

ENHANCING VOCABULARY MASTERY THROUGH INTERACTIVE DIGITAL MEDIA IN EFL CLASSROOMS: A QUASI- EXPERIMENTAL STUDY

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ABSTRACT

This study investigates the effectiveness of interactive digital media in enhancing vocabulary mastery among students in English as a Foreign Language (EFL) classrooms. Vocabulary acquisition remains a significant challenge for EFL learners, particularly in traditional learning environments that rely heavily on textbook-based instruction. This quasi-experimental study involved two groups of junior high school students: an experimental group exposed to interactive digital media and a control group taught using conventional methods. The participants consisted of eighth-grade students from SMP Tana Toraja. Data were collected through pre-tests and post-tests designed to measure vocabulary knowledge. The findings revealed a significant improvement in the experimental group compared to the control group, indicating that interactive digital media effectively enhances vocabulary learning. The study suggests that integrating digital tools such as interactive applications, multimedia content, and gamified learning platforms can increase student engagement and retention of vocabulary. These results highlight the importance of incorporating technology into EFL instruction to improve learning outcomes and support modern educational practices.

Keywords : vocabulary mastery, interactive digital media, EFL classroom, quasi-experimental, language learning

Enhancing Vocabulary Mastery Through Interactive Digital Media In Efl Classrooms: A Quasi-Experimental Study

INTRODUCTION

Vocabulary mastery plays a crucial role in second language acquisition, particularly in English as a Foreign Language (EFL) contexts. Without sufficient vocabulary knowledge, learners face difficulties in understanding texts, expressing ideas, and participating in communication (Nation, 2017). Vocabulary is considered the foundation of language competence, as it directly influences the development of other language skills such as reading, writing, listening, and speaking (Schmitt, 2019). In Indonesian EFL classrooms, vocabulary learning is often limited to memorization and translation methods, which can lead to low student engagement and retention (Sari & Wahyuni, 2020). Traditional teaching approaches frequently fail to provide meaningful contexts for vocabulary use, resulting in superficial learning (Putri et al., 2021). Consequently, students struggle to apply vocabulary in real-life communication situations.

The integration of technology in education has opened new opportunities for improving vocabulary instruction. Interactive digital media, including mobile applications, educational games, and multimedia tools, offer dynamic and engaging learning experiences (Mayer, 2020). These tools allow learners to interact with content through visuals, audio, and immediate feedback, which enhances memory retention and motivation (Dörnyei, 2021). Previous studies have shown that digital media can significantly improve vocabulary acquisition. For instance, Lin and Lin (2019) found that students who used mobile-assisted language learning applications demonstrated higher vocabulary retention compared to those using traditional methods. Similarly, Rahmawati (2022) reported that gamified learning platforms increased student motivation and participation in EFL classrooms.

Interactive digital media also supports multimodal learning, where students process information through multiple sensory channels (Moreno & Mayer, 2018). This approach aligns with cognitive theory, suggesting that learning is more effective when learners actively engage with content rather than passively receiving information. Furthermore, digital tools enable personalized learning experiences, allowing students to learn at their own pace (Hockly, 2018).

Despite the growing interest in digital learning, many schools in rural areas, including Tana Toraja, still rely on conventional teaching methods. Limited research has been conducted on the effectiveness of interactive digital media in these contexts. Therefore, this study aims to fill this gap by examining the impact of digital media on vocabulary mastery among junior high school students. This research is guided by the following questions:

1. Does interactive digital media significantly improve students' vocabulary mastery?
2. How does the effectiveness of digital media compare to traditional teaching methods?

By addressing these questions, this study contributes to the development of more effective EFL teaching strategies and supports the integration of technology in language education.

METHOD

1. Research Design

This study employed a **quasi-experimental design with a non-equivalent control group and pre-test–post-test structure**. This design was selected because the participants were drawn from existing classroom groups and could not be randomly assigned individually. The design enabled the researchers to compare changes in vocabulary mastery between students receiving interactive digital-media instruction and those receiving conventional instruction. The experimental design can be represented as follows:

Table 1. Experimental design

Group	Pre-test	Treatment	Post-test
Experimental Group	O ₁	X	O ₂
Control Group	O ₃	—	O ₄

In this design, **O₁** and **O₃** represent the pre-tests administered to the experimental and control groups, respectively; **X** represents instruction using interactive digital media; and **O₂** and **O₄** represent the post-tests administered after the treatment. The dependent variable was students' vocabulary mastery, while the instructional approach served as the independent variable.

