



Improving Vocabulary Mastery through Digital Image Media: A Pre-Experimental Study of Eleventh Grade Students

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Article Info	Abstract
Accepted: 2026-05-06 Revised: 2026-06-11 Accepted: 2026-06-23 Keywords: digital image media; vocabulary mastery; English language learning; pre- experimental design; SMA Negeri 4 Purworejo. DOI: 10.24256/ideas.v14i1.10459 Corresponding authors: Salsabillah Putri Kinanti kinantibintislamet@gmail.com English Education, University of Muhammadiyah Purworejo	<i>Mastering vocabulary is an important component of learning English, but many learners still face constant developmental barriers. While digital image media is widely recognized, previous research by Ra et al., (2022) and Aulia et al. (2025). It focuses heavily on static print visuals or standard global materials, leaving a critical research gap on how local digital visuals enhance vocabulary learning. As a new view of the use of vocabulary teaching media, this study attempts to apply the integration of contextual digital imagery with Indonesian folklore. To overcome these problems, this study aims to examine the impact of digital images on students' vocabulary mastery. The research approach used is quantitative with a pre-experimental design through a pretest-posttest group method. The participants of this study were 36 students from class XI of SMA Negeri 4 Purworejo. The data collection tool was in the form of vocabulary paper tests given before and after treatment, analyzed using descriptive statistics and paired sample t tests. Empirical results showed a significant improvement in average scores, jumping dramatically from 47.11 in the pre-test to 88.44 in the post-test. Analysis of the paired sample t-test confirmed a very significant statistical difference ($t = -12.45$, $p = 0.000 < 0.05$). Therefore, it can be concluded that digital imagery has a positive and significant impact on students' vocabulary mastery, and has proven to be an effective teaching tool in the context of English language education. Structurally, these findings offer important practical implications for EFL teachers, suggesting that integrating culturally familiar visual media can systematically lower language anxiety and successfully improve overall classroom vocabulary competence.</i>

1. Introduction

Language is the most important communication tool for humans in expressing ideas, emotions, and experiences in an efficient way to others. In the context of fast-paced modern life, language supports different types of social, professional, and academic interactions that are so important (Kapeta, 2024). As a globally spoken language, English plays a very important role in connecting people around the world in the world of business and technology. Today, English language proficiency is not only an advantage, but also a basic necessity to participate in Galloway & Rose's highly competitive global community (2024). In Indonesia, the government has regulated English as a subject to be taken to prepare students for various challenges in the future.

This initiative aims to ensure that students have high competitiveness and wider access to international knowledge from the start. However, to be able to achieve these competencies, students need to have a strong language base so that communication is not hampered. Well-rounded language skills can only be achieved if students can combine all linguistic elements well. To achieve an optimal level of language competence, students are required to learn four main skills, namely listening, speaking, reading, and writing in a balanced manner. Success in mastering these four skills depends on one important element called vocabulary.

Vocabulary becomes the main foundation that allows individuals to form meaningful sentences in a variety of communication contexts. Richards et al., (2022) emphasize that without adequate vocabulary mastery, students will not be able to apply grammatical structures appropriately. The importance of vocabulary lies in its role as a bridge of understanding that connects sound with the concept of the human mind. One may be able to communicate even with grammatical limitations, but communication will not happen at all without vocabulary. Alshumrani (2024) mentions that vocabulary is a key indicator for language proficiency and students' overall academic success in school. Therefore, strengthening vocabulary aspects must be the focus in every foreign language teaching curriculum so that students feel more confident.

Vocabulary has an important role as the main tool needed in the process of deciphering complex texts independently. Nation (2022) reveals that to understand the content of the text well, students must have mastery of at least 95% of the vocabulary contained in it without the need for outside help. Limited vocabulary is often a major obstacle for students in gaining a deeper and more critical reading understanding in the classroom. When students are confronted with unfamiliar terms, their cognitive load increases which interferes with the focus on processing the meaning of the text. Rashid & Hui (2022) note that extensive vocabulary mastery is closely related to students' ability to understand complex academic information.

In addition, having a large vocabulary allows students to draw conclusions about meanings that are not expressed in the text. On the other hand, a lack of vocabulary can cause students to feel frustrated and lose interest in exploring the broader English literature. This shows that improving vocabulary is a very important first step and should not be ignored in the development of students' language literacy skills in schools.

Referring to its very important role, efforts to expand students' vocabulary must be carried out in a planned and innovative manner. This increase has to do not only with the word count but also with the student's in-depth understanding of how to use the word. From a cognitive perspective, vocabulary mastery encompasses complex mental processes ranging from coding, storing, to retrieving information quickly. According to Thornbury (2022), the process of learning new words will be more successful if they are introduced in a context that is relevant to the student. Students should get exposure to targeted vocabulary consistently so that the information can be stored in long-term memory.

