≤ 40). Descriptive statistics, including frequency, percentage, mean score, and standard deviation, were used to describe students' vocabulary achievement before and after the treatment.

To determine whether the difference between students' pre-test and post-test scores was statistically significant, a paired-samples statistical test was employed. The level of significance was set at $\alpha = 0.05$. The statistical hypotheses were determined based on the p-value. When the p-value was greater than 0.05, the null hypothesis (H_0) was accepted, indicating no statistically significant difference. In contrast, when the p-value was lower than 0.05, the null hypothesis was rejected and the alternative hypothesis (H_1) was accepted.

The comparison of pre-test and post-test results was used to determine the improvement in students' vocabulary mastery after the implementation of the Duolingo application. This analytical procedure provided quantitative evidence regarding the effectiveness of Duolingo as a technology-based learning medium for vocabulary instruction among second-semester students at Universitas Muhammadiyah Sidenreng Rappang.

RESULT AND DISCUSSION

Results

The results of the study demonstrate changes in the vocabulary mastery of second-semester students at Universitas Muhammadiyah Sidenreng Rappang after the implementation of the Duolingo application. The analysis was based on the students' pre-test and post-test scores. The pre-test represented students' vocabulary mastery before the treatment, whereas the post-test represented their achievement after learning vocabulary through Duolingo.

Students' Vocabulary Achievement in the Pre-Test

Before the implementation of Duolingo, the students generally demonstrated relatively low vocabulary achievement. The distribution of the pre-test scores is presented in Table 1.

Table 1. Distribution of Students' Pre-Test Scores

Classification	Score Range	Frequency	Percentage
Very Good	86–100	0	0%
Good	71–85	0	0%
Fair	56–70	6	22%
Poor	41–55	17	60%
Very Poor	≤ 40	5	18%
Total		28	100%

The results show that 17 students (60%) were classified in the poor category and 5 students (18%) were categorized as very poor. Only 6 students (22%) reached the fair category, while none of the students were categorized as good or very good. These findings indicate that most students had relatively limited vocabulary mastery before the implementation of Duolingo.

Students' Vocabulary Achievement in the Post-Test

After the students participated in vocabulary-learning activities using Duolingo, their post-test results showed a considerable change. Table 2 presents the distribution of the students' post-test scores.

Table 2. Distribution of Students' Post-Test Scores

Classification	Score Range	Frequency	Percentage
Very Good	86–100	5	17%
Good	71–85	20	71%
Fair	56–70	3	12%
Poor	41–55	0	0%
Very Poor	≤40	0	0%
Total		28	100%

The post-test results indicate that 20 students (71%) achieved the good category and 5 students (17%) reached the very good category. The remaining 3 students (12%) were classified as fair. Importantly, no students remained in the poor or very poor categories after the treatment.

The comparison between the pre-test and post-test distributions indicates a clear shift in students' achievement. Before the treatment, 78% of the students were classified as poor or very poor. After the implementation of Duolingo, 88% were classified as good or very good.

Comparison of Mean Scores

The improvement in vocabulary mastery can also be observed from the students' mean scores and standard deviations.

Table 3. Comparison of Pre-Test and Post-Test Scores

Statistical Measure	Pre-Test	Post-Test
Number of Students	28	28
Mean Score	50.17	81.60
Standard Deviation	7.51	6.94
Mean Improvement	—	31.43

The students obtained a mean score of 50.17 in the pre-test. After learning through Duolingo, their mean post-test score increased to 81.60. Thus, the absolute increase in the mean score was 31.43 points.

The standard deviation decreased slightly from 7.51 in the pre-test to 6.94 in the post-test. The combination of a substantially higher mean and a slightly lower standard deviation indicates that the improvement was accompanied by somewhat more consistent scores among the students.

Hypothesis Testing

A paired-samples statistical test was employed to determine whether the difference between the pre-test and post-test scores was statistically significant.

Table 4. Result of Hypothesis Testing

Statistical Indicator	Value
Reported p-value	0.00
Alpha (α)	0.05
Decision	H ₀ Rejected

The reported p-value was 0.00, which was lower than the significance level of 0.05. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted. This result indicates a statistically significant difference between students' vocabulary mastery before and after the implementation of the Duolingo application.

