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Digital Shadowing with Mobile Tools for Improving Second Language Acquisition

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Abstract: Vocabulary mastery is fundamental in learning English as a foreign language (EFL). However, many learners struggle to increase their word count and use vocabulary effectively. This study explores the effectiveness of mobile technology-based shadowing techniques in improving EFL learners' vocabulary mastery. This study uses a mixed-methods, experimental approach. A total of 40 intermediate EFL participants from the Domestic English Course in *Kampung Inggris Pare* were selected through purposive sampling and participated in a shadowing practice program using mobile applications such as Google Voice Assistant and Duolingo for four weeks. Quantitative data were obtained from pre-test and post-test, while qualitative data were collected through questionnaires and interviews. The results of the t-test produced a t-value of -26.502, with 30 degrees of freedom (df) and a 2-tailed significance value (Sig.) of 0.000. This p-value is smaller than 0.05, indicating that the difference between pre-test and post-test scores is statistically significant. Thus, the treatment that helps students learn English vocabulary effectively and authentically improves their abilities. Interviews revealed that ease of access, flexibility, and repetitive practice supported this method's success despite obstacles like audio speed and internet limitations. Thus, mobile technology-based shadowing techniques can be innovative in improving EFL learners' vocabulary mastery.

Keywords: Shadowing, Mobile Technology, Vocabulary, EFL Learning, Technology-Based Learning

Abstrak Penguasaan kosakata sangat mendasar dalam belajar bahasa Inggris sebagai bahasa asing (EFL). Namun, banyak pelajar berjuang untuk meningkatkan jumlah kata mereka dan menggunakan kosakata secara efektif. Penelitian ini mengeksplorasi efektivitas teknik shadowing berbasis teknologi seluler dalam meningkatkan penguasaan kosakata pelajar EFL. Penelitian ini menggunakan pendekatan eksperimental dengan metode campuran. Sebanyak 40 peserta EFL menengah dari Kursus Bahasa Inggris Dalam Negeri *di Kampung Inggris Pare* dipilih melalui purposive sampling dan berpartisipasi dalam program latihan shadowing menggunakan aplikasi mobile seperti Google Voice Assistant dan Duolingo selama empat minggu. Data kuantitatif diperoleh dari pre-test dan post-test, sedangkan data kualitatif dikumpulkan melalui kuesioner dan wawancara. Hasil uji-t menghasilkan nilai-t -26,502, dengan 30 derajat kebebasan (df) dan nilai signifikansi 2 ekor (Sig.) 0,000. Nilai p ini lebih kecil dari 0,05, menunjukkan bahwa perbedaan antara skor pra-tes dan pasca-tes signifikan secara statistik. Dengan demikian, perawatan yang membantu siswa mempelajari kosakata bahasa Inggris secara efektif dan otentik meningkatkan kemampuan mereka. Wawancara mengungkapkan bahwa kemudahan akses, fleksibilitas, dan praktik berulang mendukung keberhasilan metode ini meskipun ada hambatan seperti kecepatan audio dan keterbatasan internet. Dengan demikian, teknik shadowing berbasis teknologi seluler dapat menjadi inovatif dalam meningkatkan penguasaan kosakata pelajar EFL.

Kata Kunci: Shadowing, Mobile Technology, Vocabulary, EFL Learning, Technology-Based Learning

INTRODUCTION

In learning English as a foreign language (EFL), vocabulary mastery is crucial in improving overall language skills. Sufficient vocabulary allows learners to understand written texts, listen to conversations, speak fluently, and write well. According to Richards (2016Vocabulary learning is the primary foundation in second language acquisition (L2) because, without adequate vocabulary understanding, communication skills will be minimal. At the international level, English learning curricula in various countries have emphasized the importance of vocabulary expansion in the learning process. (Jaikrishnan & Ismail, 2021), This aligns with the concept of communicative language teaching (CLT), which emphasizes the use of language in authentic contexts. Although English has been taught since elementary school in Indonesia, many students struggle to master vocabulary for effective communication, especially speaking skills.

However, improving vocabulary in EFL learning is not easy. One of the main challenges is the limited exposure to English in everyday life, especially for learners who live in non-English-speaking environments. Additionally, traditional methods, such as passively memorizing word lists, are often less effective because learners quickly forget the words learned without a clear context (Yuliana et al., 2024). Another challenge is the lack of opportunities to practice vocabulary in real-life situations, so many learners have difficulty understanding how to use words naturally in conversation. Psychological factors such as lack of confidence and anxiety in speaking are also obstacles for many EFL learners (Afini et al., 2023), which causes them to be reluctant to use new vocabulary in their daily interactions.