Unfortunately, conventional teaching methods often don't support this process because they focus only on boring and uninteresting memorization activities. More interactive learning strategies that involve direct student involvement are needed to accelerate the improvement of their language skills. This requires teachers to be more innovative in designing learning materials that can spark students' curiosity about new vocabulary.

Significant challenges in vocabulary teaching often arise in EFL classrooms, especially in schools located in rural areas. The results of initial research at SMA Negeri 4 Purworejo show that many students still have very limited vocabulary. This is evident when students have difficulty understanding simple instructions or texts given by the teacher during lessons. The main problem found was the students' low memory of the vocabulary they had learned before. Students tend to be able to remember words for temporary exam purposes, but quickly forget them after class ends.

This phenomenon of "forgetfulness" occurs because of learning methods that do not have a deep impact or emotional attachment for students. Rcla (2023) states that learning that is not connected to context is a major barrier to improving students' vocabulary memory at the secondary level. Therefore, media is needed that can help overcome this memory problem so that students can remember vocabulary for a longer time.

In response to the problem of low motivation and retention rates, it is necessary to include learning media that can effectively stimulate the visual senses. The ideal medium is one that can transform vague verbal information into more realistic and memorable visual images. The use of illustrations in language learning has been shown to increase the appeal of the material while clarifying the context of using certain vocabulary. Pictures provide powerful visual cues that assist

students in associating the sounds of words with real objects or actions. According to Webb and the Nation (2017), the human brain is naturally more effective at processing information presented visually than simply reading a series of texts.

The incorporation of visual media is also useful for teachers to reduce the use of mother tongue (L1) when deciphering the meaning of difficult words. In this way, students can become more accustomed to thinking directly in the target language through the help of image representations given in class. This is expected to create a more in-depth learning atmosphere and support the acceleration of vocabulary mastery for each student.

Digital Image Media emerged as a very appropriate alternative for the character of students who grow up in the current digital era. In contrast to traditional printed images, digital media provides much better flexibility, color clarity, and accessibility in the classroom. Digital images can be easily displayed through a projector or computer, making it easier for all students in the class to see. The use of this technology also allows teachers to get millions of authentic and up-to-date visual references from various online platforms. In addition, digital images can be customized or edited according to the needs of the subject matter being reviewed by the researcher.

The dynamic nature of digital media is able to increase the enthusiasm of students who are already very familiar with technological devices in their daily lives. The application of this media at SMA Negeri 4 Purworejo is expected to bring positive changes in students' views on English learning. Therefore, the use of digital image media is a strategic step to increase the effectiveness of vocabulary teaching at the secondary school level.

Theoretically, the advantages of using images in vocabulary teaching are rooted in the Dual Coding Theory which explains that human memory functions more effectively when information is processed through verbal and visual pathways simultaneously. In the context of modern education, this theory is supported by Mayer (2021) which states that the combination of visual and verbal inputs through digital media is able to maximize students' cognitive capacity, so that the storage of information in long-term memory becomes stronger than using only one sensory channel (Paivio, 2006). The student's brain creates two formats of representation that reinforce each other.

This results in a more in-depth memory trail than if students only received information through a single sensory pathway (Mayer, 2024). The use of this dual-code technique is very effective in speeding up the retrieval process when students need it to communicate. Webb and the Nation (2017) add that visual imagery can ease the cognitive burden of students when learning new language concepts. With pictures, students don't have to go through a complicated mental translation process from English to Indonesian to understand their meaning. So, strengthening memory pathways through digital image media is a very logical and scientifically evidence-based method. Digital images provide support for students to transform

the meaning of abstract words into something more real and easy to understand. For example, difficult verbs or adjectives can be clarified through relevant images.

This effective visualization allows the brain to store information directly into long-term memory. When information is stored well in long-term memory, students will be better able to remember vocabulary even if it is not studied often. This significantly addresses the low retention problem that English teachers in schools often complain about. Through digital images, the relationship between symbols and meanings becomes more natural and does not feel forced. Students feel calmer because they receive clear visual support at every stage of learning they experience. The simplicity of delivery through visuals actually has a big impact on students' cognitive understanding in the classroom.

A recent study by Aulia et al. (2025) show that the use of digital visuals greatly increases student participation in the classroom. Students become more active asking questions and engaging in discussions when vocabulary learning is supported by compelling image representations. This enthusiasm contributes directly to the creation of a positive learning atmosphere that supports the development of language competence.

In addition, the use of digital images also often reduces students' stress levels when dealing with English materials that are considered complex. When students feel happy and not stressed, their brain's ability to absorb new information increases significantly. Visual media serves as a trigger that increases students' curiosity to explore more image-related vocabulary. This proves that the affective or emotional aspects of students have a great influence on the success of language learning at the school level. This media integration is not just a tool, but it is actually a catalyst that accelerates achievement in the overall language learning goals.

