

The Effect of Using Duolingo Application as Mobile Assisted Language Learning in Coastal Areas

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Abstract

Vocabulary acquisition plays a fundamental role in language development. This study focuses on comparing the effectiveness of vocabulary learning with and without Duolingo application. Furthermore, the study also aims to identify the most problematic English word class for students in the context of Mobile Assisted Language Learning. This research study employed a quantitative design. The sample of the study is 30 seventh-grade students from class VII-A. The research instruments included vocabulary tests and a questionnaire. The data collection process involved administering the pre-test, followed by the treatment using the Duolingo application, and finally conducting the post-test. The data was analyzed using SPSS 25.0, including N-Gain, normality, and homogeneity tests. The findings showed that the use of Duolingo had a significant positive effect on enhancing students' vocabulary abilities. After utilizing the Duolingo application, the post-test results demonstrated a significant improvement in the students' vocabulary skills. The paired sample t-test further confirmed the effectiveness of Duolingo in enhancing vocabulary proficiency. Moreover, the study also identified adverbs as the most problematic English word class for the students.

Keywords: Effect, Duolingo application, vocabulary skills

Introduction

Vocabulary is crucial to language students because it is central to language. It is the primary emphasis of pupils' English studies. The utilization of English is essential for engaging in social interactions, effective communication, and fostering intellectual growth. (Ardini, 2020). Kridalaksana and Djoko Kentjono (in Chaer, 2014, p. 32) stated that language is a system of sounds and symbols that people use to work together, talk to each other, and identify themselves. People talk to express ideas to others—to get others to understand new facts, answer questions, register pledges, and so on. There are several aspects to learning a language. The most visible component and the first item used in language for communication is vocabulary. Hornby in Lestari (2015) stated that “vocabulary” refers to the total number of words in a person's vocabulary language. It can be defined, caught, and taught as a foreign language word.

In today's rapidly advancing world, technology is experiencing exponential growth, providing ample opportunities to enhance the learning experience with added enjoyment. According to Maysheilla (2021), technology also makes the learning process more varied, and the use of technology can help organize and offer material for learners, as well as help learners and teachers engage at any time and from any location. Choosing the appropriate media can be one of the factors contributing to academic achievement. According to Sanjaya (2013), media is not only an intermediary tool such as objects, but also people as a source of

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learning or activities such as discussions, seminars, field trips, simulations, and others that can be conditioned to provide students with insight, knowledge, and skills. Mehdipour and Zerehkafi (2013) stated that mobile-based education incorporates the learner's ability to move freely, engage with portable technologies, and emphasizes the importance of adapting society and institutions to cater to a growing mobile population. Mobile-based learning is a unique learning experience because students can access learning materials, directions, and applications connected to learning anytime, anywhere (Tamimudin in Mutaqin, 2016). Many mobile applications have educational themes and can be utilized as learning resources. Duolingo is one of them and is currently very well-liked.

The Duolingo application has a foreign language learning system designed for fun learning different languages through the concept of play, which can be accessed for free via a web page or installed on Android (Muslimin, A., & Julaikah, D. I., 2022). Students can use the Duolingo application to play games while learning vocabulary. There are numerous languages available on Duolingo for learners to select, including English, Arabic, Spanish, French, Dutch, and others. Additionally, it offers a forum for educators where people can exchange information as either students or teachers in order to learn.

The application is really easy to use, and the steps and processes are clear. According to Bustillo (2017), Duolingo aspires to be a place where people of all ages, from children to their parents, can learn a new language together. Due to its convenience, Munday (2015) claimed that instead of doing homework or watching the news, people prefer to use Duolingo. This suggests that Duolingo is not only more engaging than other language-learning apps, but also easier to implement in the classroom. Grego and Vesselinov (2012) conducted a study to determine the efficacy of Duolingo for language acquisition. Their study revealed that the students were happy with Duolingo's language learning capabilities and those they loved using it.

This research is supported by several relevant studies previously conducted by Umara (2022), which showed that YouTube is interesting for increasing students' vocabulary because it offers resources for translation from and into English. Students at Surakarta's SMP Muhammadiyah 10 can benefit from using YouTube to expand their vocabulary. According to Niah and Pahmi's study (2019), Junior high school students can benefit from using Duolingo to enhance their speaking and listening skills.