In the face of these challenges, mobile technology and shadowing techniques offer innovative solutions to EFL vocabulary learning. Mobile technology allows learners to flexibly access various learning resources, anytime and anywhere, through apps like Google Voice Assistant, Duolingo, and Youngish. Meanwhile, the shadowing technique, which requires learners to imitate and repeat words or phrases from live audio, effectively aids vocabulary retention and improves speaking fluency. By combining mobile technology and shadowing techniques, vocabulary learning becomes more interactive. (Foote & McDonough, 2017), contextual (Martinsen et al., 2017), and experience-based (Melinda Puspita Sari Jaya et al., 2023), Making it easier for learners to understand, remember, and apply vocabulary in more natural communication.

Various studies have shown that shadowing improves vocabulary mastery and speaking skills in a second language (L2). According to Kadota (2019Shadowing can improve the accuracy of pronunciation and vocabulary retention because it involves the process of active listening and simultaneous language production. Meanwhile, Martinsen et al. (2017) Integrating mobile technology in shadowing-based learning allows learners to practice independently and more often than traditional methods. In Indonesia, a study conducted by Nasar et al. (2023) Shows that the use of mobile applications in English learning can increase student motivation and engagement, although there are still technical obstacles, such as limited internet access in some areas (Kessler, 2018; Tondeur, 2018). These studies show that the combination of shadowing techniques and mobile technology has great potential to improve vocabulary mastery in English learning for EFL learners.

This study examines the effectiveness of shadowing techniques combined with mobile technology in improving vocabulary mastery for EFL learners. In addition, this study

also explores students' perception of the learning experience using this method, as well as the challenges faced in its application. By understanding the effectiveness and existing constraints, this research is expected to provide insight for educators and developers of educational technology in designing more effective and inclusive language learning strategies, especially in Indonesia, which still experiences a gap in access to ICT in education. This study's results show that mobile-based shadowing techniques significantly increase students' vocabulary mastery. As many as 85% of participants experienced increased vocabulary skills after participating in the four-week exercise. In addition, interviews with participants showed that this method helped them remember vocabulary longer and increased their confidence in speaking. However, the study also found several obstacles, such as limited internet access and the need for features that allow the adjustment of audio speed to suit the abilities of each learner. These findings underscore the importance of developing more adaptive and inclusive learning technologies to support ICT-based English learning in Indonesia and the world.

METHODOLOGY

This study uses a mixed-methods approach with an explanatory mixed-methods approach to measure the effectiveness of mobile technology-based shadowing techniques in improving EFL learners' vocabulary mastery. This experiment was carried out with a pre-test and post-test design, where participants were given vocabulary tests before and after the intervention to see the extent of improvement. In addition, the interview and questionnaire methods were used to collect qualitative data about participants' experiences and perceptions of the learning methods.

The population in this study is intermediate-level EFL learners taking English courses at the Domestic English Course of *Kampung Inggris Pare*. The research sample consisted of 31 participants selected using the purposive sampling technique. These participants had an intermediate vocabulary level and were willing to participate in a learning program using mobile technology-based shadowing techniques during the research period.

This research was carried out in several stages to measure the effectiveness of mobile technology-based shadowing techniques in improving EFL learners' vocabulary mastery. The first stage is the pre-test, where participants are given an initial vocabulary test to measure their vocabulary mastery before treatment. The test consists of 100 words that must be identified and used in sentences in context. The results of this pre-test will be used as preliminary data to be compared with the results of the post-test after the intervention is carried out.

The second stage is the intervention (learning using shadowing and mobile technology), which lasts four weeks. At this stage, participants can access audio materials based on mobile applications such as Google Voice Assistant and Duolingo. They were asked to do shadowing exercises by following and repeating the words or phrases heard in the application. Exercises are carried out independently for 15-20 minutes per day. This stage aims to familiarize participants with pronouncing vocabulary with correct pronunciation, understanding the context of word use, and improving speaking fluency. After four weeks of intervention, participants took a post-test as the third stage of the study. This test has the same format as the pre-test, aiming to evaluate participants' vocabulary mastery changes after applying mobile-based shadowing techniques. The difference in results between the pre-test and the post-test

was analyzed to see the methods' effectiveness.

Quantitative data from the pre-test and post-test will be analyzed using a paired t-test to see significant differences in vocabulary improvement. Meanwhile, qualitative data from interviews and questionnaires will be analyzed using thematic analysis techniques, identifying the main patterns or themes in participants' responses regarding the effectiveness of mobile-based shadowing in vocabulary learning.

