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Effectiveness of Using Drops Application in English Vocabulary on Students' Learning Outcomes

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Abstract

The research investigates how the English vocabulary learning application "Drops" functions as a tool for supporting foreign language learning in English. The application functions for Android and IOS System smartphones. This research design applied a quasi-experimental approach and involved a total of 60 students divided into two groups, 30 students in the experimental group using the Drops application and 30 students in the control group using the traditional textbook learning method. A test vocabulary method was used to collect data from pretests and post-tests as a way to measure vocabulary learning effects from this app usage in Deli Serdang junior high school. The statistical analysis was conducted using an independent sample t-test, which means the comparison was made between the experimental and control groups to determine the effectiveness of the Drops application on students' vocabulary learning outcomes. A significant value of 0.045 ($p < 0.05$) suggests that the difference in learning outcomes between the experimental and control groups was caused by the learning intervention delivered, rather than chance. Researcher determined that the Drops application allows students to learn vocabulary in the classroom through an interactive and visual format, which provides opportunities for better repetition and retention.. Drops combines gamification with visual learning and micro-learning features to improve student retention while boosting their vocabulary learning success indicating digital applications can be useful educational tools.

Keywords: Vocabulary; Drops Application; Learning Outcomes.

Vocabulary learning is an important part of teaching English as a foreign language, but it is often challenging for students to understand and remember new words effectively. Digital-based approaches have been highlighted in various international studies that highlight the effectiveness of interactive and multimodal media in improving vocabulary retention and comprehension. Mahdi (2018) through his meta-analysis found that the use of mobile devices in vocabulary learning significantly improved EFL students' learning outcomes. Research by Lin and Lin (2019) in a systematic review showed that vocabulary learning with the help of mobile devices is effective in ESL/EFL contexts. In addition, the use of digital media can also encourage more inclusive social interactions in the learning process, such as through collaborative features and online team-based activities. These findings reinforce the

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urgency of utilizing digital innovations in enriching the vocabulary learning process continuously, both in the classroom and independently.

In the 21st century, Digital innovations introduced new learning methods that are more interactive, engaging, and aligned with students' needs (Selwyn, 2016). One of the most significant challenges in English acquisition is the lack of exposure and ineffective learning strategies. Indonesia's low ranking in the EF English Proficiency Index (2023) highlights the need for innovative English teaching approaches. For addressing these issues, educators and academics investigated technology-assisted vocabulary acquisition as an alternate strategy (Suyono et al., 2020). Gamified learning programs, in particular, have been extensively acknowledged for their capacity to boost engagement and retention in language acquisition (Hung et al., 2018). Studies show that gamification elements, such as points, levels, rewards, and leaderboards, can significantly enhance students' intrinsic motivation and make learning more enjoyable (Sailer & Homner, 2020).

Vocabulary is an indispensable part of learning language and is emphasized in books and schools like understanding new sentences. According to Alqahtani (2015), vocabulary encompasses the words individuals use to communicate effectively, both through spoken language (expressive vocabulary) and through comprehension by listening (receptive vocabulary). In a related perspective, Patahuddin, Syawal and Bin-Tahir (2017) described vocabulary as the complete collection of words that make up a particular language, highlighting its fundamental role in language acquisition and usage. In many non-English speaking countries, including Indonesia, vocabulary acquisition is still a major challenge due to lack of exposure and ineffective learning strategies (Webb & Nation, 2017).

Moreover, many students at the junior high school level still have difficulty in mastering English vocabulary. Based on the results of the pre-test conducted in this study, the average score of students showed that their level of vocabulary mastery was still relatively low. This difficulty can be caused by lack of exposure to English in their environment as well as conventional learning methods that are less interesting. Vygotsky's Constructivist Theory (1978) highlights the importance of interactive and experiential learning, where students actively engage with content rather than passively receiving information. Likewise, Paivio's Dual Coding Theory (1986) states that the combination of visual and verbal elements enhances information retention.

The English learning application, especially Drops, delivers a distinctive educational experience to its users. Drops functions as a visual learning platform which implements gamification mechanics to teach vocabulary to students. Users can learn through visual content and interactive elements including levels and challenges which the application provides as a unique learning method. Through its platform Drops enables students to develop consistent learning habits and delivers all its learning advantages. The language learning platform Drops enables students to study 32 languages through its interactive system which enhances word retention (Najmi & Mahsa, 2021). Research on Drops vocabulary learning shows limited studies that use scientific methods to measure its results. This study examines how Drops helps students learn new words through experimental research methods.