The researcher establishes two research problems. The first research problem addresses the effectiveness of using the Duolingo Application to enhance vocabulary skills among students at SMP N 1 Tambakromo, Kabupaten Pati. In light of the presented background information, the researcher aims to investigate and compare the progress in vocabulary skills among students before and after utilizing the Duolingo Application. The second research problem revolves around identifying the most problematic English word class for students from the perspective of Mobile Assisted Language Learning (MALL). The researcher will focus on four primary word classes in English and investigate the challenges students face while learning them through mobile-assisted methods.

Literature Review

Previous Studies

There are a few researchers who have researched the improvement of speaking skills using few strategies. The first researcher is Pangkuh Ajisoko (2020). This study employed a pre-experimental design with a pre- and post-test structure. 10 students were the sample for this study, and they spent 30 days training with the Duolingo applications at a "regular" intensity

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(20 xp per day). To address the research questions, tests and questionnaires were used as research instruments. His research had a result that there was a considerable improvement in students' scores before and after frequent use of Duolingo. Learners responded positively to the questionnaire results. Learners were more motivated to learn; more skilled because their interest in learning increased; easier to understand the material; and giving all learners a fair chance to practice the material.

The second researchers are Siti Niah and Pahmi (2019). The results indicated that the students in class VIII.1 achieved a speaking ability score of 5.5, which was greater than 2,042, and a listening ability score of 4.48, also surpassing 2,042. Similarly, students in class VIII.2 demonstrated a speaking ability score of 5.17 (> 2.052) and a listening ability score of 5.10 ($> 2,042$). This suggests that the implementation of Duolingo as a tool to enhance speaking and listening abilities among junior high school students was successful.

The third researcher is Nurbaiti Ali (2021). This study took a quantitative method. The primary data analyzed were the students' scores, and a T-Test formula was utilized to examine the results. SPSS 20.0 was employed to ensure data validity. The research findings revealed a significant increase in students' vocabulary proficiency due to the use of Duolingo. This study indicates that Duolingo positively influenced the vocabulary mastery of seventh-grade pupils at MTs PAB 1 Helvetia.

The fourth researcher is Dwi Heriyanto (2015). The data collection involved pre- and post-tests, along with questionnaires. The analysis showed that the group exposed to YouTube clips performed better in the post-test compared to the non-exposed group. These results clearly indicate that YouTube had a statistically significant impact on the students' vocabulary acquisition. Additionally, participants in the study expressed positive views on incorporating YouTube into their classes. The study also revealed a significant improvement in the students' vocabulary achievement.

There are differences in the methods that were used in the previous studies (research gaps). The first difference between this study and the previous study by Siti Niah and Pahmi (2019) is that instead of vocabulary, they used Duolingo as a learning media to improve students' listening and speaking skills. The second difference occurs between this study and the previous study by Nurbaiti Ali (2021). To analyze the data, she used T-Test formula. That was different with this study. This study used N-Gain test, normality test, homogeneity test).

Vocabulary

Vocabulary development is a crucial part of learning any language. The significance of vocabulary in second language acquisition cannot be denied, as a lack of sufficient vocabulary may lead to challenges in understanding others and effectively expressing oneself (Domingo & Aguillon, 2021). Reading ability is closely related to vocabulary knowledge. Furthermore, having a good vocabulary can help you achieve success in school. Vocabulary mastery is the major determinant in explaining diversity in language performance, and by extension, it is the key to understanding how one does in school (Masrai & Milton, 2018, p. 46.). The memorization method is used to master vocabulary in general. However, without the proper strategy, memorization activities frustrate students and cause them to give up before mastering a few tens of words, which is certainly not comparable to the demands for a number of vocabularies that students should master based on their level of education.

What makes up a person's vocabulary is their word knowledge. Alfaki (2015) stated that teaching vocabulary improves students' ability to comprehend and engage in conversation in English. Vocabulary appears to be very crucial; it allows one to express ideas and thoughts

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despite imperfect grammar. According to Sue Hackman in Anggraeni (2019), vocabulary goes beyond mere word lists. While the size of one's vocabulary holds significance, its effective utilization carries greater importance. Students cannot comprehend what they read unless they understand the meaning of the majority of the words. Language users must understand and know the meaning. Furthermore, it derives from both receptive and productive forms. In summary, vocabulary is crucial for effective communication with a diverse group of people and for grasping the meaning of what others say. It is crucial for students to comprehend what they read and study, especially when learning a foreign language.

