

EXPLORING THE IMPACT OF USING STORYNORY ON VOCABULARY LEARNING: A SHORT-TERM INTERVENTION STUDY INVOLVING SEVENTH-GRADE EFL LEARNERS

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Abstract: This study examined the short-term effectiveness of multimedia instruction for vocabulary learning among Indonesian Grade 7 EFL learners. Using a quasi-experimental pretest–posttest control group design, 64 students received either multimedia instruction via Storynory (audio narration, written text, and visuals) or conventional text-only instruction across two sessions. Vocabulary gains were assessed using a teacher-developed multiple-choice test. Results revealed significant improvement in the experimental group ($p < .001$) and a significant between-group difference favoring multimedia instruction ($M = 82.25$ vs. 74.13 , $p = .003$), with a medium-to-large effect size (Cohen's $d = 0.77$). Findings provide preliminary evidence that brief multimedia interventions using free digital platforms can support initial vocabulary gains in resource-constrained EFL classrooms. This suggests Storynory-based instruction may complement traditional vocabulary teaching and aligns with multimedia learning principles for junior secondary contexts.

Keywords: Multimedia Learning; Storynory; Vocabulary; Mayer's Theory

In the process of acquiring a foreign language, vocabulary often becomes the first and most noticeable barrier faced by learners. Vocabulary knowledge is the foundation on which language proficiency stands, allowing learners to make sense of and participate in target language communities (Nation, 2013; Schmitt, 2010). It is essential for effective communication, text comprehension, and nuanced expression. Research has consistently shown that vocabulary knowledge is one of the most influential factors affecting reading comprehension, listening, and communicative competence, with strong correlations between vocabulary size and performance in language skills (Nation, 2013; Zhang et al., 2023).

A strong vocabulary enables students to comprehend challenging texts, participate in discussions, and express ideas accurately. This creates a reinforcing cycle in which improved vocabulary supports reading comprehension, leading to increased exposure to new words in meaningful contexts, which in turn further strengthens vocabulary knowledge. In contrast, learners with limited vocabulary struggle to access academic content because they have difficulty understanding key terms, instructions, and complex texts, restricting their ability to engage with grade-level materials and express ideas effectively. These learning difficulties consequently become a pedagogical challenge for EFL teachers in Indonesia, as a recent study reported that up to 76% of seventh-grade students were unable to use newly learned words appropriately in context (Puspayanti et al., 2024). Vocabulary plays a central role in language learning and strongly influences all aspects of language acquisition. In EFL contexts, where learners often have limited exposure to English outside the classroom, vocabulary development cannot rely solely on environmental input. Therefore, vocabulary needs to be supported through conscious and systematic teaching practices to help learners build a strong lexical foundation.

However, vocabulary learning difficulties among Indonesian EFL learners are influenced by two interrelated factors. The first concerns limited exposure to English input outside formal classroom instruction. Many schools, particularly in rural or non-urban areas, have restricted access to English reading materials beyond mandatory textbooks (UNESCO, 2023). Although some schools provide libraries, Ministry of Education data (2022) show that only about 20% of secondary students regularly use them, indicating that availability does not necessarily translate into actual reading practice. Moreover, English materials are often limited in quantity or dominated by academic texts rather than narrative or graded reading materials. According to Nation (2013), incidental vocabulary learning is more likely to occur when learners are exposed to comprehensible and meaning-focused input, such as through extensive reading of narrative texts. Contextualized exposure allows learners to encounter words repeatedly in meaningful situations, which supports vocabulary development over time.

The second factor relates to classroom vocabulary practices. Vocabulary instruction frequently relies on decontextualized word lists, direct translation, and rote memorization. While such techniques may support short-term recall, they are less effective for long-term retention and meaningful use in communication. For beginning EFL learners, including seventh graders who are often encountering formal English instruction for the first time, this instructional emphasis may restrict opportunities to encounter vocabulary repeatedly in rich contexts. As

Chen and Geva (2023) emphasize, vocabulary knowledge forms the foundation of reading comprehension, and instruction that actively supports vocabulary development contributes to broader language proficiency.

These intertwined problems can only be addressed with solutions that concurrently increase resources and change the way instruction is delivered. Digital reading systems, which have this dual capability of media integration, are ideal in offering both opportunities. Platforms like these also provide equitable access to a wide array of quality materials irrespective of geography or resources, afford multimodal presentations that appeal to multiple sensory modalities, and support self-paced learning as per educational trends in facilitating learner autonomy (Feng et al., 2023). Of course there are clear pedagogical benefits to both of these, and more importantly those pedagogical benefits are based on some solid science around how humans learn and incorporate information.

This research is theoretically grounded in Mayer's (2021) Cognitive Theory of Multimedia Learning (CTML), which has been extensively tested across a broad range of educational settings for more than thirty years. According to CTML, human cognitive processing operates through two separate but interdependent channels: a visual–pictorial channel that handles images and written text, and an auditory–verbal channel where spoken words and sounds are processed. Mayer's multimedia principle states that "people learn more deeply from words and pictures than from words alone" (Mayer & Fiorella, 2014).