However, previous empirical studies present a critical pedagogical contradiction. Recent visual investigations, such as those conducted by Ra et al (2022) and Aulia et al (2025), given that digital visuals successfully spark short-term class participation and local engagement, they rely heavily on standard global materials or static imagery. This creates a distinct research gap, as traditional text training methods and global visual content fail to address the high cognitive load and retention anxiety experienced by EFL Indonesia students. This study explicitly addresses this lack of critical synthesis by integrating dynamic digital image media with culturally familiar narratives, especially Indonesian folklore to build authentic cognitive schemas that support long-term vocabulary retention.

By incorporating digital images in learning, educators get a greater opportunity to create an interactive and enjoyable learning environment for all students. This interaction can be achieved through a variety of classroom activities such as charades games, word matching, or visual discussions in groups. This activity encourages students to actively use the vocabulary they have just learned in a communicative context. The teacher's role is as a facilitator who directs

students' attention to visual elements that are relevant to the vocabulary they want to achieve. The use of these media also allows for direct feedback between teachers and students during the classroom learning process.

This has a direct impact on increasing students' intrinsic motivation to continuously improve their English skills. Students no longer think of English lessons as a burden, but as an exciting activity that every meeting looks forward to. The long-term impact of this high motivation is the formation of independent learning habits that are very beneficial for students' futures.

In addition to motivation, the effectiveness of acquiring vocabulary through the use of digital images is also supported by a variety of authentic and varied content. Teachers can choose images that accurately reflect the culture and real-life situations in English-speaking countries to enrich students' cultural knowledge. This cultural knowledge is essential so that students not only know the meaning of words, but also understand the social context of their use. According to Lee (2026), exposure to authentic digital materials helps students develop more natural and flexible communicative competencies.

Digital images allow teachers to bring the outside world into the classroom in an efficient and practical way. The flexibility of this medium also supports a wide range of student learning styles, from students with visual inclinations to those who prefer the hearing method. The diversity of visual content ensures that each student gets stimulus that suits their individual learning style in the classroom. This is what makes digital images the main choice in improving students' vocabulary skills at school.

The application of digital image media is very much in line with the principles of student-focused learning as regulated in the modern curriculum. In this approach, students are encouraged to construct meaning independently based on the visual stimuli provided by the teacher in the classroom. Digital images serve as a discussion trigger that allows students to explore their own original ideas in English Ra et al. (2022). Teachers no longer dominate conversations, but provide many opportunities for students to express themselves creatively with visual aids. Baker (2017) notes that the active involvement of students in the learning process is the key to successful mastery of the material independently.

Through the medium of images, students are trained to become critical observers and be able to connect visual information with their language knowledge. This active process of building meaning is much more recorded in the student's memory compared to passive information absorption. Thus, digital imagery contributes to the development of learning independence which is essential for the academic progress of students at a higher level.

The use of digital technology in vocabulary teaching also provides administrative advantages for teachers related to efficiency in the preparation of teaching materials. Materials that have been prepared in digital format can be easily saved, updated, and reused for future classes or school years (Zain et al.,

2024). Teachers can compile a collection of pictures classified according to the theme or difficulty level of vocabulary to be taught to students. This easy access allows teachers to concentrate more on developing more creative and innovative methods of delivering material in the classroom.

In addition, the use of digital media allows the incorporation of other multimedia elements such as audio or short videos that can strengthen students' hearing comprehension. According to Graham et al. (2020), the combination of various media modalities in teaching can significantly improve student learning outcomes at all levels of education. This efficiency is very important considering the many tasks that teachers have to face in the formal school environment in Indonesia. The use of smart technology will support teachers in achieving curriculum goals in a more modern and effective way.

In the context of SMA Negeri 4 Purworejo, the use of digital image media is expected to be able to provide concrete solutions to the limitations of existing print learning resources. Many students at this school come from diverse backgrounds with varying levels of digital skills as well. Through attractive visuals, the comprehension gap between students can be reduced because pictures are a universal language that is easy to understand.

The researchers believe that with comprehensive care, the vocabulary skills of students in these schools can be significantly improved in a short period of time. Adequate school facility support for the use of digital technology must be fully utilized by educators there. This study aims to measure how much improvement occurs through a measurable and systematic research design. The results of this study are expected to be a reference for other teachers in schools to adopt similar learning media. The change in teaching methods from traditional to digital is something that must be responded to positively for the advancement of education in the country.