The fundamental skill essential for acquiring a second language is vocabulary proficiency. Vocabulary knowledge is crucial for effective communication in a second language (Rohmatillah, 2017). Vocabulary serves as a bridge that connects the four language learning skills of English: listening, speaking, reading, and writing. Thornbury (2006) found out that students need a detailed knowledge of vocabulary to master it. This knowledge includes an understanding of meaning, how they speak and write, grammatical behavior, word derivation, collocation, word pitch (both spoken and written), meaning or relevance, and word frequency. In conclusion, vocabulary is the foundation for learning a second language. Wiji (2013) categorized vocabulary into four groups: function word, substitute words, and content words.

Thornbury (2006) emphasized that a comprehensive knowledge of vocabulary is necessary to master a language, including understanding meaning, usage, grammar, collocation, and word frequency. Rahmasiah (2021) categorized vocabulary into different groups, such as function words, substitute words, grammatically determined words, and content words. Viera (2016) suggested that structured procedures, focusing on form and function within a specific context, can enhance vocabulary learning. Developing a strong foundation in frequently used words is essential before progressing to less common vocabulary. According to Ahmad (2022), there are the nine parts of speech in English grammar; noun, pronoun, verb, adjective, adverb, preposition, conjunction, interjection and determiner.

Duolingo Application

According to Teske (2017), Duolingo is an online language learning platform that launched in 2012 and provides courses in 27 different languages. Duolingo is accessible via Android, iOS, or by connecting to the internet on a computer device. The application markets itself as a personal language trainer, promising tailored lessons and game-like exercises to keep users engaged and advance their language skills. The vocabulary learning and self-assessment tools provided by Duolingo help students focus on their weak spots (Guaquet and Castro, 2018). It means that Duolingo is promoted as a classroom resource that can be used to give students an innovative learning experience that is grounded in high-quality materials, helpful advice, and intrinsic motivation.

The Duolingo application displays information in the form of text, audio, and visuals. In the beginning of the English learning journey, students will be exposed to simple material that will gradually increase in difficulty. If the users have completed some subject matter, they can proceed to the next level. Duolingo has a clean and contextually appropriate interface. It elicits a pleasant and enjoyable feeling when used (Sanda & Klimova, 2021). The display is designed in such a way that the text appears dominant in its learning, allowing users to easily understand and read every arrangement of words that appears. One notable feature of Duolingo is its use of spaced repetition algorithms to reinforce learning and enhance long-term memory retention (Kessler, 2021). This adaptive learning method tailors exercises based on the user's performance, ensuring that challenging concepts are revisited until mastery is

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achieved. Additionally, the platform encourages social interaction through a community forum and leaderboard, allowing users to connect with fellow learners, share experiences, and motivate each other to stay committed to their language goals.

According to Sanda & Klimova (2021), the courses contain many topics. Each of these topics can be chosen by the user to test their English skills. If the user selects an animal as the topic, the questions that appear will be related to the animal. The issues that arise are sentence translation, determining the correct pair of sentences, translating spoken words, and pronouncing written words. The lessons are very interactive because users must say the correct words or sentences in English based on the material being studied. If the user mispronounces it, the material will immediately provide feedback in the form of the correct answer. The formulation of sentences for each question is also accompanied by a virtual English voice where users can learn firsthand the correct pronunciation of words in English to improve their English communication skills.