However, CTML also emphasizes that multimedia learning is effective only when materials are designed in ways that respect learners' limited working memory capacity and avoid cognitive overload. Meaningful learning occurs when verbal and visual information are well integrated, relevant, and presented in manageable amounts. When these conditions are met, dual-channel presentation distributes cognitive processing across systems, reduces excessive load on any single channel, and supports more efficient encoding into long-term memory. Meta-analytic studies report consistent multimedia learning advantages across content domains, with average effect sizes of approximately $d = 0.89$ (Mayer & Fiorella, 2014).

Some of these principles are particularly relevant to vocabulary learning in EFL contexts. When learners are exposed to new vocabulary through multimedia presentations in which they see written word forms and hear their pronunciation, dual mental representations are formed, creating stronger associations between form, meaning, and sound than those developed through text-only materials (Mohsen & Balakumar, 2021). The visual channel processes orthographic information, while the auditory channel processes phonological input, resulting in two retrieval paths that support both word recognition and recall (Paivio, 1986). However, the learning problem described above remains a high-stakes issue that cannot be adequately addressed through text-only materials. This challenge is particularly evident among Indonesian EFL learners, who often experience difficulty connecting written English with its phonological system, as English phonology differs from that of their first and second languages.

Borrowing from these theoretical underpinnings, there is a body of empirical work that has supported the effectiveness of multimedia instruction for vocabulary learning. According to Mohsen and Balakumar (2021), this effect size was associated with moderate to large in favour of multimedia interventions compared with text alone from the pool of 35 experimental studies. Similarly, media conditions facilitated more initial learning and delayed posttest retention (Çakır, 2022). Gorjian et al. (2024) have shown that the effects of multimedia gloss on vocabulary learning were significant and large in practical terms ($\eta^2 = 0.14$). Together, these results constitute strong evidence in favor of the cognitive benefits of teaching vocabulary using a multimodal instruction.

In addition to Mayer's theory, Nation's (2013) emphasized that meaningful vocabulary learning and mastery require multiple encounters with target words in varied and meaningful contexts. Input should be richly contextualized—presented in authentic text as opposed to word lists—as retention and depth of vocabulary knowledge are highly influenced by the way new words are encountered in text. Principles such as carefully matched input, the need for seeing words, and motivation are particularly well suited to multimedia environments that offer a combination of auditory and visual support and textual feedback for new vocabulary including multiple sensory channels (Webb & Nation, 2017).

Storynory (www.storynory.com) was selected as the digital platform for this study due to its several advantages over other digital learning resources. Unlike good digital resources available by subscription only, Storynory is totally free and open access, a critical aspect for many under-funded schools in Indonesia. Most importantly for the current study's theoretical framework, every story provides simultaneous professional audio narration and written text, representing a direct application of Mayer's multimedia and modality principles (Mayer, 2021). Content is arranged for young students from 6 to 14 years of age, vocabulary and grammatical structures reflect early secondary level EFL and the topics have been carefully chosen to appeal to this age group. The platform uses professional voice actors who speak native and non-native languages with clear articulation, natural prosodic features, and appropriate pausing—and as such the system which supports pronunciation development and form–meaning connections (Nation, 2013). Together, these features make Storynory a suitable website to explore whether insights gleaned from multimedia learning research can provide measurable vocabulary improvement benefits in real-world EFL classroom situations. In this study, Storynory was used as a

practical tool; however, it also represents a broader multimedia storytelling instruction. Therefore, the findings reflect the potential of multimedia-supported digital reading rather than the Storynory platform alone.

There is, however, a gap in the literature concerning research that focuses exclusively on Storynory, as previous studies have mainly examined language skills other than vocabulary. Ahwida and Marlina (2023) found that Indonesian university students showed improvement in listening comprehension along with reduced anxiety. More relevant to the present study, Gumay and Marlina (2024) reported preliminary evidence of vocabulary improvement. However, their quasi-experimental design did not compare multimedia and text-only conditions in a controlled manner, making it unclear whether the observed gains were attributable to Storynory's multimodal features. In addition, existing Storynory research has focused on older learners, leaving the junior secondary level largely unexplored.

Junior secondary students aged 12–14 years constitute an important yet often overlooked group of learners. At this stage, students begin to develop abstract thinking skills, moving from concrete to formal operational thinking (Inhelder & Piaget, 1958), and therefore require pedagogical instructions that connect abstract concepts to engaging and meaningful situations. Zhang et al. (2023) argue that vocabulary development during this period is a strong predictor of long-term English proficiency. Nevertheless, traditional vocabulary instruction in Indonesia often discourages junior secondary students, as word lists and rote memorization are frequently perceived as monotonous and disconnected from meaningful contexts. This situation suggests that multimedia applications integrating vocabulary practice into engaging stories can provide more meaningful input for learners at this developmental stage.

Although previous studies have demonstrated the effectiveness of multimedia-based vocabulary instruction (Çakır, 2022; Mohsen & Balakumar, 2021) and initial studies have reported promising results on the use of Storynory (Gumay & Marlina, 2024), research focusing specifically on Storynory for vocabulary learning remains limited. First, existing studies on Storynory have mainly focused on listening comprehension and affective variables (Ahwida & Marlina, 2023), while vocabulary learning remains underexplored. Second, no prior research has directly tested Mayer's (2021) primary theoretical prediction by experimentally manipulating presentation formats (e.g., dual-mode versus single-mode) while holding content constant. Third, no research has examined the effectiveness of Storynory among junior secondary students, who have distinct cognitive and motivational profiles.