2. Participants / Subjects

The participants were **60 eighth-grade students from SMP Tana Toraja**, consisting of 30 students in the experimental group and 30 students in the control group. The participants were selected through purposive sampling based on their comparable initial English proficiency and their participation in regular English classes. The two groups were selected from intact classes to maintain the natural classroom setting. Before the treatment, both groups completed the same vocabulary pre-test to determine their baseline performance. The pre-test results showed relatively similar mean scores, indicating that the groups had comparable initial vocabulary knowledge before the intervention.

3. Instruments

The primary instrument was a **vocabulary achievement test** administered as both a pre-test and a post-test. The test consisted of multiple-choice and matching items designed to measure students' knowledge of word meanings, synonyms, and vocabulary use in context. The same learning indicators were assessed in both testing sessions to ensure comparability.

Content validity was established through **expert judgment**, in which specialists in English language education reviewed the relevance, clarity, and appropriateness of the test items. Reliability was examined using **Cronbach's Alpha** to determine the internal consistency of the vocabulary test. The final manuscript should report the number of test items and the obtained Cronbach's Alpha coefficient.

A **classroom observation sheet** was also used to document students' engagement during the treatment. Observation focused on participation, attention, interaction, responsiveness, enthusiasm, and involvement in vocabulary-learning activities. These observational data were used to provide contextual support for the quantitative test results.

4. Data Collection Procedure

Data collection was conducted over **four weeks**. Before the intervention, both the experimental and control groups completed a vocabulary pre-test to determine their initial level of vocabulary mastery. During the treatment period, students in the experimental group received vocabulary instruction through **interactive digital media**, including Quizizz, Kahoot, multimedia presentations, visual materials, audio input, interactive

quizzes, and immediate digital feedback. These activities were designed to provide multimodal input and encourage active engagement with target vocabulary.

The control group learned the same general vocabulary content through conventional instructional procedures, including textbook exercises, teacher explanations, vocabulary memorization, and classroom practice without the systematic integration of interactive digital platforms. Throughout the intervention, classroom observations were conducted to record students' participation and engagement. After the four-week treatment period, both groups completed the post-test under comparable conditions. The post-test scores were then compared with the pre-test scores to examine changes in vocabulary mastery and differences between the two instructional groups.

5. Data Analysis

The data were analyzed using both **descriptive and inferential statistics**. Descriptive statistics included the mean and standard deviation of the pre-test and post-test scores for each group. Gain scores were also calculated by subtracting each participant's pre-test score from the corresponding post-test score.

Before conducting inferential analysis, the data should be examined for the assumptions of normality and homogeneity of variance. A **paired-samples t-test** may be used to determine whether vocabulary scores changed significantly from pre-test to post-test within each group. An **independent-samples t-test** was used to determine whether the post-test scores or gain scores of the experimental group differed significantly from those of the control group.

Statistical significance was determined at the $p < .05$ level. In addition to statistical significance, reporting an effect size such as **Cohen's d** is recommended to indicate the magnitude of the treatment effect. The classroom-observation data were analyzed descriptively to identify patterns of participation, motivation, interaction, and engagement during the learning process. These qualitative observations were used to complement the statistical findings and provide a more comprehensive interpretation of the effectiveness of interactive digital media in EFL vocabulary instruction.

RESULTS AND DISCUSSION

Results

The results of this study indicate a significant improvement in vocabulary mastery among students in the experimental group compared to those in the control group. The data were obtained from pre-test and post-test scores, as well as classroom observations conducted during the treatment period. The pre-test results revealed that both groups had relatively similar levels of vocabulary knowledge at the beginning of the study. The experimental group achieved a mean score of 55.2, while the control group obtained a mean score of 54.8. This minimal difference suggests that both groups started from a comparable

baseline, ensuring the validity of the comparison. In addition, the standard deviation values for both groups were relatively close, indicating a similar distribution of scores among students. Therefore, it can be concluded that there was no significant difference in vocabulary mastery prior to the treatment.