According to Wagner et al. (2015, p. 322), Duolingo features four distinct exercises: vocabulary, listening transcription, sentence completion, and speaking. Since the test is made up of 20 computer-based tasks, the order and number of times each task appears can change based on how the test taker answers.

a. Vocabulary

In the vocabulary section, the test taker is presented with a set of words on the screen and is required to select the correct English words. Completing this task is time-limited, with only one minute allocated for it.

b. Listening Transcription

The purpose of the listening transcription task is to evaluate the test taker's listening ability. They are expected to type out the sentence they hear, typically following a dictation model. The audio can be played up to three times, and the test taker is given one minute to finish the assignment.

c. Sentence Completion

In the sentence completion section, the test taker is presented with a short text consisting of several sentences with five blanks to fill in. They have a choice of eight possible answers and must select the correct ones. This task is akin to a rational close or selected-response task and has a fixed time limit of three minutes for completion.

d. Speaking

The final step involves speaking. The test taker will be prompted with on-screen instructions such as "Speak this sentence." They are required to read the sentence aloud while the microphone icon is clicked 21 times to count the duration. This activity also has a time limit of one minute. Although the Duolingo application includes various task types, this study will focus on analyzing the vocabulary task, which is central to the investigation's objectives.

Method

The methodology of the research follows a quantitative design, which involves the use of statistical procedures to collect and analyze data. This design allows for the testing of hypotheses and the investigation of cause-and-effect relationships between variables (Creswell & Poth, 2017; Tavakol & Sandars, 2014). The research design utilized in this study is a pre-experimental One Group pretest-posttest design. This design involves a pretest before the treatment is administered, allowing for a comparison of the conditions before and after the

treatment. The t-test statistic is used to determine the effectiveness of the treatment (Sugiyono, 2015).

The population of the study consists of 682 students from SMP N 1 Tambakromo, with 359 male students and 323 female students. The sample for this study is comprised of seventh-grade students from class VII-A, with a total of 30 students, including 10 male and 20 female students. The research instruments used in this study are vocabulary tests and a questionnaire. The vocabulary tests, including pre-test and post-test, are used to measure the improvement in vocabulary knowledge. The questionnaire is used to collect additional data based on respondents' answers and is a commonly used and useful device for gathering survey information (Basias & Pollalis, 2018).

The data collection procedure involves a pre-test, treatment using the Duolingo application, post-test, and a questionnaire. The pre-test is conducted before the treatment to assess the students' initial vocabulary knowledge. The treatment involves the use of the Duolingo application. The post-test is administered after the treatment to measure the improvement in vocabulary. The questionnaire collects data related to vocabulary and the use of Duolingo. Data analysis is performed using SPSS 25.0 for Windows. N-Gain, normality, and homogeneity tests are conducted to answer specific problem statements. Miles and Huberman's method is also employed to analyze the data, which includes data collection, condensation, data display, and conclusion drawing/verification (Miles & Huberman, cited in the research).

The hypothesis tested in this study is:

H₀ = There is no significant improvement in the students' vocabulary before and after using the Duolingo application.

H₁ = There is a significant improvement in the students' vocabulary before and after using the Duolingo application.

The criteria for the value of the vocabulary skills of class VII-A students at SMP N 1 Tambakromo are as follows:

Table 1 : Criteria Score

Score	Criteria
0-20	Very less
21-45	Not enough
46-65	Enough
66-80	Good
81-100	Very good

Finding and Discussion

This study provided valuable insights into the effectiveness of the Duolingo application in improving students' vocabulary skills.

1. The Effectiveness and Improvement by using the Duolingo Application through Pre-Test and Post-Test.

In order to know the results of the research, the researcher used two tests consisted of pre-test and post-test. The score of the pre-test is described as follows:

Table 2 : Data Description of the Experimental Class Pre-Test

	N	Minimum	Maximum	Means	std. Deviation
Experimental Class_PreTest	30	50	75	62.33	8,483

Based on the Table 2, it can be concluded that only a small proportion of students in the experimental class were able to surpass the predetermined proficiency level, while the majority fell below the expected threshold. After giving a pre-test in the first meeting, the researcher gave a treatment and post-test to the students. The result can be defined as follows:

Table 3 : Experimental Class Post-Test Criteria

Descriptive Statistics

		Frequency	percent	Valid Percent	Cumulative Percent
Experimental Class	Not Achieved	3	10.0	10.0	10.0
	Achieved	27	90.0	90.0	100.0
	Total	30	100.0	100.0	

Based on the data of the Table 3, it can be observed that 27 students, accounting for 90% of the total, attained scores meeting the minimum passing requirement (KKM). This suggests a positive impact of the Duolingo application on the vocabulary abilities of the majority of students. However, it is noteworthy that there were still 3 students, representing 10% of the class, who did not achieve scores meeting the minimum passing score.