This study explored the extent to which the multimedia nature of Storynory contributes to significant vocabulary gains among seventh-grade Indonesian EFL students in comparison with non-digital text-based instruction. The experimental group was exposed to Storynory stories presented through a dual-mode format consisting of audio narration accompanied by on-screen text. In contrast, the control group received the same stories in a printed format taken from the Storynory website, presented as text-only materials without illustrations or audio support. Thus, the two groups differed solely in the mode of presentation rather than in content. Based on Mayer's (2021) Cognitive Theory of Multimedia Learning, it was predicted that learners exposed to the dual presentation mode (audio + text) would outperform those learning through a single modality (text only), even within a short intervention period. Vocabulary knowledge was measured using Nation's (2013) three-dimensional framework, encompassing form (spelling recognition), meaning (semantic understanding), and use of words in context.

Therefore, this study examined the short-term effectiveness of multimedia instruction using Storynory compared with conventional text-only instruction on vocabulary learning among Indonesian Grade 7 EFL learners. Accordingly, this study addressed the following research questions:

RQ1: Is there a significant difference in students' vocabulary development after being taught using the Storynory multimedia platform?

RQ2: Is there a significant difference in vocabulary improvement between students taught using multimedia instruction (Storynory) and those taught using traditional non-multimedia, text-only instruction?

Based on multimedia and modality theories (Mayer, 2021), the following hypotheses were formulated:

H_0 (Null Hypothesis): There is no significant difference in vocabulary improvement between students who learn through Storynory multimedia instruction and those who learn through text-only instruction.

H_1 (Alternative Hypothesis): There is a significant difference in vocabulary improvement between students who learn through Storynory multimedia instruction and those who learn through text-only instruction.

This study is expected to contribute theoretically by providing empirical evidence for Mayer's (2021) Cognitive Theory of Multimedia Learning in the context of EFL vocabulary instruction, particularly by comparing dual-mode and single-mode presentation formats. Practically, the findings may inform EFL teachers about the potential use of digital storytelling platforms such as Storynory for vocabulary instruction at the junior secondary level. Pedagogically, this study may offer insights into designing engaging vocabulary learning activities that align with students' cognitive and motivational characteristics.

METHOD

This study employed a quasi-experimental nonequivalent control group pretest–posttest design to examine whether Storynory-based multimedia digital reading, grounded in Mayer’s (2021) multimedia learning principles, led to measurable short-term vocabulary gains among Indonesian seventh-grade EFL learners compared with traditional text-only instruction. In the control condition, students learned the same stories presented in printed form without audio or visual support.

The intervention compared Storynory multimedia instruction with traditional text-only reading over two instructional sessions. A quasi-experimental design was adopted because random assignment was not feasible due to institutional constraints; however, systematic comparisons could still be conducted between learners who received different instructional treatments (Creswell, 2012).

Respondents

This study was conducted with the seventh-grade students at a junior high school in Ponorogo in academic year 2024/2025. The school had 64 seventh grade students distributed in 2 classes (Experimental Group: $n = 32$ and Control Group: $n = 32$). Practical reasons (all available seventh graders) also determined the sample size which is acceptable for these analyses. Following Cohen’s (1992) power analysis criteria for educational research, there is enough statistical power with 26 participants per group (0.80) to capture medium effect sizes ($d = 0.50$) at the $\alpha = 0.05$ significance level in independent sample t-tests. This study exceeded the minimum recommended sample size of 32 participants per group, providing sufficient statistical power to detect meaningful differences between groups. Both classes were comparable: exact same age (12-13 years old), using the same curriculum in school, all at the same academic level and taught by the same english teacher.

The sampling adopted was purposive, because the classes were selected as recommended by the subject teachers of students’ familiarity considering that both classes had equal skills. Therefore, the sample selection was not random but purposively done to ensure that the chosen classes were relevant and suitable for the study.

Instrument

One principal instrument was used to collect quantitative data in this study: a multiple-choice vocabulary knowledge test, which was administered as both the pre-test and post-test using the same set of items. The use of the same test for both administrations was intended to measure students’ vocabulary development consistently before and after the treatment.

The test was developed based on Nation’s (2013) comprehensive framework of word knowledge, which conceptualizes vocabulary as consisting of three main dimensions: form, meaning, and use, each of which can be distinguished into receptive and productive knowledge. In this study, the instrument focused on assessing students’ knowledge of form (spelling accuracy and basic word structure), meaning (semantic and contextual understanding), and use (appropriate application of words in simple sentences). This multidimensional instruction ensured that the dependent variable reflected not merely isolated word recognition, but broader lexical competence.

All vocabulary items included in the test were derived directly from the selected Storynory stories used during the instructional treatment. The test items were entirely constructed by the researcher and designed to align with the dimensions and indicators adapted from Nation’s (2013) framework. The vocabulary content was contextualized using narrative situations from the stories to reflect authentic language use and to maintain consistency between the learning materials and the assessment. These adaptations were necessary to ensure content validity, age appropriateness, and relevance to the vocabulary actually encountered by seventh-grade Indonesian EFL learners. The final version of the instrument is presented in Table 1.

