

# Tech meets practice: Shadowing with mobile tools to enhance L2 vocabulary mastery

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## Abstract

*Vocabulary acquisition plays a crucial role in mastering English as a foreign language (EFL), yet numerous learners face challenges in expanding their lexical repertoire and applying it accurately. This research investigates how shadowing techniques delivered through mobile technology can enhance vocabulary mastery among EFL students. Using a mixed-methods design with an experimental framework, the study involved 40 intermediate-level learners from a local English course in Kampung Inggris Pare, selected via purposive sampling. Over the course of four weeks, participants engaged in shadowing activities using mobile applications, including Google Voice Assistant and Duolingo. Data collection combined quantitative measures—pre-test and post-test scores—with qualitative insights drawn from questionnaires and semi-structured interviews. Statistical analysis using a paired-samples t-test produced a t-value of -26.502 ( $df = 30$ ) and a two-tailed p-value of 0.000, which is well below the 0.05 threshold, confirming a statistically significant improvement in vocabulary performance following the intervention. This suggests that the mobile-assisted shadowing approach effectively supports authentic and meaningful vocabulary learning. Qualitative feedback further indicated that participants benefited from the method's accessibility, adaptability, and opportunities for repeated practice, although some noted challenges related to audio playback speed and inconsistent internet connectivity. Overall, the findings highlight mobile-based shadowing as a promising and innovative strategy for strengthening vocabulary skills among EFL learners.*

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

## 1. Introduction

In learning English as a foreign language (EFL), mastering vocabulary is essential for enhancing overall language proficiency. A sufficient vocabulary enables learners to comprehend written texts, engage in conversations, speak fluently, and write effectively. According to 2016, vocabulary 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. This aligns with the concept of Communicative Language Teaching (CLT), which emphasizes the use of

language in authentic contexts. Although English has been taught in elementary school in Indonesia, many students struggle to master vocabulary for effective communication, particularly in speaking skills.

However, improving vocabulary in EFL learning is not an easy task. One of the primary challenges is the limited exposure to English in everyday life, particularly for learners residing 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, which means many learners struggle 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), This 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 enables learners to access various learning resources flexibly, 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 a more interactive experience (Foote & McDonough, 2017, Willyan et al, 2025: Kurniadi, et al, 2025), contextual (Martinsen et al., 2017), and experience-based (Jaya et al., 2023), this approach helps learners grasp, retain, and use new vocabulary more effectively in authentic, everyday communication.

Several studies have demonstrated that shadowing enhances vocabulary mastery and speaking skills in a second language (L2). According to Kadota (2019), shadowing enhances both pronunciation accuracy and vocabulary retention by engaging learners in active listening while simultaneously reproducing the spoken language. Meanwhile, Martinsen et al. (2017) Integrating mobile technology into shadowing-based learning enables learners to practice independently more frequently than with 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 demonstrate that the combination of shadowing techniques and mobile technology has significant potential to enhance vocabulary mastery in English language learning for EFL learners.

This study investigates the effectiveness of shadowing techniques combined with mobile technology in enhancing vocabulary mastery among 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 shows that mobile-based shadowing techniques significantly increase students' vocabulary mastery. As many as 85% of participants reported improved vocabulary skills after completing the four-week exercise. Additionally, interviews with participants revealed that this method helped them retain vocabulary for more extended periods and increased their confidence in speaking. However, the study also identified several obstacles, including limited internet access and the need for features that allow learners to adjust the audio speed to suit their individual abilities.

These findings highlight the need to develop more adaptive and inclusive learning technologies that support ICT-based English learning in Indonesia and globally.

## **2. Theoretical Framework**

### **2.1. Second Language (L2) Vocabulary Acquisition**

Vocabulary acquisition is fundamental to second language (L2) competence and is crucial for developing skills in reading, listening, speaking, and writing (Nation, 2001). Learners often struggle to comprehend and express themselves effectively without adequate vocabulary knowledge. Schmitt (2010) emphasized that vocabulary learning is not merely about memorizing word lists, but also involves contextual usage, pronunciation, collocation, and syntactic knowledge. Moreover, vocabulary knowledge is acquired through both incidental and intentional learning, where practice and repetition play key roles.