After finding the result of pre-test and post-test score, the researcher calculated the result of significant differences of students' English vocabulary mastery before and after using Duolingo application. The difference comes from the result of pre-test and post-test.

Table 4 : Experimental Class Pre-test Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Experimental Class	50	5	16.7	16.7	16.7
	55	5	16.7	16.7	33.3
	60	5	16.7	16.7	50.0
	65	5	16.7	16.7	66.7
	70	6	20.0	20.0	86.7
	75	4	13.3	13.3	100.0
	Total	30	100.0	100.0	

According to Table 4, the results indicated that among the students in the experimental class, there were 5 students who scored 50, 5 students who scored 55, 5 students who scored 60, 5 students who scored 65, and 6 students who scored 70 on the pre-test. Additionally, there were 4 students who scored 75. In total, 30 students participated in the pre-test assessment.

Table 5 : Experimental Class Post-test Frequency

		frequency	Percent	Valid Percent	Cumulative Percent
Experimental Class	60	1	3.3	3.3	3.3
	70	2	6.7	6.7	10.0
	75	5	16.7	16.7	26.7
	80	5	16.7	16.7	43.3

85	9	30.0	30.0	73.3
90	5	16.7	16.7	90.0
95	2	6.7	6.7	96.7
100	1	3.3	3.3	100.0
Total	30	100.0	100.0	

According to Table 5, it showed that one student scored 60, two students scored 70, five students scored 75, five students scored 80, nine students scored 85, five students scored 90, two students scored 95, and one student scored 100. The average score of the class was 82.67, which falls within the "Very Good" category. These results indicated that the students have surpassed the minimum completeness criteria of the school, which is 75. From the analysis of Tables 4 and 5, it can be concluded that there is a difference in vocabulary skills before and after utilizing the Duolingo application. These conclusions are further supported by the findings from the Paired Sample Test output, as presented below:

Table 6: Paired Samples Test

Pair 1	Paired Differences	Mean s	std. Deviation	std. Error Means	95% Confidence Interval of the Difference		t	f	Sig. (2-tailed)
					Lower	Upper			
PreTest – PostTest		20,333	9,553	1,744	-23,901	16,766	11,658	3,0	.000

The Paired Sample T-Test results, as displayed in Table 6 using SPSS version 25.0, provided evidence to address the hypothesis of this study. In the paired sample t-test, the decision-making criterion is based on the significance value (Sig.) or Sig. (2-tailed). If the Sig. (2-tailed) value is less than 0.05, H₀ is rejected, and H_a is accepted. Conversely, if Sig. (2-tailed) is greater than 0.05, H₀ is accepted, and H_a is rejected. In this case, the Sig. (2-tailed) value was 0.000, which was smaller than 0.05 (0.000 < 0.05). Therefore, H₀ was rejected, and H_a was accepted. This indicated that there is a significant increase in students' vocabulary skills before and after utilizing the Duolingo application. These statistical findings support the conclusion that the use of Duolingo has a positive impact on enhancing the vocabulary proficiency of the students in the experimental class.

2. The Most Problematic English Word Class

Based on the questionnaire responses, the researcher has identified the most problematic English word class according to the students was adverb and the researcher also has classified four main categories that encompass the reasons why students find adverbs to be the most problematic English word class. These categories provided insights into the specific difficulties students encounter and shed light on their perceptions and experiences.

a. Lack of Understanding

Many students find it difficult to identify adverbs, as the concept of what adverbs encompass is not universally understood. This lack of understanding is evident in the statement made by student 7, who mentioned that adverbs are "sulit diidentifikasi" (difficult to identify). Additionally, the similarity in function between adverbs and adjectives often

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leads to confusion. As another student pointed out (student 18), "Karna adverb dan adjective yang hampir sama fungsinya" (Because adverbs and adjectives have similar functions). Students sometimes struggle to differentiate between the two or inadvertently reverse their usage, which further adds to the challenge of grasping the concept of adverbs and effectively incorporating them into their English language skills.

b. Difficulty in Studying

Students mentioned that adverbs provide additional information, particularly about objects and their descriptions, which adds complexity to their comprehension and usage. As student 5 stated, adverbs involve "memberi keterangan tambahan" (providing additional information). The numerous tenses associated with adverbs also pose a challenge, requiring students to navigate the appropriate usage in different contexts. This difficulty is evident in the statement made by student 10, who mentioned that adverbs have "banyak tenses-nya" (many tenses).