Table 1. The Blueprint

Data Collection Procedure	Data Collection Procedure	Data Collection Procedure	Data Collection Procedure	Data Collection Procedure	Data Collection Procedure
Vocabulary	Spelling Accuracy	Students can spell simple vocabulary in English correctly based on the letters and syllables that form it.	Story 1: Sweet sesame balls, Christmas pudding Story 2: Grain, Stir	4	1, 2, 3, 4
	Vocabulary Application in Context	Students can use vocabulary in simple, meaningful sentences	Story 1: Fried rice, Kitchen, Sweet and	10	5, 6, 7, 8, 16, 18, 22, 23, 24

		without memorizing grammar patterns or formulas explicitly.	sour chicken wings, Steaming Story 2: Cook, Pot		
	Contextual Vocabulary Understanding	Students can understand the meaning of new vocabulary through the help of visual media, movement, real objects, or story context.	Story 1: Toast, Glistening, Delicious Story 2: Sweet, Hot, Dumpling	11	9, 10, 11, 12, 13, 14, 15, 17, 19, 20, 21, 25

The contextual vocabulary items were taken from original stories available on the Storynory website and aligned with the Unit 1 curriculum topic, “How to Make Orange Juice,” which covers kitchen-related vocabulary, cooking verbs, taste, and texture. All vocabulary items included in the test were directly derived from these Storynory stories. Each test item was mapped to a corresponding word in the story to ensure alignment between the learning materials and the assessment. The items assessed students’ knowledge of the same words they encountered in the stories in terms of spelling, meaning, and appropriate use. This instruction ensured content validity and reinforced the connection between the instructional input and the measured outcomes. The test consisted of 25 multiple-choice questions assessing spelling, contextual meaning, vocabulary use, antonyms, and visual-based clues to comprehensively evaluate students’ vocabulary mastery.

The story materials selected for the treatment were reviewed and approved by the school’s English teacher to ensure curricular relevance and linguistic appropriateness. The approved story titles are presented in Table 2.

Table 2. The Selected Story Titles

No	The Title	Time	Word	Genre	Link of the Treatment
1	Jimmy Mouse and the Chinese New Year	(18.12)	2.241	Modern Animal Story	https://www.storynory.com/jimmy-mouse-chinese-new-year/
2	The Old Woman Who Lost Her Dumpling	(11.48)	1.314	Japanese Folktale	https://www.storynory.com/the-old-woman-who-lost-her-dumplings/

Procedures

Several lesson plans were developed prior to the data collection to guide classroom activities, teacher actions, and student groupings during last session. The complete lesson plans for each meeting are presented in Appendix 6. The study involved four instructional meetings in total: two meetings for the experimental group and two meetings for the control group. Meetings were conducted in different weeks to avoid cross-contamination between groups. The overall procedure consisted of three main phases: pretest, treatment, and posttest.

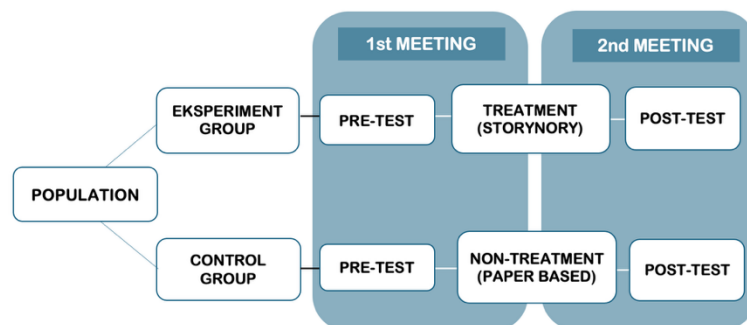


Figure 1. Data Collection Procedure

This study consisted of three main phases: pretest, treatment, and posttest. All sessions were conducted in a face-to-face classroom setting. Students worked individually during testing and reading activities, while whole-class interaction was applied during post-reading discussions and vocabulary activities.

Pretest

In the first meeting, both the experimental and control groups completed a vocabulary pretest administered through Google Forms, which took approximately 30 minutes. The teacher explained the test

instructions, ensured students were ready with their devices, monitored the classroom, and collected students' responses. The pretest aimed to measure students' baseline vocabulary knowledge prior to the treatment.

Treatment

During the treatment phase, the experimental group was introduced to the Storynory digital reading platform. The teacher demonstrated how to access and navigate the Storynory website using an LCD projector, explained the learning objectives, and guided students in opening the selected story.

Students then read the story *The Old Woman Who Lost Her Dumpling* individually for approximately 12 minutes using their own devices. After reading, the teacher led a whole-class *story chat*, during which students were asked to summarize the story, answer comprehension questions, and share their understanding. To reinforce vocabulary learning, the teacher facilitated vocabulary-focused activities, including identifying new words from the story, guessing meanings through visual clues, discussing word meanings and usage in context, and short vocabulary games. These activities were conducted in a whole-class setting to increase exposure and engagement.

In the second session, students continued the treatment by reading another story (*Jimmy Mouse and the Chinese New Year*) following the same procedures: individual reading, teacher-guided story discussion, and whole-class vocabulary activities.