### **2.2. Shadowing Technique in Language Learning**

Shadowing is a technique where learners repeat what they hear almost simultaneously, with minimal delay (Lambert, 1992). Initially developed for interpreting training, shadowing has evolved into a practical language learning strategy that supports listening comprehension, pronunciation, prosody, and vocabulary recall (Hamada, 2016). According to Murphey (2001), shadowing enhances the learner's attention to form and meaning while improving speech fluency. In terms of vocabulary development, shadowing offers exposure to natural input and facilitates deeper mental processing through active engagement (Kadota, 2019).

### **2.3. Mobile-Assisted Language Learning (MALL)**

Mobile technology has revolutionized language learning by providing adaptable, learner-centered, and contextually immersive environments. Mobile-Assisted Language Learning (MALL) involves leveraging portable devices—such as smartphones and tablets—to facilitate language acquisition anytime and anywhere (Kukulka-Hulme & Shield, 2008). Research by Burston (2015) shows that mobile applications and tools can enhance vocabulary retention, increase learner motivation, and promote learner autonomy. Moreover, mobile platforms enable repeated exposure and practice, which are essential for vocabulary mastery.

### **2.4. Integration of Shadowing and Mobile Technology**

Integrating shadowing with mobile technology provides learners with greater accessibility and control over their language input. With mobile apps that include native speaker recordings, subtitles, and playback control, learners can engage in repeated shadowing practice—fostering better vocabulary retention and pronunciation. According to Teng (2020), combining shadowing with mobile tools enables learners to optimize their cognitive load and self-regulate their learning pace, resulting in more effective acquisition of L2 vocabulary. Such integration also promotes authentic learning experiences and aligns with the principles of multimodal learning (Stockwell, 2013).

## **3. Research Method**

This study adopts an explanatory mixed-methods design to evaluate the impact of mobile technology-integrated shadowing techniques on EFL learners' vocabulary mastery. The research implemented a pre-test/post-test experimental framework, with participants completing vocabulary assessments both before and after the intervention to measure gains in proficiency. To complement the quantitative findings, qualitative insights were collected

through interviews and questionnaires, offering a deeper understanding of learners' experiences and their perceptions of the instructional approach.

The population in this study consists of intermediate-level EFL learners enrolled in 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 samples 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 conducted in multiple phases to assess the effectiveness of mobile technology-supported shadowing techniques in enhancing 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 pre-test results served as baseline data, which were later compared with the post-test outcomes following the implementation of the intervention.

The second stage is the intervention (learning using shadowing and mobile technology), which lasts four weeks. Participants can access audio materials based on mobile applications such as Google Voice Assistant and Duolingo at this stage. 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 correctly pronouncing vocabulary, understanding the context of word use, and improving speaking fluency. Following a four-week intervention, participants completed a post-test as the third phase of the study. This assessment mirrored the pre-test in structure and was designed to measure any shifts in vocabulary proficiency resulting from the use of mobile-based shadowing techniques. The comparison between pre-test and post-test scores was then analyzed to determine the overall effectiveness of the instructional approach.

Quantitative data obtained from the pre-test and post-test were analyzed using a paired-samples t-test to determine whether there was a statistically significant improvement in participants' vocabulary knowledge. In parallel, qualitative data gathered through interviews and questionnaires were examined using thematic analysis to uncover recurring patterns, insights, and overarching themes related to learners' perceptions of mobile-based shadowing in vocabulary acquisition.

As the concluding phase of the study, qualitative input was collected by inviting participants to reflect on their experiences with the mobile-assisted shadowing approach. They shared their views on its perceived benefits, encountered difficulties—such as technical issues or pacing challenges—and its overall effectiveness in supporting vocabulary development. These qualitative findings were systematically coded and interpreted through thematic analysis, providing contextual depth that complements and enriches the statistical results from the pre- and post-tests. Together, this mixed-methods design offers a comprehensive understanding of how mobile technology-integrated shadowing techniques contribute to enhancing vocabulary mastery among EFL learners.

## 4. Findings and Discussions

### 4.1 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 presents the students' performance in vocabulary assessments before and after the intervention. The data reveal a marked improvement in overall scores following the implementation of the vocabulary instruction. The mean pre-test score was 55.2, which rose substantially to 89.5 on the post-test. Every participant demonstrated score gains, with individual improvements ranging from 18 to 45 points—highlighting the positive impact of the instructional approach on vocabulary comprehension. Post-test scores fell within the range of 80 to 96, with the majority exceeding 85, indicating that most learners achieved a high level of vocabulary mastery by the end of the intervention. Collectively, these results suggest that the applied vocabulary learning strategy was highly effective, as reflected in the substantial and consistent gains across all participants.