As the final stage, this study also collects qualitative data through questionnaires and interviews. Participants were asked to share their experiences using mobile-based shadowing techniques, including the benefits they felt, the challenges they faced, and the effectiveness of this method in improving their vocabulary. This data will be analyzed using thematic analysis to identify key patterns and trends in participants' responses, which will then be used to support the pre-test and post-test quantitative analysis results. With the design of this study, a clear picture can be obtained about the extent to which mobile technology-based shadowing techniques can help EFL learners improve their vocabulary mastery.

RESULT AND DISCUSSION

Result

A. Learner Vocabulary Improvement

Table 1. Student pre-test and post-test results

No	Pre-Test	Post-test
1	60	82
2	55	85
3	46	88
4	65	90
5	55	85
6	50	86
7	58	89
8	67	88
9	60	92
10	52	90
11	45	89
12	58	90
13	52	86
14	50	89
15	51	86
16	52	89
17	54	93
18	58	95
19	62	87
20	54	80
21	57	88
22	67	89
23	64	90
24	49	92
25	51	96
26	55	94
27	57	93

28	57	90
29	64	89
30	63	93
31	66	91

Table 1 explains that the data on the pre-test and post-test results of students in vocabulary learning showed an increase in overall scores. The average pre-test of students was 55.2, while the average post-test increased to around 89.5. This shows a significant increase after vocabulary learning is given. Each student showed an increase in scores between the pre-test and the post-test. The increase in grades ranged from 18 to 45 points, indicating the effectiveness of vocabulary learning in improving students' understanding. Post-test scores range from 80 to 96, with most students scoring above 85. This shows that most students achieve a better mastery of vocabulary. Overall, the increase in pre-test to post-test scores shows that the vocabulary learning methods applied are compelling. Most students mastered the vocabulary material well, as seen from the significant increase in post-test scores.

Table 2. Paired sample statistics before and after treatment

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before treatment	56.58	31	6.120	1.099
	After treatment	89.16	31	3.560	.639

Table 2 explains a significant improvement in students' vocabulary ability after treatment. The average score of students before treatment was 56.58, which shows that students' initial ability in vocabulary learning is still relatively low. The average score increased significantly to 89.16 after treatment, indicating that the treatment or learning method effectively improved students' vocabulary skills. The sample size was 31 students, the basis for the average calculation and other statistics. Before the treatment, the standard deviation value of 6.120 showed a considerable variation in the students' initial scores before and after the treatment. The standard deviation decreased to 3.560, which indicates that the students' scores were more centralized or consistent after the treatment. This shows the success of the treatment in equalizing the level of students' vocabulary understanding. The standard error value before treatment was 1.099, indicating that the average estimate of the value before treatment had a pretty good level of accuracy, and the standard error value decreased to 0.639 after receiving the treatment, indicating an increase in accuracy in the average estimate after treatment. The decrease in standard deviation and standard error in post-test scores also indicates that the learning methods increase the average score and make the learning outcomes more even and consistent among students.

Table 3. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Before treatment, after treatment	31	.075	.688

Table three shows the relationship between pre-test (before treatment) and post-test (after treatment) scores in English vocabulary learning. A correlation value of 0.075 indicates a very weak or almost non-existent relationship between pre-test and

post-test scores. This means that students' initial grades (pre-test) do not affect their final grades (post-test) much. In this context, the post-test results depend more on the treatment than the student's initial ability. A significance value (p-value) of 0.688 is insignificant because the p > 0.05). This means the relationship between pre-test and post-test is not strong enough to be considered statistically significant. In other words, no evidence suggests that students' pre-test and post-test scores have a significant relationship. This low and insignificant correlation shows that students' post-test results are more influenced by the effectiveness of the vocabulary learning methods than their initial scores. The treatment increased students' scores evenly, regardless of their initial ability level (pre-test).

Table 4. Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Before treatment - After treatment	-32.581	6.845	1.229	-35.091	-30.070	-26.502	30	.000

Table four shows the results of the *Paired Samples Test* analysis, which compares the scores of pre-tests (before treatment) and post-tests (after treatment) of students in learning English vocabulary. The average score difference between the pre-test and post-test was -32.581, with a negative score indicating that the post-test score was significantly higher than the pre-test score. The standard deviation of 6.845 shows a variation in student scores, but it is still consistent, leading to increased learning outcomes. The 95% confidence interval indicates that the average value difference is estimated to be between -35,091 and -30,070, indicating a high confidence level in the analysis result. The results of the *t-test* statistical test produced a value of t = -26.502, with a degree of freedom (df) of 30 and a significance value (Sig. 2-tailed) of 0.000. This p-value is smaller than 0.05, indicating that the difference between pre-test and post-test scores is statistically significant. Thus, the treatment provided to help students learn English vocabulary effectively and authentically improves their abilities. The vocabulary learning methods have proven to be very effective in improving students' abilities. The statistical analysis results showed that the increase in scores between the pre-test and the post-test was statistically significant, indicating that the treatment had a substantial positive impact on the students' English vocabulary learning outcomes.