Meanwhile, the control group received the same stories in printed form and followed conventional reading instruction. Students read individually, followed by teacher-led discussions and vocabulary exercises without access to Storynory. As previously noted, all materials had been reviewed and approved by the school's English teacher.

Posttest

After completing the treatment sessions, both groups took a posttest using the same vocabulary test format as in the pretest. The teacher supervised the session and ensured all students completed the test individually. The posttest aimed to measure students' vocabulary gains after the intervention.

Validity

Content validity was demonstrated through rigorous practices to ensure that test items adequately sampled the vocabulary domain. All items were linked to the seventh-grade English curriculum (Kurikulum 2013, Unit 1: Procedures) and constructed to represent Nation's (2013) three dimensions of vocabulary knowledge (form, meaning, and use). The school's English teacher, who has over 15 years of experience teaching EFL at the junior secondary level, pre-tested all items to ensure that the lexical terms were age-appropriate, unambiguous in wording, within a reasonable difficulty range, and supported by plausible distractors. Items were written using clear and direct language to establish face validity, avoiding ambiguity unrelated to vocabulary knowledge. Evidence for content validity is presented in Appendix 7.

Construct validity—whether the test accurately measured vocabulary knowledge as theoretically defined—was supported through three analytical procedures. First, test design was explicitly grounded in Nation's (2013) multidimensional vocabulary model, aligning theoretical construct with operational measurement. Second, item-total correlation analysis during pilot testing was used to identify and revise poorly performing items (below $r = 0.30$); final correlations ranged from $r = 0.35$ to $r = 0.72$, confirming all items contributed meaningfully to the measured construct. Third, discrimination analysis compared upper-group (top 27%) and lower-group (bottom 27%) performance on each item, with items failing to differentiate between groups being revised to ensure the test effectively distinguished students with varying vocabulary knowledge levels. The validity of the instrument was tested using the Pearson Product Moment correlation test through SPSS. All 25 items had a correlation coefficient (r) ≥ 0.400 with a significance value of $p < 0.05$, so they were declared valid. The r values ranged from 0.401 (question 5) to 0.802 (question 16). The validity categories are as follows: 4% very high, 36% high, and 60% moderate to fair. This indicates the instrument has good and balanced construct validity.

Reliability

Cronbach's Alpha with a sample of 30 respondents. The result, $\alpha = 0.915$ (excellent category), indicates high internal consistency. Positive item-total correlations (0.329-0.771) and "Cronbach's Alpha if item removed" values between 0.906-0.916 prove that no items need to be eliminated because all strengthen the reliability of the instrument.

Table 3. Table of Reliability Analysis Results

Statistic	Value	Category
Number of Respondents	30	—
Cronbach's Alpha	0.915	Excellent
Range of Corrected Item-Total Correlation	0.329 – 0.771	Positive, acceptable
Range of Cronbach's Alpha if Item Deleted	0.906 – 0.916	No item to be removed

Data analysis

This research used quantitative analysis to investigate learners' vocabulary improvement by analyzing the pretest and posttest results. All test responses were summed to produce a total score for each measure, which was then transformed into a 100-point scale. Microsoft Excel 365 was used to administer the data, and IBM SPSS Statistics version 27 was applied for analysis.

Before hypothesis testing, assumptions for parametric tests were checked. The Shapiro-Wilk test initially tested the normality of scores per group ($n = 32$), where $p > 0.05$ denoted normal distribution. Second, the Levene's test was performed to assess homoscedasticity across groups and a $p > 0.05$ was used as criterion of sample acceptance. Both criteria were met and thus the use of parametric tests was justified. If these assumptions had been violated ($p < 0.05$), non-parametric equivalents of the above tests were used, which are Wilcoxon Signed-Rank and Mann-Whitney U test respectively.

After verifying assumptions, inferential analyses were performed to answer both research questions. For RQ1, a Paired Samples t-test was used to determine if the experimental group experienced significant vocabulary gain from pretest to posttest. For RQ2, an Independent Samples t-test of posttest scores between experimental and control groups was used to test if multimedia instruction resulted in a better score than did text-only instruction.

Practical utility beyond statistical significance was evaluated using effect sizes. Cohen's d , Glass's δ and Hedges' g were calculated, where effect interpretation was based on Cohen (1988) criteria: small ($d = 0.2$), medium ($d = 0.5$) and large effects ($d = 0.8$). Statistical solutions were always taken at $\alpha = 0.05$, and $p < 0.05$ was used to define significance.

FINDINGS AND DISCUSSION

Findings

The students' pretest and posttest vocabulary scores were used as the main indicators to examine their vocabulary mastery in both the experimental and control groups. The frequency distribution of the scores is presented in Table 4 and Table 5. The table summarizes students' pretest and posttest performance in both groups. The control group showed minimal score shifts, with average scores remaining relatively stable within the range of 64–84. In contrast, the experimental group demonstrated a noticeable improvement after the multimedia treatment, with posttest scores becoming more concentrated in the higher range of 76–88. This shift indicates a positive trend in vocabulary performance among students exposed to Storynory.