Therefore, this investigation shifted from excessive theoretical repetition to evaluating the direct operational outcomes of local digital media in the classroom. To systematically guide this empirical study and address the limitations found in the existing literature, this study addresses the following explicit research questions: 1) Is there a significant difference in the vocabulary mastery of grade 11 students before and after being taught using digital image media at SMA Negeri 4 Purworejo? 2) How the integration of local digital image media affects students' vocabulary retention when learning English through Indonesian folklore?

2. Method

This investigation applied a quantitative method with a pre-experimental design that used the One-Group Pretest-Posttest Design model to empirically assess the effectiveness of the intervention. The selection of this model was triggered by the need to assess the causal impact of an intervention in a natural classroom environment (Aries, 2022).

Introduction to School Field (PLP) grade XI SMA Negeri 4 Purworejo researchers found significant obstacles in vocabulary mastery. Using this design, the researcher conducted a pre-test, then provided a series of treatments, and ended with the final test (post-test). Creswell (2017) argues that this one-group model is effective in capturing changes in behavior or ability after the implementation of a particular intervention. Using the design of this study, its implementation is operationally justified due to administrative scheduling constraints in schools that prohibit the rearrangement of existing classrooms.

To reduce threats to internal validity, researchers maintain absolute environmental and instructional consistency at all stages. The researchers aimed to prove statistically whether there was a significant improvement in students' vocabulary after using the media. Systematically, the comparison of scores between the two tests will be used as the main indicator of the success of the application of digital image media. Therefore, this framework provides a solid basis for answering research questions related to improving students' language skills.

This research was conducted at SMA Negeri 4 Purworejo, Central Java, during the even semester of the 2025/2026 school year with a focus on junior high school students. The population used as the research subject included all students of grade XI, while the sample was deliberately taken using purposive sampling techniques based on certain criteria. The researcher chose class XI-4 consisting of 36 students as the main subject because the class had the lowest vocabulary mastery.

The specific inclusion criteria for this objective selection require that the class: 1) demonstrate the lowest baseline retention score in the initial observation, and 2) operate on a curriculum timeline that is appropriate to the scope of the research. This sample selection was carried out based on recommendations from local English teachers and the results of observations in previous field practice activities (Nuryadi et al., 2017). Students in these classes show a tendency to avoid using dictionaries and often have difficulty answering oral questions from researchers.

The uniform characteristics of the sample in terms of language constraints allowed researchers to be more focused and in-depth in controlling the treatment variables. The purposive sampling technique ensures that the data obtained actually comes from the group that most needs visual media intervention. Regarding ethical considerations, formal institutional permits and administrative permits are officially granted by the principal and English teachers at SMA Negeri 4 Purworejo. In addition, orally informed consent was obtained explicitly from all

36 participating students, guaranteeing their voluntary participation, strict confidentiality, and complete anonymity during data collection. It is hoped that the results of this research will be able to provide practical solutions to the problem of teaching English in schools.

The initial stage of the research began at the first meeting with the implementation of a 40-minute pre-test session aimed at assessing the basic level of students' abilities. To ensure the validity of the data and the accuracy of the results obtained, the researcher required all students to hand over their mobile phones before the exam started.

This strict procedure is implemented so that the testing process takes place without the support of a digital translator application or online dictionary (Chong, 2023). In order to guarantee the strict construction and validity of the content, the test instruments undergo prior evaluation and formal validation by experts of the senior English education faculty. In addition, a comprehensive item analysis and pilot trials were conducted on non-sample classes to verify high reliability and appropriate difficulty levels prior to application. Students are given the task of solving vocabulary problems taken from the narrative text of Indonesian folklore to match the curriculum material.

The score obtained at this stage will serve as baseline data that will be compared with the results after treatment is administered. The classroom conditions are maintained to remain formal and calm to ensure the reliability of the results of the questions by everyone. The researchers note that honesty during the pre-test is crucial to objectively evaluate the effectiveness of digital image media in the future. After all the answer papers were collected, the researcher continued the meeting by introducing a visual scheme as the first step of the intervention session.

The meeting continued by introducing visual schemes through digital image guessing activities related to folklore such as Malin Kundang, Timun Mas & Buto Ijo, and Joko Kendil. The medium used is an interactive PowerPoint presentation with high-quality images designed to grab the attention of students in the classroom. Students were then invited to watch a narrative video about Indonesian legends in English, followed by an interactive session to guess ten vocabulary keywords.

This activity is in line with the Cognitive Theory of Multimedia Learning which shows that the incorporation of text and images can improve cognitive comprehension (Mayer, 2024). The use of contrasting colors and animations in digital media aims to strengthen students' mental connection with the meaning of new words. With this visual aid, students can recognize the characteristics of characters and objects without having to constantly rely on Indonesian translations. The session ends with a brief reflection to evaluate which vocabulary is the easiest or the most difficult to understand with visual assistance. The

researcher ensured that each image displayed had a direct relationship with the target vocabulary that would be improved in this study.