c. Limited Examples and Resources

The students express frustration at the scarcity and limitations of examples and resources specifically focused on adverbs. Student 16 stated, "Karena untuk mencari contoh dari adverb masih sangat sedikit dan terbatas" (Because there are very few and limited examples of adverbs). This lack of comprehensive and diverse learning materials hampers their ability to fully comprehend and practice using adverbs effectively.

d. Confusion with other part of speech

The Students mention the similarity between these word classes as a major source of confusion. As student 21 stated, "Kadang terbalik balik dengan adjective" (Because sometimes adverb get mixed up with adjective). Sometimes, students struggle to discern when to use adverbs versus adjectives, resulting in incorrect usage or misinterpretation.

In conclusion, the reasons why students find adverbs to be the most challenging word class in English can be categorized into lack of understanding, difficulty in studying, limited examples and resources, and confusion with other parts of speech. These categories highlight the specific obstacles students encounter and emphasize the importance of tailored instructional approaches, comprehensive learning materials, and targeted support to enhance students' comprehension and proficiency in using adverbs effectively.

Discussion

The findings of the research study conducted on the impact and efficacy of the Duolingo application on students' vocabulary skills at SMP N 1 Tambakromo provided valuable insights into the effectiveness of this language learning tool. The post-test results showed a significant improvement in the vocabulary skills of the students. The scores ranged from a minimum of 60 to a maximum of 100, with an average score of 82.67. This indicates that the majority of the students achieved scores meeting the minimum passing requirement, demonstrating the positive impact of the Duolingo application on their vocabulary abilities. The paired sample t-test confirmed the significant increase in students' vocabulary skills before and after using the Duolingo application.

The research also identified adverbs as the most challenging word class for the students. Several categories were identified to explain the difficulties students encountered with adverbs. These categories included a lack of understanding, difficulty in studying, limited examples and resources, and confusion with other parts of speech. These insights provide valuable information for educators and curriculum developers to tailor instructional approaches and provide targeted support to enhance students' comprehension and proficiency in using adverbs effectively.

Overall, the findings indicated the effectiveness of the Duolingo application in improving students' vocabulary skills. One previous study that aligns with the results of this research is the study conducted by Ajisoko (2020), which also explored the use of the Duolingo application to improve language skills. Although Ajisoko focused on the improvement of speaking skills, while this research focused on vocabulary mastery, both studies demonstrated positive outcomes. On the other hand, the study by Heriyanto (2015) presented different findings compared to this research. While Heriyanto (2015) investigated the use of YouTube videos to improve vocabulary acquisition, this research focused on the effectiveness of the Duolingo application. The methodologies and tools used in these studies were also different. However, both studies aimed to enhance language learning through the use of technology.

Conclusion

In conclusion, the research study conducted at SMP N 1 Tambakromo provided valuable insights into the impact and efficacy of the Duolingo application on students' vocabulary skills. The findings revealed that the use of Duolingo had a significant positive effect on enhancing students' vocabulary abilities. The pre-test results indicated that the students' vocabulary skills were below the expected level, with the majority not meeting the minimum competency criteria. However, after utilizing the Duolingo application, the post-test results demonstrated a significant improvement in the students' vocabulary skills, with the majority of students achieving scores meeting the minimum passing requirement. The paired sample t-test further confirmed the effectiveness of Duolingo in enhancing vocabulary proficiency.

Moreover, the study identified adverbs as the most problematic English word class for the students. The challenges students encountered with adverbs were categorized into lack of understanding, difficulty in studying, limited examples and resources, and confusion with other parts of speech. These insights highlight the specific difficulties students face and emphasize the need for tailored instructional approaches and comprehensive learning materials to enhance their comprehension and proficiency in using adverbs effectively.

The findings of this research contribute to the field of language learning by providing evidence of the effectiveness of the Duolingo application in improving students' vocabulary skills. It demonstrates the potential of technology-assisted language learning in enhancing language proficiency. The study also highlights the importance of addressing specific challenges related to the learning of adverbs, such as providing targeted instruction and comprehensive learning materials.

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