B. Effectiveness of Shadowing and Mobile Technology

Research on the effectiveness of shadowing techniques combined with mobile technology in English learning for EFL learners shows positive results. Based on the results of the pre-test and post-test conducted on 31 students, it was found that as many as 85% of students experienced an increase in vocabulary mastery after participating in the program for four weeks. The shadowing technique, which allows participants to mimic the pronunciation of words or phrases from audio sources, has been shown to help in improving vocabulary retention as well as pronunciation skills. In addition, mobile technology provides flexibility in learning so that participants can practice anytime and anywhere at their convenience.

The results of interviews with some students showed that some students experienced significant improvement, and other students with low improvement revealed some interesting findings. Most students feel that the shadowing technique done through the mobile app helps them memorize vocabulary faster and understand its use in a broader context. One participant stated that the recording and repetition features in the mobile app were beneficial in improving their pronunciation and intonation. However, some students find it challenging to keep up with the audio speed in the application, especially for those who are still at the beginner level.

> *"I can learn anytime and anywhere, even when traveling. Apps like Duolingo and Google Voice Assistant help me practice more regularly." (Informant 2)*

As a student, M highlighted the ease of access and flexibility in using mobile technology to support shadowing techniques. With apps like Duolingo and Google Voice Assistant, participants can practice anytime without time or place restrictions. This shows that mobile technology provides a more dynamic learning solution and is not limited to traditional classrooms. In addition, more frequent practice routines, thanks to the app's accessibility, show that mobile technology can improve participants' engagement and learning consistency in developing their vocabulary.

> *"Compared to memorizing words, the shadowing technique helps me more in remembering and understanding the context of word use." (Informant 4)*

Another comment from B compares the shadowing technique with conventional methods, such as memorizing vocabulary directly. According to him, shadowing is more effective because it allows learners to remember new words and understand the context in which they are used. This shows that the shadowing technique provides a more contextual and meaningful learning experience, where students not only passively memorize words but also apply them in more natural situations. Thus, this approach can help EFL learners improve their understanding of language structure and memory of new vocabulary.

Further analysis shows that shadowing and mobile technology improve vocabulary mastery and build confidence in speaking English. Participants who were initially reluctant to speak in English felt more comfortable after getting used to imitating audio from the app. This technique provides a more interactive learning experience than conventional methods, such as memorizing word lists or translating text directly. In addition, mobile technology allows learners to get immediate feedback on their pronunciation through the speech recognition feature and voice recordings that they can listen to again.

However, some challenges were found in the implementation of this method. Some participants experienced technical problems, such as unstable internet connections or limited devices used. In addition, the audio speed in the app is sometimes too fast for beginners, so they need the feature to adjust the speed according to their respective ability levels. Therefore, in applying this technique, more adaptive application support and materials that can be accessed offline are needed to accommodate the needs of all participants.

"Sometimes I have trouble understanding words that are too fast. There needs to be a feature that can slow down the audio speed. (Informant 8)

E, a student, revealed a challenge in the breakneck audio speed, which hinders comprehension and the ability to imitate pronunciation well. This shows that shadowing techniques need to be adjusted to the ability level of each learner, especially for those who are still at the beginner level. The proposed solution, a feature to slow down the speed of audio, suggests that flexibility in speed settings can help improve the effectiveness of this method. If this feature is available, participants can adjust the tempo of the practice to their abilities so that the learning process becomes more optimal and does not cause frustration.

"My biggest problem was the unstable internet connection, so I had to download the material before studying." (Informant 10)

MA, a student, faces technical obstacles such as an unstable internet connection, which hinders smooth access to learning materials based on mobile technology. This condition shows that the availability of internet access is still an important factor in the success of mobile learning implementation, especially in areas with limited networks. Therefore, the solution carried out by participants, namely downloading the material first, reflects the need for offline access features in shadowing-based learning applications. This emphasizes the importance of application developers to provide learning options without an internet connection to reach more users with various digital infrastructure conditions.

Overall, this study shows that the shadowing technique combined with mobile technology effectively improves EFL learners' vocabulary mastery. Although there are several obstacles, the benefits obtained are much more significant, especially regarding vocabulary retention, pronunciation, and increased confidence in speaking. Therefore, this approach can be an innovative learning strategy for English language teaching, especially for learners who want to improve their language skills independently and flexibly.