At the second meeting, the focus was entirely directed to strengthening students' memory through interactive approaches and fun gamification methods in the classroom. The researcher explains verbally the characteristics of a particular object, and students are challenged to name relevant English vocabulary based on the visual stimuli given. The scheduled repetition strategy is implemented by replaying images from the previous meeting to test students' long-term memory (Thornbury, 2022).

As the peak of the activity, the researcher applied a digital matching game to strengthen the visual and verbal relationship for each student. Gamification has been shown to be effective in increasing emotional engagement and lowering students' anxiety when learning a foreign language (Idayani & Sailun, 2024). Students look more excited to compete in pronouncing difficult words because they are motivated by dynamic and engaging digital visual displays. Repetition in the context of this game aims to make the targeted vocabulary more permanently stored in their long-term memory. Thus, the improvement of vocabulary skills occurs naturally through immersive and interactive learning experiences.

The series of research ended at the third meeting with the implementation of *Post-Test* to measure the significance of increasing students' vocabulary mastery quantitatively. Although the three-session intervention timeline is relatively concise, this short duration is methodologically necessary and justified in aligning appropriately with the local curriculum allocation for the narrative unit, thereby preventing cognitive fatigue while maximizing the intensity of focused teaching.

The researcher deliberately did not say that the post-test questions were identical to the initial test to obtain pure data related to the effectiveness of the media. The confidentiality of the identity of the questions is essential to ensure that the improved score is the result of comprehension, not just memorization of the question. All data collected is then systematically fed into the SPSS v.26 application for statistical data processing (Field, 2024).

Before testing the hypothesis, the researcher conducted a normality test to ensure the data was distributed normally at a 95% confidence level. Tests *Paired Sample T-Test* used as the main analysis technique to compare the average scores between *Pre-tests* and *Post-Test* accurate. If the significance value (2-tailed) shows a number below 0.05, then the research hypothesis regarding the influence of digital image media is accepted. The results of this analysis will be strong empirical evidence to support the use of visual media in improving the vocabulary of high school students.

3. Results

1. Distribution of Individual Pre-test and Post-test Scores

To see the effectiveness of digital image media in depth, the researcher presented a comparison of the scores of each student. The student's name has been anonymized into a code **S (Student)** to meet research ethics.

Table 1. Comparison of Pre-Test and Post-Test Scores for Students of Class XI-4 (N=36)

Student Code	Pre-tests	Post-tests	Improvement	Student Code	Wed	Post-tests	Improvement
S1	40	88	+48	S19	36	88	+52
S2	32	80	+48	S20	32	80	+48
S3	52	100	+48	S21	48	96	+48
S4	80	100	+20	S22	36	96	+60
S5	72	100	+28	S23	48	60	+12
S6	88	100	+12	S24	40	88	+48
S7	48	88	+40	S25	48	80	+32
S8	52	80	+28	S26	28	68	+40
S9	40	88	+48	S27	68	100	+32
S10	40	96	+56	S28	64	100	+36
S11	32	80	+48	S29	48	80	+32
S12	76	100	+24	S30	64	100	+36
S13	48	88	+40	S31	20	68	+48
S14	48	88	+40	S32	64	100	+36
S15	32	96	+64	S33	28	92	+64
S16	48	96	+48	S34	60	100	+40
S17	32	80	+48	S35	32	76	+44
S18	40	96	+56	S36	32	68	+36

Table 1 presents the raw value of the results *Wed* and *Post-Test* of 36 students in grades XI-4 who showed significant changes in scores after being treated using digital image media. The data shows that all students (100%) experience an increase in scores, where none of them experience a decrease in grades or fixed outcomes. The highest increase was recorded in S15 and S33 students who managed to increase their grades by 64 points, a drastic jump that suggests that the use of image media is particularly effective in helping students with low initial ability to pursue their vocabulary.

In addition, the effectiveness of this media is also seen in the achievement of a perfect score (100) by a number of students such as S3, S4, S12, and S34 at the time of *Post-Test*. Overall, the distribution of this raw data showed a consistent and clear pattern of improvement between participants, which proves that the integration of image media in learning is able to improve students' vocabulary mastery evenly.

A deeper analysis of individual variance in this distribution reveals different cognitive trajectories among students. Students who initially showed the lowest basic competencies in pre-tests, such as S15 and S33, showed the most substantial point escalation. This significant individual variance occurs because the digital image medium explicitly acts as an external cognitive anchor. By moving away from abstract and text-only drilling and integrating culturally familiar narratives—especially Indonesian folklore—effectively minimizes the high cognitive load and retention anxiety typically experienced by these low-performing students. As a result, they can quickly build authentic cognitive schemas to match new verbal tokens with semantic visual images.