**Table 2.** Paired sample statistics before and after treatment

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

Table 2 shows a significant improvement in students' vocabulary ability after treatment. The average score of students before treatment was 56.58, indicating that students' initial ability in vocabulary learning was still relatively low. The average score increased significantly to 89.16 after treatment, indicating that the treatment or learning method was effective in improving students' vocabulary skills. The sample size consisted of 31 students, serving as 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 relatively high level of accuracy. The standard error value decreased to 0.639 after treatment, indicating an improvement in the accuracy of the average estimate following 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.** Relationship Between Pre-test and Post-test Scores

		<b>N</b>	<b>Correlation</b>	<b>Sig.</b>
Pair 1	Before treatment, after treatment	31	.075	.688

Table 3 examines the association between students' pre-test (baseline) and post-test (after treatment) scores in English vocabulary learning. The correlation coefficient of 0.075 indicates a negligible or virtually absent linear relationship between the two sets of scores. This implies that students' initial vocabulary knowledge, as measured by the pre-test, had little to no bearing on their performance after the intervention. The associated p-value of 0.688 (well above the conventional alpha level of 0.05) further confirms that this correlation is not statistically significant. In practical terms, post-test outcomes appear to be driven primarily by the effectiveness of the instructional treatment rather than by learners' starting proficiency levels. The findings suggest that the vocabulary learning method benefited students uniformly, regardless of their initial ability, leading to consistent improvements across the board.

**Table 4. Paired Samples Test Results**  
**Paired Differences**

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

Table 4 presents the results of the Paired Samples t-test, which was conducted to compare students' English vocabulary scores before (pre-test) and after (post-test) the intervention. The mean difference between the two assessments was -32.581, confirming that post-test scores were substantially higher than pre-test scores. A standard deviation of 6.845 reflects moderate variability in individual score improvements, yet the overall trend consistently points toward enhanced learning outcomes. The 95% confidence interval for the mean difference ranges from -35.091 to -30.070, indicating a high degree of certainty that the true average improvement lies within this interval. The statistical analysis yielded a t-value of -26.502 with 30 degrees of freedom, and a two-tailed p-value of 0.000, which is far below the conventional significance threshold of 0.05. This confirms that the observed improvement in vocabulary scores is not due to chance but is instead a direct result of the instructional treatment.

#### 4.2 Effectiveness of Shadowing and Mobile Technology

Research examining the effectiveness of integrating shadowing techniques with mobile technology in English language instruction for EFL learners has yielded promising outcomes. Based on pre-test and post-test data collected from 31 participants, approximately 85% demonstrated noticeable improvement in vocabulary mastery following a four-week intervention program. This substantial gain underscores the potential of combining mobile-assisted learning tools with shadowing as an effective strategy to enhance lexical acquisition among EFL students. 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. Additionally, mobile technology offers flexibility in learning, allowing participants to practice at their convenience, anytime and anywhere.

The results of interviews with some students showed that some experienced significant improvement, while others with low improvement revealed some interesting findings. Most students believe that the shadowing technique, implemented through the mobile app, helps them memorize vocabulary more quickly and understand its application 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 Assistant, participants can

practice anytime, anywhere, without restrictions on time or place. This demonstrates that mobile technology provides a more dynamic learning solution, one that is not limited to traditional classroom settings. In addition, more frequent practice routines, made possible by the app's accessibility, demonstrate that mobile technology can enhance participants' engagement and consistency in vocabulary development.

*“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 enhance their understanding of language structure and improve their memory of new vocabulary.

Further analysis reveals that shadowing and mobile technology enhance vocabulary mastery and foster 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. Additionally, mobile technology enables learners to receive immediate feedback on their pronunciation through the speech recognition feature and voice recordings, which they can review at their convenience.