Multiple research investigations demonstrate that technology plays a vital role in vocabulary education. Digital platforms enable interactive learning which merges visual inputs and audio and body movement results to help students strengthen their vocabulary retention (Suyono et al., 2020). Research by Wang and Tahir (2020) established that digital learning apps benefit from gamification features including points and badges and progress indicators because they improve

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student involvement and knowledge retention. According to Hasim and Darmi (2024), interactive aspects in gamification programs such as Duolingo and Memrise assist students retain vocabulary information over time, resulting in superior long-term learning results. The learning process generates various changes in individuals who successfully complete it. A learning process results in three types of changes: better concept comprehension, enhanced application skills and modified academic attitudes. The learning outcomes demonstrate how well students meet the educational targets established by teaching institutions and their educators. Students' capacity to acquire new vocabulary, accurate language structure application, and increasing willingness to communicate in the target language are indications of their learning outcomes in a language acquisition environment. Learning outcomes are quantitative indicators that show students' accomplishment and progress in gaining certain information, skills, and abilities (Mustakim, 2020).

Recent study has shown that technology-enhanced learning improved learning outcomes, specifically vocabulary retention and engagement. Gamified applications have been shown to foster active learning, which enhances cognitive engagement and facilitates deeper information processing (Wang & Tahir, 2022). Furthermore, the concept of long-term learning outcomes has gained attention in recent years, focusing on how students retain and apply acquired knowledge beyond formal education. After comprehending the principle of learning outcomes, multiple prior research have found that using applications in vocabulary acquisition has a substantial impact on increasing student learning outcomes.

Several studies have examined mobile applications in vocabulary learning. Cahanaya et al. (2022) found that Drops improved vocabulary among junior high school students, but their study only used post-test data. Rahmandika (2023), using a design-based approach, focused on students' motivation in using Drops, without measuring learning outcomes quantitatively. Wahyuningsih (2024) reviewed mobile vocabulary apps like Duolingo and Memrise, but did not specifically examine Drops or provide experimental data. Furthermore, much of the existing research has been conducted in regions with high English proficiency, whereas Indonesian students face unique challenges such as limited exposure to English and varying levels of digital literacy (Rahman, 2021). Additionally, the effectiveness of Drops in the Indonesian educational context remains underexplored. To address this gap, this study uses a quantitative experimental design to measure the actual impact of Drops on vocabulary learning outcomes, providing empirical data that is currently lacking in the field.

Based on the description above, by analyzing actual performance improvements rather than subjective feedback, this research provides stronger empirical evidence to support the integration of gamified applications into English language education. Furthermore, it highlights the pedagogical implications of using Computer-assisted learning tools, emphasizing how structured gamification strategies can enhance vocabulary retention and overall language learning effectiveness. This study was conducted to answer the following research question of "How does the use of Drops affect students' vocabulary learning outcomes ?". Moreover, the aim of this research is to provide educators with insights into the practical applications of gamified learning tools and their potential to transform vocabulary learning in Indonesian classrooms.

Method

This research used a quantitative method with a quasi-experimental design, which aims to test the effectiveness of using the Drops application in learning English vocabulary at one of the Junior High Schools in Deli Serdang, the reasons for selecting this school were based on practical and academic considerations, including ease of

access, readiness of supporting technology, and the suitability of the learning context to the research topic. According to Campbell and Stanley (1963), a quasi-experimental design can still provide valid results if there is strict control over the variables being studied, such as through the use of pre-tests and post-tests and comparisons between experimental and control groups.

All seventh grade at the chosen junior high school in Deli Serdang made up the study's population. Two entire classes were chosen for the sample using a non-random cluster sampling technique, taking into account the school's convenience and availability. This means the researcher did not randomly assign individual students, but used existing classroom groups as experimental and control groups. As a result, this study involved a total of 60 students, consisting of 30 students in the experimental group and 30 students in the control group. The experimental group was given learning using the Drops application, while the control group learned using conventional methods based on textbooks and written exercises.

The vocabulary test was an instrument utilized in this study. Through a pre-test administered prior to treatment and a post-test following treatment, the vocabulary exam was utilized to gauge student learning outcomes. Twenty questions on this test were created by using vocabulary material in the application. This research approach is quantitative experimental, so the analysis process does not require the application of triangulation or data saturation, because the data is obtained objectively through the results of the pre-test and post-test.

The data obtained were analyzed using statistical methods to validate the research findings. The first step in data analysis was to do a normality test to see whether the data from the pre-test and post-test were normally distributed. Following that, a homogeneity test was performed to determine whether both groups had the same variance. Once the normality and homogeneity assumptions were confirmed, an Independent Sample T-Test was conducted to determine whether there were significant differences in post-test results between the experimental and control groups, aiming to assess the impact of the Drops application on students' learning outcomes.

Result and Discussion

The results of this study show how the use of drop applications affects improvements in student vocabulary championships. To measure the effectiveness of this application, analysis of pre-test results and post-test analyses in the experimental group and control group were performed. In addition, statistical tests were used to see the significance of the differences in learning outcomes between the two groups. The following are three tables that include Descriptive Statistic Analysis, Homogeneity Test, and Hypothesis Test.