In contrast, students who already had high pre-test baselines, such as S6 (+12 points) and S4 (+20 points), showed more moderate gradual improvements. This narrower margin of growth does not indicate a lack of media effectiveness, but rather a ceiling effect, as their early mastery of vocabulary leaves less room for numerical expansion.

For these higher-performing students, interactive PowerPoint presentations and digital flashcards serve primarily as tools to validate and stabilize their pre-existing mental schemas rather than as basic vocabulary loaders. This dual-speed development suggests that although digital interventions accommodate individual differences in visual working memory, digital interventions universally guarantee a supportive and engaging environment for all levels of proficiency in the classroom.

2. Description of Data Statistics

The researchers summarized this distribution of grades into descriptive statistics to look at class performance collectively.

Table 2. Description of Vocabulary Value Statistics

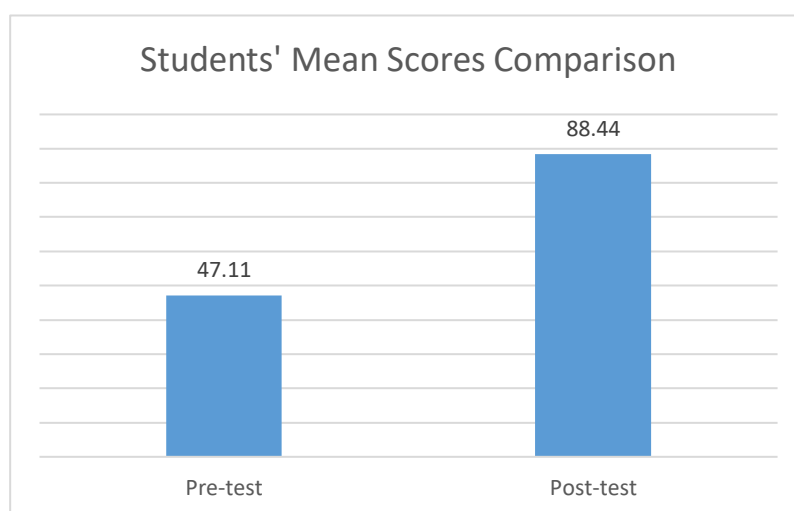
Statistical Size	To the	Post-tests
Means	47,11	88,44
Standard Deviation	16,28	11,22
Minimum	20,00	60,00
Maximum	88,00	100,00

Table 2 presents a summary of descriptive statistics confirming the findings of previous raw data. Based on the table, there was a very significant increase in the average score, from 47.11 in *Pre-tests* to 88.44 on *Post-Test*. This spike in average scores shows that collectively, the use of image media has a great positive impact on improving students' vocabulary mastery in grades XI-4.

In addition to the average increase, the standard deviation at the *post-test* was recorded to be smaller (11.22) than at the *pre-test time* (16.28). This shows that students' vocabulary skills after treatment become more evenly distributed, where the gap in grades between students in the classroom is getting smaller. This improvement in performance is also supported by a shift in the range of minimum and maximum values; The lowest score of the student increased drastically from 20.00 to 60.00, while the highest score reached a perfect score of 100.00. Overall, this statistical description proves that interventions through the medium of images not only improve individual grades, but also successfully improve the standard of overall class vocabulary competencies.

To measure mathematically the magnitude of this pedagogical treatment, *d* Cohen is calculated as a measure of effect size. Analysis yields effect size $d = 2.96$, which substantially exceeds the standard threshold of 0.80 for large effects, shows very strong practical significance. This metric confirms that digital image media integration results in transformative impact rather than marginal gains.

This profound effect is in line with Paivio's Double Coding Theory, which posits that the human cognitive architecture processes information through separate visual and verbal channels simultaneously. By synchronizing the narrative of folklore with explicit digital visual stimuli, the intervention reduces cognitive load and increases dual-channel retention, thereby accelerating the cognitive shift from transient lexical recognition to sustained vocabulary mastery.



The substantial shift in collective class performance is visually illuminated by the accompanying bar chart, which highlights the definitive gap reduction achieved post-intervention. This collective compression of standard deviations from 16.28 to 11.22 shows that digital visual integration standardizes vocabulary acquisition across a wide range of learners' backgrounds. By operationalizing high-quality animations and structured contextual visuals, the class shifts from fragmented memorization to a synchronized core language retention base.

3. Classification of Student Ability Level

To facilitate understanding the effectiveness of media, researchers grouped students into several categories of abilities.