Discussion

The findings demonstrate that students achieved higher vocabulary scores after participating in vocabulary-learning activities through Duolingo. The increase in the mean score from 50.17 to 81.60 provides quantitative evidence of improvement. More importantly, the score distribution changed considerably. Before treatment, most students were concentrated in

the poor and very poor categories. Following the treatment, the majority moved into the good and very good categories.

One possible explanation for this improvement lies in the characteristics of the learning activities provided through Duolingo. Vocabulary learning requires students to encounter words repeatedly and establish connections among their forms, meanings, pronunciation, and contextual use. Duolingo provides activities such as matching words, identifying vocabulary, constructing sentences, translation, and other interactive exercises. Through repeated engagement with such activities, students receive opportunities to retrieve previously encountered vocabulary rather than simply memorize lists of words.

The findings also support the use of game-based activities in vocabulary instruction. Traditional vocabulary instruction may become monotonous when students primarily receive explanations, copy words, and memorize their meanings. In contrast, a game-oriented application requires learners to interact directly with tasks. Students must select answers, recognize words, construct responses, and progress through learning activities. Such interaction provides additional opportunities for active vocabulary practice.

The improvement in the score classifications is particularly noteworthy. In the pre-test, no student achieved the good or very good category. After treatment, 25 of the 28 students were classified as either good or very good. At the same time, the number of students in the poor and very poor categories decreased from 22 students before treatment to zero after treatment. This shift suggests that improvement was not restricted to only a small number of high-achieving students but was reflected across much of the class.

The findings are also consistent with previous studies concerning game-based vocabulary instruction. Sulistyowati (2012) reported that puzzle activities contributed to students' vocabulary development, while Purba (2013) examined crossword games as an alternative approach to vocabulary teaching. Jauhari (2015) similarly reported improvement through bingo-game techniques. Rosada (2016) found an increase in vocabulary achievement through anagram games, with mean scores rising from 55.45 in the pre-test to 81.21 and subsequently 87.09. These previous findings and the present results indicate that incorporating game-oriented activities into vocabulary instruction can provide productive opportunities for vocabulary practice.

Nevertheless, the present findings should be interpreted according to the research design and sample. The study involved 28 students from one second-semester class and compared their achievement before and after the treatment. Because the study did not employ a separate control group, the observed improvement cannot establish that Duolingo alone caused all of the increase in vocabulary achievement. Other learning-related factors during the treatment period may also have contributed to the results. Therefore, the findings primarily demonstrate a significant pre-test–post-test improvement associated with the implementation of Duolingo in this particular group.

Overall, the results indicate that the implementation of Duolingo was associated with substantial improvement in the vocabulary mastery of second-semester students at Universitas Muhammadiyah Sidenreng Rappang. The significant difference between the pre-test and post-test scores, together with the movement from lower to higher achievement categories, supports the use of Duolingo as a supplementary technology-based medium for vocabulary practice. The application can complement classroom instruction by providing interactive and repeated vocabulary-learning activities, while lecturers remain responsible for connecting digital exercises with broader language-learning objectives.

CONCLUSION

This study concludes that the use of the Duolingo application was associated with a significant improvement in students' vocabulary mastery among second-semester students at Universitas Muhammadiyah Sidenreng Rappang. The students' mean score increased

substantially from 50.17 in the pre-test to 81.60 in the post-test, representing an increase of 31.43 points. The distribution of achievement also improved considerably, with most students moving from the poor and very poor categories in the pre-test to the good and very good categories in the post-test.

The statistical analysis further demonstrated a significant difference between students' vocabulary achievement before and after the treatment. The reported p-value of 0.00 was lower than the significance level of 0.05, resulting in the rejection of the null hypothesis and acceptance of the alternative hypothesis. These findings indicate that vocabulary-learning activities through Duolingo provided students with useful opportunities to practice, recognize, recall, and reinforce English vocabulary through interactive and game-based activities.

In conclusion, Duolingo can be used as a supplementary technology-based learning medium for vocabulary instruction at the university level. Its interactive activities can complement classroom teaching and provide students with additional opportunities for vocabulary practice. However, since this study involved only 28 students from one class and did not include a separate control group, further research involving larger samples, longer treatment periods, and experimental and control groups is recommended to provide stronger evidence regarding the effectiveness of Duolingo in improving English vocabulary mastery.

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