Table 4. Experimental Group (N=32)

Pre-Test		Post-Test
Score	Frequency	Frequency
48	2	
52	2	1
56	2	2
60	1	
64	3	2
68	3	2
72	6	1
76	5	3
80	4	4
84	3	5
88	1	3
92		1
96		
Total	32	32
Mean	70.625	82.25

Table 4. Control Group (N=32)

Pre-Test		Post-Test
Score	Frequency	Frequency
48	2	
52		1
56	2	2
60	3	3
64	3	3

68	1	1
72	7	7
76	3	3
80	2	2
84	2	2
88	3	3
92	1	
96		2
Total	32	32
Mean	69.75	74.125

The descriptive statistics illustrate the variability of students' vocabulary scores in both groups. Before the treatment, the experimental group had a mean score of 70.63 (SD = 10.42), which was very similar to the control group's mean score of 69.75 (SD = 11.69), indicating that both groups started from a comparable baseline. After only two learning sessions, the experimental group's mean increased substantially to 82.25 (SD = 9.31), with individual scores ranging from 52 to 92, reflecting a clear upward trend. In comparison, the control group showed a more modest increase, reaching a mean score of 74.13 (SD = 11.67), with scores ranging from 52 to 96. Overall, these trends suggest that the experimental group achieved stronger short-term vocabulary gains following multimedia exposure.

Normality Testing

Before testing the research hypotheses, prerequisite assumption tests were conducted to confirm the suitability of parametric statistical procedures. Given the sample size per group ($n = 32$), the Shapiro-Wilk test was used as the primary method for determining normality.

Table 5. Normality Test

Class	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Control Group Pre-test	.093	32	.200 [*]	.978	32	.734
Control Group Post-test	.115	32	.200 [*]	.967	32	.416
Experiment Group Pre-Test	.166	32	.025	.942	32	.086
Experiment Group Post-Test	.138	32	.127	.946	32	.114

Shapiro-Wilk tests indicated that all pretest and posttest score distributions were approximately normal (Pretest Control $p = .734$; Posttest Control $p = .416$; Pretest Experimental $p = .086$; Posttest Experimental $p = .114$), satisfying the assumption for parametric testing.

Homogeneity Testing

Furthermore, Levene's test indicated that the assumption of homogeneity of variances was met ($p = .225$), suggesting that both groups had comparable score variability. Therefore, an independent samples t-test was appropriately applied to examine between-group vocabulary differences.

Table 6. Homogeneity Test

	Levene Statistic	df 1	df2	Sig.
Based on Mean	1.505	1	62	.225
Based on Median	1.373	1	62	.246
Based on Median and with adjusted df	1.373	1	59.011	.246
Based on trimmed mean	1.536	1	62	.220

Paired Sample T-Test

To measure short-term vocabulary gains resulting from the multimedia treatment, a paired-samples t-test was conducted to compare the experimental group's pretest and posttest scores. As shown in Table 5, the results revealed a statistically significant improvement, $t(31) = -13.658$, $p < .001$. The mean difference of -12.250 indicates a notable increase in students' vocabulary scores following the treatment. This result is further supported by the 95% confidence interval of the mean difference (-14.079 , -10.421), suggesting consistent improvement across participants. These findings address RQ1 and indicate that even a brief two-session exposure to Storynory resulted in significant short-term vocabulary gains, with the observed improvement unlikely to have occurred by chance.

Table 8. Paired Sample T-Test

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	Pre-test – Post-test	-12.250	5.074	.897	-14.079	-10.421	-13.658	31	<.001	<.001

Independent Samples T-Test

An independent samples t-test was then conducted to examine between-group vocabulary differences.

Table 9. Independent Samples T-Test

		T-test for Equality of Means							
		t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
				One-Side d p	Two-Side d p			Lower	Upper
Score	Equal variances assumed	-3.079	62	.002	.003	-8.125	2.639	-13.401	-2.849
	Equal variances not assumed	-3.079	59.075	.002	.003	-8.125	2.639	-13.406	-2.844

The independent-samples t-test revealed a significant difference between groups, with $p = .003$ (two-tailed, equal variances assumed), indicating that students in the experimental group outperformed those in the control group. The estimated mean difference of -8.13 further confirms that, on average, the experimental group scored approximately 8.1 points higher than the control group (Experimental $M = 82.25$; Control $M = 74.13$). This result is supported by the 95% confidence interval (-13.40 to -2.85), which does not cross zero, indicating a reliable treatment effect. These findings address RQ2 and suggest that the Storynory intervention produced meaningful short-term vocabulary gains compared to traditional instruction.

Nevertheless, this study has methodological limitations. Because the treatment duration was brief and the same test items were administered for both pretest and posttest to ensure score comparability, the observed gains may partially reflect novelty effects (Fowler & Barker, 1974) and test-item familiarity (Neuman & Dickinson, 2001; Shute, 1987). Such effects are common in short-term experimental studies. Despite these limitations, the findings indicate that multimedia-supported digital reading can effectively facilitate immediate vocabulary learning in EFL classroom contexts compared to conventional text-based instruction.

Effect Size Analysis

Table 10 presents the descriptive statistics of posttest vocabulary scores for both the experimental and control groups.