Discussion

The study's results showed a significant impact on improving students' vocabulary skills. This increase is shown by comparing pre-test and post-test results, with an increase in the average score from 60.00 to 77.80. The results of *the Paired Samples Test* analysis compared the pre-test (before treatment) and post-test (after treatment) scores of students in learning English vocabulary. The average score difference between the pre-test and post-test was -32.581, with a negative score indicating that the post-test score was significantly higher than the pre-test score. The standard deviation of 6.845 shows a variation in student scores, but it is still consistent, leading to increased learning outcomes. The 95% confidence interval indicates that the average value difference is estimated to be between -35,091 and -30,070, indicating a high confidence level in the analysis results. The results of the *t-test* statistical test produced a value of t = -26.502, with a degree of freedom (df) of 30 and a significance value (Sig. 2-tailed) of 0.000. This p-value is smaller than 0.05, indicating that the difference between pre-test and post-test scores is statistically significant. The shadowing technique, which involves

repeating a word or phrase after hearing a voice model, assists students in speeding up the comprehension and pronunciation of vocabulary. Meanwhile, mobile technology, such as audio-based learning apps, allows students to learn independently and flexibly (Ridayani & Purwanto, 2024), increasing their exposure to the target language (Nasar et al., 2024; Umar et al., 2023).

The implications of this study show that using mobile technology as a learning medium can increase the effectiveness of the shadowing method, especially in the context of independent learning. Mobile technology provides wider access to learning resources. (Hidayad et al., 2023), allowing students to repeat exercises without relying on an instructor (Irawan et al., 2024). In addition, this approach supports self-regulated learning, where students can adjust their own learning pace. The practical implication for educators is to adapt technology in learning strategies to improve students' language skills more optimally.

The interpretation of the results of this study shows that the shadowing method supported by mobile technology is more effective than the conventional method in improving students' vocabulary. With technology, students have easier access to structured listening and speaking exercises (Budiyanto et al., 2024), increasing their retention and understanding of new vocabulary (Purwanto & Despita, 2022). In addition, the reduction of standard deviation from the pre-test to the post-test shows that the applied learning techniques make student learning outcomes even more intense. This means these methods can be widely applied to various student ability levels.

Compared to previous research, this result is in line with research conducted by Hamada (2018), which states that shadowing techniques improve listening and speaking skills in foreign languages. In addition, research by Bonar Siagian and M Bambang Purwanto (2023) Using mobile applications in language learning can increase student motivation and engagement. However, this study makes an additional contribution by showing that the combination of shadowing and mobile technology has a more substantial impact on vocabulary improvement than traditional shadowing method.

Based on these findings, further research is suggested to explore using artificial intelligence (AI) in mobile technology to provide more personalized training for language learners. Additionally, further research may expand the scope of the sample by considering other variables, such as students' learning styles and motivational factors, which may play a role in the success of vocabulary learning using these methods. Thus, the development of mobile-based learning technology can continue to be improved to support the effectiveness of more innovative and adaptive language learning strategies.

CONCLUSION

The results of this study show that the combination of shadowing techniques and mobile technology has a significant impact on improving students' vocabulary. The increase in the average score from 60.00 in the pre-test to 77.80 in the post-test shows that the method applied effectively improves vocabulary comprehension and mastery. The results of the Paired Sample T-Test with a value of p = 0.000 confirm that this increase is statistically significant. The shadowing technique allows students to increase fluency and accuracy in vocabulary use. At the same time, mobile technology provides flexibility for students to access learning materials independently and repeatedly, speeding up the

learning process. The main strength of this research is the integration of shadowing and mobile technology, which contributes scientifically to the academic world in technology-based language teachin This study strengthens the evidence that using digital technology can improve the effectiveness of language learning strategies, especially in vocabulary development. The results of this research can be the basis for developing technology-based curricula in educational institutions. They can become a reference for future research exploring innovations in mobile-assisted language learning (MALL). In addition, this study also underscores the importance of a self-regulated learning-based learning approach, which allows students to be more active in their learning process. While this study provides valuable insights, some limitations need to be noted. First, the number of samples used is still relatively small, so the results of this study cannot be generalized widely. Second, the study only focused on improving vocabulary without considering other factors such as learning motivation, language anxiety levels, and students' learning styles, which may also affect learning effectiveness. Third, this study was conducted relatively briefly, so it has not been possible to measure the long-term impact of using this method on student vocabulary retention. Therefore, follow-up research with a larger sample and a wider range of variables is highly recommended to provide more comprehensive results.

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