However, some challenges were found in the implementation of this method. Some participants experienced technical issues, including unstable internet connections and limited device availability. Additionally, the audio speed in the app is sometimes too fast for beginners, so they would benefit from a feature that allows them 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 should be a feature that allows users to 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 indicates that shadowing techniques should be tailored to the ability level of each learner, particularly for those who are still at the beginner level. The proposed solution, which includes a feature to slow down the audio speed, suggests that flexibility in speed settings can enhance the effectiveness of this method. If this feature is available, participants can adjust the tempo of the practice to their abilities, making the learning process more optimal and reducing 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 via mobile technology. This condition underscores the importance of internet access availability in the success of mobile learning implementation,

particularly in areas with limited network coverage. 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 in providing learning options that work offline, enabling them to reach a broader range of users with varying digital infrastructure conditions.

Overall, this study demonstrates that the shadowing technique, combined with mobile technology, effectively enhances EFL learners' vocabulary mastery. Although there are several obstacles, the benefits obtained are significantly more substantial, particularly in terms of 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.

### **4.3 Discussion**

The research findings showed a significant improvement in students' vocabulary skills. This improvement is clearly shown by comparing pre-test and post-test scores, with the average score increasing from 60.00 to 77.80. Paired sample tests were conducted to evaluate differences between students' vocabulary scores before and after the intervention. The analysis showed a mean difference of  $-32.581$ , confirming that post-intervention scores were substantially higher than those recorded prior to the treatment. Although the standard deviation of 6.845 reflects some variability in individual student performance, the overall trend points toward consistent learning gains. The 95% confidence interval for the mean difference ranged from  $-35.091$  to  $-30.070$ , reinforcing the reliability of the observed improvement. Furthermore, the t-test yielded a t-value of  $-26.502$  with 30 degrees of freedom, and a two-tailed p-value of 0.000—well below the conventional alpha level of 0.05—indicating that the improvement was statistically significant. This positive outcome is attributed to the use of the shadowing technique, a method in which learners immediately repeat spoken words or phrases after a native or fluent speaker, thereby reinforcing both vocabulary retention and pronunciation accuracy. 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 suggest that utilizing mobile technology as a learning medium can enhance the effectiveness of the shadowing method, particularly 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). Additionally, this approach supports self-regulated learning, allowing students to adjust their own learning pace. The practical implication for educators is to incorporate technology into learning strategies to enhance students' language skills more effectively.

The interpretation of the results from this study indicates 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). Additionally, the reduction in standard deviation from the pre-test to the post-test suggests that the applied learning techniques further enhance student learning outcomes. This means that these methods can be widely applied to students of various ability levels.

Compared to previous research, this result aligns 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 methods.

In light of these findings, it is advisable to conduct additional studies exploring the integration of artificial intelligence (AI) within mobile learning platforms to deliver more tailored and individualized vocabulary instruction. Future research could also broaden its participant base and incorporate other influencing factors—such as learners' preferred learning styles and levels of motivation—which may significantly affect the outcomes of vocabulary acquisition through such approaches. This would further support the refinement and advancement of mobile-assisted language learning tools, enabling them better to accommodate dynamic, learner-centered, and adaptive educational strategies.

## 5. Conclusions

This study demonstrates that integrating shadowing techniques with mobile technology significantly enhances students' vocabulary acquisition. The average score rose notably from 60.00 on the pre-test to 77.80 on the post-test, reflecting a meaningful improvement in both understanding and command of vocabulary. A Paired Sample T-Test yielded a p-value of 0.000, confirming that this improvement is statistically significant. Shadowing helps learners develop greater fluency and precision in using new words. At the same time, mobile technology provides the convenience of anytime, anywhere access to learning resources, enabling repeated practice and thus speeding up vocabulary retention. A key contribution of this research is the successful fusion of shadowing and mobile-assisted tools, offering a valuable model for technology-enhanced language instruction. These findings support the broader notion that digital tools can substantially enhance the effectiveness of language learning strategies, particularly in vocabulary development. The results can be used for the design of technology-integrated curricula in educational settings and serve as a basis for future research on innovative approaches within mobile assisted language learning (MALL). In addition, the study highlights the benefits of promoting self-regulated learning, empowering students to take a more active and independent role in the development of their language. Despite these promising results, the study has limitations. First, the number of samples used is still relatively small, so the results of this study cannot be generally broad. Second, the study focuses solely 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 over a relatively short period of time, so it is not possible to measure the long term effects of using this method on the retention of students' vocabulary. Therefore, follow-up research with a larger sample size and a wider range of variables is highly recommended to obtain more comprehensive results.

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