Table 10. Independent Samples T-Test

Class		N	Mean	Std. Deviation	Std. Error Mean
Score	Posttest Control Class	32	74.13	11.672	2.063
	Posttest Experimental Class	32	82.25	9.308	1.645

For RQ1, the experimental group demonstrated a significant increase in vocabulary scores following multimedia exposure (mean gain = 12.25, $p < .001$). These results indicate statistically significant improvement in students' vocabulary achievement after using Storynory. Effect size analysis further supported these findings. Cohen's $d = 0.77$, Hedges' $g = 0.77$, and Glass's $\delta = 0.70$ indicate an effect bordering between medium and large (Cohen, 1988). Approximately 78% of students in the experimental group scored above the control group mean, demonstrating a substantial practical difference between groups.

Discussion

This research examined the impact of multimedia storytelling on Indonesian seventh-grade students' vocabulary mastery. It investigated whether students experienced notable vocabulary enhancement after using the Storynory multimedia platform, which integrates audio narration, written text, and pictures, compared to traditional text-only instruction. Examining this effect is necessary, as Indonesian junior secondary students often face challenges in developing vocabulary proficiency. A free and easy-to-access solution may be provided by platforms such as Storynory.

Three main findings emerged from the study. First, the experimental group demonstrated a significant improvement in vocabulary, with a mean gain of 12.25 points ($p < .001$), addressing RQ1 regarding vocabulary development after multimedia instruction. Second, the experimental group performed significantly better than the control group on the posttest (82.25 versus 74.13, $p = .003$), addressing RQ2 regarding comparative effectiveness between multimedia and text-only instruction. Third, the effect size was medium-to-large (Cohen's $d = 0.77$), indicating that the results reflect not only statistical significance but also meaningful practical impact. Together, these findings suggest that multimedia storytelling supports vocabulary learning more effectively than traditional text-based instruction.

One noteworthy outcome was the magnitude of improvement achieved after only two instructional sessions. While Storynory's multimedia features likely enhanced learners' attention and contextualized vocabulary exposure, part of the observed gains may also reflect novelty effects, as both groups showed increased engagement when exposed to instructional formats different from their usual classroom routines. Given the brief intervention period, the extent to which initial enthusiasm contributed to short-term performance gains cannot be fully disentangled from the treatment effect.

Theoretical Explanation of Findings

The experimental group's superior performance can be explained by how multimedia instruction facilitates vocabulary learning, as predicted by Mayer's (2021) Cognitive Theory of Multimedia Learning. This study was grounded in (Mayer's, 2021) theory, which proposes that combining auditory and visual input enhances learning by engaging dual processing channels. The intervention applied this principle by integrating listening and reading. Students who listened to stories while reading engaged both auditory and visual channels to process new words. This dual processing likely supported retention of word meanings, spelling, and pronunciation more effectively than reading text alone. The findings support the theory's prediction that dual-channel presentation (audio plus text) is more effective than single-channel (text-only) instruction.

Storynory's professional narration, written text, and visual elements created an engaging learning experience. The audio helped students hear accurate pronunciation, the text reinforced spelling, and the story context made new words easier to understand and remember. The narrative structure provided contextualized exposure to vocabulary, strengthening word associations compared to isolated word lists. Additionally, combining native-speaker pronunciation with written input may have fostered stronger memory links. The audiovisual format likely enhanced students' attention and motivation, contributing to the observed gains.

Comparison with Previous Studies

These results are consistent with previous studies on multimedia vocabulary learning. Mohsen and Balakumar (2021) synthesized 35 studies and reported that multimedia instruction typically yields medium-to-large effects ($d = 0.68$), which is comparable to the effect size obtained in this study ($d = 0.77$). Gorjian et al. (2024) similarly found substantial vocabulary gains through multimedia materials. The present findings further support this pattern by demonstrating that multimedia instruction is more effective than text-only instruction. While prior Storynory research has mainly focused on listening skills (Ahwida & Marlina, 2023), this study expands the evidence base by showing that Storynory also supports vocabulary improvement among junior secondary students, a population previously underexplored.

One noteworthy outcome was the magnitude of improvement achieved after only two instructional sessions. Given the limited intervention period, a mean increase of 12.25 points represents a meaningful development. Some improvement may also be attributed to novelty effects, as students showed enthusiasm when engaging with a new technology-based learning tool.

Pedagogical Implications

These findings provide several practical implications for English teachers. First, multimedia storytelling platforms such as Storynory can be integrated into vocabulary lessons, particularly as the platform is free and accessible online, making it suitable even for low-budget schools. For example, a single smartphone connected to speakers can be used to play stories for the whole class. Second, multimedia activities can be incorporated into short instructional segments of 15–20 minutes without disrupting existing lesson structures. Third, teachers

may encourage independent Storynory use at home, allowing students to practice vocabulary outside school hours. This is especially important in Indonesian EFL contexts, where exposure to English is often limited.

After only two instructional sessions, teachers can realistically expect short-term improvements in students' receptive vocabulary, including better word recognition, pronunciation awareness, and contextual understanding. Increased learner engagement may also occur due to the audio-visual storytelling format. However, teachers should not yet expect long-term retention, productive vocabulary mastery (speaking or writing), or overall language proficiency improvement based solely on brief exposure. These outcomes require longer exposure and repeated practice.