Table 3. Frequency Distribution of Student Vocabulary Ability Categories

Value Range	Category	Pre-test (f)	Post-tests (f)
80 – 100	Awesome	3	28
60 – 79	Good	5	8
40 – 59	Enough	15	0
< 40	Less	13	0
Quantity		36	36

Table 3 provides strong visual evidence of the success of the intervention in improving students' vocabulary mastery. On stage *pre-tests*, the initial condition of the class shows that the dominance of ability is still low, where there are 28 students (around 77.8%) who are in the "Sufficient" and "Less" categories. However, after the process *Pengobatan* Involving the use of image media, the distribution of students' abilities has undergone a very significant shift in a more positive direction.

post-test indicates that the "Sufficient" and "Less" categories are now empty (0%), which means that all students have successfully exceeded their basic ability threshold. Instead, there was a rapid increase in the "Excellent" category, which jumped dramatically from just 3 students to 28 students. Meanwhile, 8 other students were in the "Good" category. This data transformation confirms that the use of image media in folklore learning is very effective in increasing the level of student competence collectively, bringing the majority of classes to reach the optimal level of ability.

This macro-level redistribution shows that the integration of digital image media acts as an equalizer in vocabulary acquisition, effectively pulling low-level learners out of a lacking foundation. The total depletion of the 'Enough' and 'Less' categories suggests that visual contextualization prevents cognitive overload, allowing weaker students to anchor abstract lexical items into tangible mental representations.

In contrast, the small variation observed in the post-test—where 8 students remained in the 'Good' category while 28 achieved 'Excellent'—could be attributed to individual variation in working memory capacity and prior semantic familiarity with folklore content. While digital visuals guarantee a standard basis of understanding across groups, the leap to absolute excellence is still modulated by the student's internal factors, such as the individual's processing speed and intrinsic level of involvement during treatment.

4. Significance Test (Paired Sample T-Test)

The researcher conducted a hypothesis test to ensure that the difference in values had statistical significance.

Table 4. Paired Sample T-Test Results

Variabel	Average Difference	<i>t</i>	Sig. (2-tailed)
Pre-test - Post-test	-41.33	-12.45	0.000

Table 4 presents the results of a hypothesis test that aims to ensure that the difference in values between the two tests is statistically significant. Based on the results of the Paired Sample T-Test, a significance value (2-tailed) of 0.000 was obtained. Because the value is much smaller than the specified level of significance ($p < 0.05$), the Working Hypothesis (H_a) is accepted and the Null Hypothesis (H_0) is rejected.

In addition, a t-count value of -12.45 with an average difference of -41.33 reinforces the finding that there was a very significant increase in vocabulary mastery. Thus, it can be concluded that the use of digital image media in learning has a great positive influence on the vocabulary mastery of students in grades XI-4 of SMA Negeri 4 Purworejo. These results prove that the increase in value that occurred was not a coincidence, but a direct impact of the media intervention provided by the researcher.

This statistically significant divergence ($p < 0.001$) mathematically validated that the observed vocabulary expansion was not a product of casual testing variance or transient experimental bias. The extreme t-value output confirms that the structured implementation of digital image media actively bridges the cognitive gap in lexical retrieval. By replacing traditional abstract memorization learning with highly engaging and context-rich visual stimuli, the intervention systematically anchors new word forms within the student's long-term cognitive framework, ensuring verified and sustained progress in foreign language vocabulary mastery.

4. Discussion

In contrast to some assumptions that short-term digital media use may not have a permanent impact, the findings in this study comprehensively prove the opposite result. The integration of digital image media is able to significantly change students' vocabulary mastery even though the intervention is carried out in a limited duration.

This effectiveness proves that the quality of the media and the accuracy of instructional strategies are more influential than just the quantity of class meetings. This phenomenon of rapid success can be explained through several pedagogical and cognitive factors as follows:

Success in improving student grades is in line with the principles of cognitive load management (Swelling, 2020), where the use of digital image media serves as an aid to minimize irrelevant cognitive load (*foreign cognitive load*). By presenting interesting and relevant images, students don't have to work hard imagining foreign concepts, so their mental energy can be fully allocated to effectively processing and memorizing new vocabulary. Proper visual integration helps the brain organize information systematically, so that even though the learning duration is short, it is absorbed optimally without causing cognitive fatigue.

1. Analysis of the Effectiveness of Digital Image Media

The main findings in this study show a very positive impact on the vocabulary mastery of students in grades XI-4 of SMA Negeri 4 Purworejo. This is empirically proven by the spike in average scores from 47.11 at the time *Pre-tests* up to 88.44 in a session *Post-Test*. This success shows that visual media is able to simplify abstract English concepts into more concrete representations. Theoretically, this is in line with *Cognitive Theory of Multimedia Learning* (May, 2024) where the integration of visual and verbal inputs facilitates a stronger storage of information in long-term memory.

When systematically juxtaposed with previous empirical studies, the findings of this study reinforce and expand the existing literature on lexical acquisition. While previous studies have traditionally emphasized static flashcards that often result in moderate vocabulary gain, the integration of dynamic digital image media in this study resulted in a much higher effect size ($d = 2.96$).