Descriptive Statistic Analysis

In this analysis EG (Experimental Group) and CG (Control Group) are used for the two sample groups. The results of the descriptive statistical data analysis, as shown in Table 1, the highest test results achieved by students during the pretest in the experimental group (EG - Experimental Group) were 70 and the control group was 70. In the pre-test, the lowest score obtained by the experimental group was 40, while the control group scored 35. Meanwhile, in the post-test, the experimental group reached the highest score of 100, whereas the control group achieved a maximum score of 95. The minimum score in the post-test for both groups was recorded at 60.

Based on the calculation of the average value (mean), the experimental group had a pre-test value of 54.00 and increased to 81.76 in the post-test. Meanwhile, the control group increased from 53.67 in the pre-test to 76.67 in the post-test. Descriptively, both groups showed an increase in learning outcomes after treatment.

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Table 1. Descriptive Statistic Analysis

	Pretest		Posttest	
	EG	CG	EG	CG
Mean	54.00	53.67	81.76	76.67
Median	55.00	55.00	80.00	77.50
Std. Deviation	8.550	10.080	11.769	10.613
Variance	73.103	101.609	138.506	112.644
Minimum	40	35	60	60
Maximum	70	70	100	95

However, analytically, the higher improvement in the experimental group (difference of 27.76 points) compared to the control group (difference of 23.00 points) indicates that the use of Drops application has a more significant impact on English vocabulary acquisition. This can be explained through the Dual Coding Theory approach (Paivio, 1986) which states that processing information through text and visuals simultaneously can strengthen students' recall of new vocabulary. The visual and interactive nature of Drops application allows students to experience a more multimodal learning process.

In addition, from the Constructivism point of view, app-based learning provides space for students to build their own understanding through independent exploration, which can also explain the higher improvement in the experimental group. Thus, the mean data obtained not only shows an increasing trend, but also strengthens the empirical evidence of the effectiveness of technology-based learning strategies.

Homogeneity Test

The homogeneity test used in this study is the Levene test. This test is used to test the equality of variance between the experimental group and the control group before further statistical analysis is carried out. The Levene test functions to ensure that both groups have variances that are not significantly different, which is one of the important assumptions in parametric statistical analysis such as the Independent Sample T-Test.

Table 2. Homogeneity Test

Variable	F	df1	df2	Sig.
Pretest Learning Outcomes	1.846	1	58	0.180
Posttest Learning Outcomes	0.265	1	58	0.609

Table 2 shows a significance value (p-value) greater than 0.05, so it can be concluded that the variance of the two groups is homogeneous, so that the analysis can be continued using the Independent Sample T-Test.

Hypothesis test

This research employed the Independent Sample T-Test as the statistical method to examine whether there were notable differences in the average scores between two separate groups the experimental group and the control group. Prior to conducting the test, it was assumed that the data collected met the essential requirements of normal distribution and homogeneity of variance, ensuring the validity of the analysis. According to statistical conventions, when the resulting p-value is found to be less than 0.05, it suggests that the observed differences between the groups are statistically significant and unlikely to have occurred by chance. As shown in Table 3, the findings of the Independent Sample T-Test revealed a meaningful difference in learning outcomes, with the experimental group outperforming the control group, thus indicating the effectiveness of the intervention used in the study.

Table 3. Hypothesis test

	t	Df	Sig
Pretest	-0.138	58	0.891
Posttest	-1.728	58	0.045

Table 3 prensents the independent t-test, the significance value obtained was 0.045, which is smaller than the significance limit of 0.05. This result indicates that there is a significant difference between the vocabulary

achievement of students who use the Drops application and those who learn using conventional methods. In other words, the use of the Drops application has a real effect on improving students' vocabulary mastery. This lower significance value indicates that the difference in students' vocabulary test scores did not occur by chance, but was caused by the intervention given in the experimental group. In accordance with the principles of hypothesis testing, when the p-value is less than 0.05, the null hypothesis is rejected and the alternative hypothesis is accepted, which means that the Drops application is effective in improving students' vocabulary learning. The hypothesis test supported the alternative hypothesis (H_a), showing that the Drops application had a substantial impact on student vocabulary acquisition results. The null hypothesis (H_0) that there is no significant difference between students who use and do not utilize drops was rejected. These findings confirm prior research indicating that gamification-based applications might boost students' vocabulary accomplishment and become a more exciting and effective alternative learning technique than traditional ways.

The findings of this study, which demonstrated a substantial boost in students' vocabulary acquisition outcomes through the usage of the Drops application, may be seen through the lens of Vygotsky's social development theory. According to Vygotsky (1978), learning is most effective when students are supported by tools or social interactions that allow them to construct more sophisticated understandings. In this setting, Drops serves as a mediation tool, facilitating students' learning processes both independently and with the assistance of teachers. This application uses linguistic and visual stimuli to help students understand and remember new vocabulary more effectively, in accordance with Vygotsky's theory that tools are essential in the process of internalizing knowledge.