To support long-term vocabulary retention and move students toward productive mastery, teachers should implement several follow-up strategies. First, regular repeated exposure to the same vocabulary items through varied activities helps consolidate learning. Second, spaced repetition—reviewing target words at increasing intervals over weeks—strengthens memory retention more effectively than massed practice. Third, productive tasks such as using new words in original sentences, role-plays, or short writing assignments encourage active retrieval and deeper processing. Fourth, integrating learned vocabulary into subsequent lessons ensures that words are encountered in multiple meaningful contexts. Finally, encouraging students to create personal vocabulary journals with example sentences and images can promote autonomous learning and sustained engagement. By combining multimedia input from Storynory with these follow-up practices, teachers can help students retain vocabulary beyond initial recognition and develop the ability to use words actively in communication.

Therefore, Storynory should be viewed as a supportive multimedia tool that initiates vocabulary learning effectively, but it works best when combined with systematic follow-up instruction to ensure retention and productive use.

Limitations

This study had several limitations that should be acknowledged. First, only two instructional sessions were conducted, limiting exposure time and the diversity of vocabulary encountered, as only two reading passages were used. Although significant gains were observed, the results mainly reflect receptive vocabulary improvement measured through multiple-choice tests. Actual productive use of newly learned words was not directly assessed, meaning that while students may recognize correct answers, this does not guarantee their ability to use the words productively in speaking or writing. Future research should incorporate productive tasks to provide a more comprehensive picture of vocabulary development.

Second, several methodological constraints should be considered. Test items were presented in the same order for both pretest and posttest, which may have encouraged memorization and contributed to score gains through item familiarity rather than genuine learning alone. Additionally, intact classes were used instead of random assignment, limiting generalizability. The short interval between pretest and posttest may have amplified both test familiarity and novelty effects, as students in both groups were exposed to instructional formats that differed from typical classroom routines. Such novelty effects are common in short-term educational interventions and tend to diminish over time. Therefore, the observed gains—particularly in the short term—may partially reflect initial enthusiasm rather than solely the instructional impact of multimedia presentation. Furthermore, long-term retention was not examined due to the immediate timing of posttesting, leaving questions regarding sustained vocabulary knowledge unanswered.

Recommendations for Future Research

Given these limitations, several recommendations are offered for future research. First, longer interventions (e.g., 8–10 sessions over multiple weeks or at least one month) with more frequent sessions are recommended to examine sustained effects and allow for deeper vocabulary acquisition. Second, broader reading materials across varied topics and genres should be included to increase vocabulary diversity and provide richer contextual exposure. Third, parallel test forms should be employed to reduce test-item familiarity, and test items should be randomized between pretest and posttest to minimize memorization effects. Fourth, delayed posttests are suggested to measure long-term retention and determine whether initial gains persist over time. Finally, productive assessment tasks—such as writing assignments, oral presentations, or contextualized vocabulary use—should be incorporated alongside receptive measures to capture a more comprehensive picture of learners' vocabulary mastery.

For teachers and schools, the results suggest that multimedia storytelling can serve as a valuable complement to traditional vocabulary instruction, even within limited timeframes. Free platforms such as Storynory can be integrated using basic technology, such as a smartphone and speakers. However, technology alone is not sufficient; effective teaching practices remain essential. Professional development programs may help teachers maximize the benefits of multimedia instruction and implement follow-up strategies that support long-term retention and productive vocabulary use.

CONCLUSION AND RECOMMENDATION

This study investigated whether multimedia storytelling through Storynory enhances vocabulary improvement among Indonesian seventh-grade EFL learners compared to conventional text-only instruction. The research addressed a key challenge: Indonesian secondary students' limited vocabulary development, compounded by restricted access to engaging reading materials and reliance on rote learning practices. The findings provide clear and affirmative answers to both research questions.

First, students exposed to Storynory demonstrated statistically significant vocabulary improvement, with mean scores increasing by 12.25 points ($p < .001$). Second, multimedia instruction produced superior outcomes compared to text-only methods, with the experimental group outperforming the control group by approximately 8.1 points (82.25 vs. 74.13, $p = .003$). The medium-to-large effect size (Cohen's $d = 0.77$) indicates that these differences reflect educationally meaningful gains rather than mere statistical artifacts.

These results support Mayer's (2021) prediction that dual-channel presentation enhances learning and align with Nation's (2013) emphasis on contextualized vocabulary input. Even brief multimedia exposure across two instructional sessions yielded measurable advantages. This suggests that technology-enhanced storytelling offers a practical and accessible approach to supporting vocabulary improvement. For resource-constrained Indonesian schools, free platforms such as Storynory provide viable alternatives to costly commercial materials.

However, the findings should be interpreted cautiously due to several limitations, including short treatment duration, limited content variety, non-randomized testing, and potential item memorization effects. Future research employing longer interventions, diversified materials, randomized assessment formats, and delayed posttests is recommended to confirm and extend these initial results.

Nevertheless, this study provides preliminary evidence that multimedia storytelling, grounded in cognitive learning principles, represents a promising pedagogical strategy for Indonesian EFL educators seeking to enhance students' vocabulary development and may serve as a valuable complement to traditional vocabulary instruction.

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