This sharp contrast suggests that combining local folklore with animated visual narrative creates a superior cognitive anchor compared to the Western-centric generic visual aids often found in commercial ELT materials. As a result, this study fills an important empirical gap by proving that local cultural narratives, when digitized, significantly lower the barriers of cultural unfamiliarity, allowing EFL learners to allocate more cognitive working memory directly to lexical coding than to contextual decoding.

2. Memory Strengthening through Visual Stimulation

Consistent score improvements across students show that high-resolution digital images and contrasting colors serve as a powerful stimulus to attract students' selective attention. In the context of vocabulary, images help students establish direct associations between visual objects and their linguistic labels without the need to go through a lengthy mental translation process.

Strategy *Distance repetition* which the researcher applied through the replay of key images in each session was also proven to strengthen student information retention (Thornbury, 2022). As a result, students with low initial abilities may catch up with them significantly because visual information is easier to remember (*Intake*) during the exam.

3. The Impact of Gamification and Student Affective Responses

In addition to the cognitive aspect, the success of this intervention was triggered by changes in the learning atmosphere through the application of gamification methods. The researchers observed very high enthusiasm when students were actively engaged in guessing digital images and playing matching games (*Matching Games*).

This interactive classroom condition effectively lowers anxiety levels (*filter afektif*), so that they become more courageous to participate without fear of making mistakes. The intrinsic motivation that arises from the pleasure of learning is expressed directly by students in reflection sessions, where they find it easier to memorize vocabulary due to the presence of attractive visual aids (Idayani & Sailun, 2024).

4. Cultural Integration and Contextualization of Learning

The use of Indonesian folklore content, such as *Malin Kundang*, *Cucumber Mas*, *Green Button* providing cultural proximity (*Cultural Proximity*) for students. The use of familiar material makes it easier for students to focus on the target vocabulary rather than having to struggle to understand the background of an unfamiliar story. The integration between modern digital media and local content creates a more immersive learning experience for Generation Z students at SMA Negeri 4 Purworejo.

These findings reinforce the evidence that the combination of digital technology and local content is an effective formula for overcoming barriers to vocabulary mastery at the secondary school level. In addition to simply confirming Paivio's Dual Coding Theory or Mayer's Multimedia Learning Principles, this study expands on this basic framework by proposing a 'Cultural-Visual Synergy Model' in EFL vocabulary acquisition.

Theoretically, traditional multimedia learning assumes that each synchronized visual-verbal input reduces cognitive load. However, this study reveals a critical nuance: the power of dual-channel processing relies heavily on the semantic familiarity of the underlying narrative. By utilizing culturally-based folklore, digital images don't just illustrate words; They activate pre-existing and entrenched cultural schemes. This synergy demonstrates theoretical progress – multimedia learning tools achieve maximum pedagogical efficiency not only through visual quality, but when visual stimuli make use of learners' collective cultural identities, thereby minimizing cognitive friction from the start.

5. Limitations of Short-Term Interventions and Long-Term Retention

Despite the profound statistical spikes observed in post-tests, critical alternative explanations must be addressed regarding the durability of this vocabulary acquisition. Because the study operated within a pre-experimental timeline, the hands-on evaluation primarily captured short-term lexical retention modulated by transient working memory inflation and novelty effects of digital flashcards and interactive PowerPoint presentations. It makes sense that without continuous exposure, these newly anchored mental schemas can unravel over time.

To address these limitations and ensure long-term retention, pedagogical interventions must shift from temporary classroom exposure to ongoing retrieval practices. Future implementations should integrate interval repetition schedules within digital media platforms, ensuring that folklore-based visual tokens are systematically reintroduced at calculated intervals to transition vocabulary derived from episodic memory to students' permanent semantic long-term frameworks.

5. Conclusion

Based on the results of data analysis and discussions that have been presented, it can be concluded that the use of digital image media has a significant influence on improving the vocabulary mastery of students in grades XI-4 of SMA Negeri 4 Purworejo. This is empirically proven through the results of statistical tests *Paired Sample T-Test* which shows a significance value (2-tailed) of 0.000 ($p < 0.05$), which means that the working hypothesis (H_a) is accepted conclusively.

The success of this intervention was evident in the surge in class grades that increased dramatically from 47.11 at the time *Pre-tests* up to 88.44 in one session *Post-Test*. The fact that 100% of students experience an increase in individual scores shows that digital image media is effective in helping students of all abilities to master new vocabulary more easily.

In addition, the integration of interactive visual media with elements of gamification and Indonesian folklore has been proven to be able to create a fun learning atmosphere and increase students' intrinsic motivation. Thus, the use of

digital image media is not just a technical tool, but a comprehensive instructional strategy in overcoming vocabulary mastery obstacles at the secondary school level.

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