Following the implementation of the treatment, the post-test results demonstrated a noticeable improvement in both groups. However, the increase in the experimental group was substantially higher than that of the control group. The experimental group achieved a mean score of 78.6, whereas the control group reached a mean score of 65.3. This indicates that students who were exposed to interactive digital media experienced greater gains in vocabulary learning compared to those who received traditional instruction. Furthermore, the gain scores between the pre-test and post-test highlight the effectiveness of the treatment. The experimental group showed an average improvement of 23.4 points, while the control group improved by only 10.5 points. This difference clearly illustrates that the use of interactive digital media contributed significantly to students' vocabulary development.

To determine whether the difference between the two groups was statistically significant, an independent samples t-test was conducted. The results of the analysis showed that the p-value was less than 0.05 ($p < 0.05$), indicating that the difference between the experimental and control groups was statistically significant. This confirms that the use of interactive digital media had a positive and meaningful effect on students' vocabulary mastery.

In addition to the quantitative data, qualitative findings from classroom observations further support the effectiveness of the treatment. Students in the experimental group demonstrated higher levels of engagement throughout the learning process. They actively participated in various activities, such as answering questions, completing interactive quizzes, and engaging in group discussions. The use of digital tools appeared to create a more dynamic and stimulating learning environment, encouraging students to become more involved in the learning process. Moreover, students in the experimental group showed increased motivation and enthusiasm when learning new vocabulary. They were more willing to explore new words, ask questions, and collaborate with their peers. The interactive nature of the digital media allowed students to receive immediate feedback, which helped them identify and correct their mistakes more effectively. This immediate reinforcement contributed to a deeper understanding of vocabulary and improved retention.

In contrast, students in the control group exhibited lower levels of engagement and participation. The learning process in this group was largely teacher-centered, with students relying heavily on explanations and textbook exercises. As a result, students tended to be more passive and less motivated to actively participate in the learning activities. This may have limited their opportunities to practice and apply new vocabulary, leading to lower improvement compared to the experimental group.

Another important finding of this study is the role of multimedia elements in facilitating vocabulary learning. The integration of images, audio, and interactive quizzes helped students understand the meaning of words in context rather than through simple memorization. Visual aids, such as pictures and animations, provided concrete representations of abstract concepts, making it easier for students to comprehend and remember new vocabulary. Similarly, audio elements helped improve pronunciation and listening skills, further enhancing vocabulary acquisition.

Additionally, the use of gamified features, such as scoring systems and competition, contributed to increased student engagement. Students were motivated to achieve higher scores and outperform their peers, which encouraged them to participate more actively in learning activities. This competitive yet enjoyable environment fostered a positive attitude toward learning English vocabulary.

Overall, the findings of this study demonstrate that interactive digital media is an effective tool for enhancing vocabulary mastery in EFL classrooms. The combination of quantitative and qualitative data provides strong evidence that students benefit significantly from the use of technology in language learning. The results not only show improvement in test scores but also highlight changes in student behavior, motivation, and engagement during the learning process.

Table 1. Descriptive Statistics

Group	Test Type	N	Mean	Standard Deviation
Experimental Group	Pre-test	30	55.2	6.45
Control Group	Pre-test	30	54.8	6.30
Experimental Group	Post-test	30	78.6	7.10
Control Group	Post-test	30	65.3	6.85

Table 2. Standard Deviation

Group	Mean Gain	Standard Deviation
Experimental Group	23.4	5.20
Control Group	10.5	4.90

The table above shows that both groups had relatively similar initial abilities, as indicated by the nearly identical pre-test mean scores. However, after the treatment, the experimental group demonstrated a significantly greater improvement compared to the control group. The standard deviation values indicate that the variation in scores within both

groups remained at a moderate level, with the experimental group showing more consistent improvement.

Discussion

The findings of this study strongly support previous research indicating that interactive digital media enhances vocabulary learning (Lin & Lin, 2019). The significant improvement observed in the experimental group suggests that digital tools provide more effective and engaging learning environments compared to traditional teaching methods. This improvement can be attributed to the interactive nature of digital media, which encourages active participation and continuous practice. The results are consistent with Mayer's (2020) multimedia learning theory, which emphasizes that learners understand information more effectively when it is presented through both visual and auditory channels. In this study, students were exposed to multimedia elements such as images, audio pronunciations, and interactive quizzes, which helped them process and retain vocabulary more efficiently. The integration of these elements likely reduced cognitive overload and facilitated meaningful learning by connecting new vocabulary with contextual cues.