Furthermore, when teachers direct or guide students' use of the application, educational interactions occur that contribute to their cognitive development. As a result, the success of Drops is measured not only by its technological capabilities, but also by its contribution to the creation of a social learning environment that promotes the progressive construction of knowledge.

This finding lines up with the results of previous studies which show that the use of digital based applications can significantly improve students' vocabulary mastery. Research by Cahanaya et al. (2022) revealed that the Drops application can improve vocabulary retention and students' learning motivation. However, the study only measured the results using a post-test, without tracking students' progress since the beginning of the intervention. In contrast, this study used a pre-test and post-test, thus providing a clearer picture of students' vocabulary growth over time.

Furthermore, Rahmandika (2023) focused on vocabulary teaching using Drops in a high school setting through a design-based research (DBR) method. Her findings emphasized that integrating Drops into discovery learning increase students' motivation and engagement. Although the main similarity with this study lies in the use of the same application, this study differs by implementing a quasi-experimental design with a controlled group and measurable results through statistical analysis. In addition, this study targets junior high school students, which provides a different perspective on the effectiveness of apps across educational levels. On the other hand, Wahyuningsih (2024) conducted a systematic review that analyzed various mobile language learning apps for vocabulary enhancement. Her study identified the benefits and challenges of mobile-assisted language learning, such as increased flexibility and motivation, but also issues related to pedagogy and empirical validation. While her study focused on synthesizing findings from multiple sources, this study provides

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primary data through a direct experiment, filling the empirical gap she highlighted by offering measurable evidence of how Drops affect learning outcomes.

What distinguishes this study is not only its focus on the Drops app but also its structured experimental approach that observes vocabulary gains over time, rather than relying solely on end-results or perception-based data. By combining the strengths of previous studies and addressing their limitations, this study provides strong evidence to support the integration of gamified mobile learning tools into formal language education, particularly in the context of junior high schools in Indonesia. From the comparison of the three studies, it can be seen that the use of gamified apps is equally helpful in improving vocabulary mastery.

Although the applications are different, they all have advantages in making learning more interesting and interactive. However, the way each study views the results is not always the same. This study is unique because it not only looks at the final results, but also monitors student development from start to finish using pre-tests and post-tests. So, the results obtained are more accurate and describe the learning process that occurs. In addition, the focus of this study also provides a new perspective, because most previous studies were conducted using a different approach.

These differences in context, method, and focus are what make this study able to add new insights. So, although it generally supports the results of previous studies, this study provides stronger and more complete evidence of how the Drops application can be used effectively in English vocabulary learning in schools.

Overall, this study supports previous research findings that gamification-based apps like Drops can improve students' vocabulary learning. However, this study also provides additional contributions by using a more systematic approach in measuring students' learning outcomes through pre-tests and post-tests, and emphasizing a more in-depth quantitative analysis. Thus, the results of this study not only strengthen the evidence that the Drops app is effective in vocabulary learning, but also provide more detailed insights into how much influence this app has on students' learning outcomes. In the future, further research can combine quantitative and qualitative approaches to provide a more comprehensive understanding of the effectiveness of the Drops app, not only in improving learning outcomes but also in terms of students' experiences in the learning process.

Conclusion

This study concluded that the use of the Drops application has a significant effect on improving students' vocabulary learning outcomes. The statistical analysis results demonstrate that students who study using Drops have a higher level of vocabulary acquisition than students who utilize traditional textbook-based learning techniques. A significant value of 0.045 ($p < 0.05$) suggests that the difference in learning outcomes between the experimental and control groups was caused by the learning intervention delivered, rather than chance.

The outcome of this study shows that digital based technology could be a useful alternative in learning English vocabulary. The use of the Drops application allows students to learn vocabulary in the classroom through an interactive and visual format, which provides opportunities for better repetition and retention. The integration of applications in vocabulary learning can create a more varied and student-centered learning environment. This approach is also in line with current educational trends that emphasize the use of technology as a supporter of language development. This study shows the great potential for teachers to adopt simple yet impactful digital solutions to enrich classroom teaching and encourage continuous vocabulary development in students.

Although this study shows positive results, there are some limitations that need to be considered. This study was conducted on a limited scale with a relatively small sample size, so the results cannot be generalized to a wider population. Furthermore, this study only examined the vocabulary aspect, not the impact on other language skills such as speaking, reading, and writing. As a result, more study is needed to investigate the long-term influence of Drops on many elements of language skills, as well as to integrate quantitative and qualitative research approaches to acquire a more thorough picture of gamification-based learning's effectiveness.

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