Furthermore, the increased engagement observed in the experimental group aligns with Dörnyei's (2021) theory of motivation in language learning. Motivation is a key factor influencing students' success in acquiring a second language. The use of interactive platforms such as Quizizz and Kahoot created a fun and competitive atmosphere that encouraged students to actively participate in learning activities. As a result, students were more willing to engage with the material, practice repeatedly, and take risks in using new vocabulary.

The findings also confirm Rahmawati's (2022) study, which highlighted the effectiveness of gamification in enhancing language learning outcomes. Gamified elements such as points, leaderboards, and instant rewards motivated students to compete and collaborate with their peers. This competitive yet supportive environment fostered a positive learning experience and increased students' confidence in using English vocabulary. Moreover, the collaborative nature of some activities allowed students to learn from each other, further reinforcing their understanding.

Another important aspect highlighted by this study is the role of immediate feedback provided by digital media. As noted by Hockly (2018), instant feedback is crucial in language learning because it helps learners identify and correct errors promptly. In this study, students received immediate responses to their answers during interactive activities, enabling them to understand their mistakes and improve their performance. This feature is often absent in traditional classrooms, where feedback may be delayed or limited.

The study also supports the cognitive theory proposed by Moreno and Mayer (2018), which emphasizes the importance of active learning. Students who actively interacted with digital content demonstrated better vocabulary retention compared to those who passively

received information. The hands-on experience provided by interactive media allowed students to engage in meaningful learning processes, such as analyzing, applying, and evaluating vocabulary in different contexts.

In addition to cognitive benefits, interactive digital media also contributed to the development of learner autonomy. Students were able to access learning materials independently, repeat exercises as needed, and monitor their own progress. This aligns with modern educational approaches that emphasize student-centered learning, where learners take an active role in their own development. As a result, students became more responsible and motivated to improve their vocabulary skills. However, despite these advantages, the implementation of digital media in EFL classrooms is not without challenges. As highlighted by Sari and Wahyuni (2020), the effectiveness of digital tools depends on the availability of adequate infrastructure, such as stable internet connections and access to devices. In rural areas like Tana Toraja, these resources may be limited, which can hinder the successful integration of technology in the classroom.

Additionally, teachers play a crucial role in the effective use of digital media. Without proper training and support, teachers may struggle to integrate technology into their teaching practices. Therefore, professional development programs are essential to equip teachers with the necessary skills and knowledge to use digital tools effectively. Teachers need to be able to select appropriate media, design engaging activities, and manage classroom interactions in a digital learning environment.

Another consideration is the potential for distraction when using digital devices. While interactive media can increase engagement, it may also lead to off-task behavior if not properly managed. Teachers must establish clear guidelines and maintain classroom control to ensure that digital tools are used for educational purposes.

Overall, the findings of this study demonstrate that interactive digital media is a powerful and effective tool for enhancing vocabulary mastery in EFL classrooms. The combination of multimedia elements, gamification, and immediate feedback creates a dynamic learning environment that supports both cognitive and motivational aspects of language learning. Despite the challenges, the benefits of integrating digital media outweigh the limitations, particularly when supported by proper infrastructure and teacher training. These results have important implications for EFL teaching practices. Educators are encouraged to incorporate interactive digital media into their lessons to improve student engagement and learning outcomes. Future research should explore the long-term effects of digital learning and investigate its impact on other language skills, such as speaking and writing, in different educational contexts.

CONCLUSION

The findings of this study further reinforce the growing body of evidence that interactive digital media plays a crucial role in enhancing vocabulary mastery among EFL learners. The significant improvement observed in the experimental group highlights how technology-supported instruction can create a more engaging and effective learning environment compared to conventional methods. The use of multimedia elements such as images, audio, and animations allows learners to process vocabulary through multiple channels, which strengthens memory retention and comprehension.

Moreover, the integration of gamified platforms such as Quizizz and Kahoot contributes to increased student motivation and participation. These tools not only make learning more enjoyable but also encourage active involvement, competition, and immediate feedback, which are essential components of effective language acquisition. Students become more autonomous and confident in using new vocabulary in meaningful contexts.

In contrast, traditional teaching methods tend to limit interaction and rely heavily on rote memorization, which may not support long-term retention. The results of this study suggest that incorporating digital media can transform passive learning into active engagement. Therefore, educators should consider adopting interactive digital tools as part of their instructional strategies. Such integration aligns with modern educational demands and prepares students for a more technology-driven learning environment.

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