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GAMIFIED VOCABULARY LEARNING THROUGH ZEP QUIZ: EVIDENCE FROM INDONESIAN VOCATIONAL EFL STUDENTS

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ABSTRACT

Mastering vocabulary is fundamental to students' success in comprehending narrative texts, yet conventional, drill-based instruction often fails to produce long-lasting lexical knowledge, particularly in vocational English as a Foreign Language (EFL) classrooms. Although gamified learning platforms such as Zep Quiz have shown promise in boosting motivation and retention, previous studies have primarily tested these tools using generic vocabulary lists in ideal conditions. This leaves their effectiveness unclear when vocabulary instruction is tied to a specific genre of text and delivered under authentic classroom constraints, such as limited contact time and scheduling at the end of the day. This study addresses this gap by examining the effect of Zep Quiz on narrative-text vocabulary mastery among tenth grade Marketing students at SMK Negeri 2 Purworejo, using a quasi-experimental non-equivalent control group design. Although hypothesis testing did not confirm a statistically significant effect of Zep Quiz relative to conventional instruction, the experimental class showed a consistent upward trend, whereas the control class declined over the same period. This suggests that there is a genuine, albeit modest, instructional benefit that may have been masked by classroom-level constraints. These findings suggest that the effectiveness of gamified vocabulary tools depends heavily on the conditions of their implementation, such as treatment duration, scheduling and baseline learner equivalence, rather than on the tools themselves. This study extends gamification research beyond generic vocabulary instruction to genre-specific learning in an authentic vocational classroom setting. It also offers teachers considering game-based platforms as part of a sustained instructional strategy a more tempered, practice-relevant perspective.

Keywords: Gamified Learning, Narrative Text, Vocabulary Mastery, Zep Quiz

INTRODUCTION

English has now become a global lingua franca spoken by people universally (Rufaidah & Rahmi, 2025). As a universal language, English is essential for facilitating students' access to scholarly materials, encouraging critical thinking, and fostering intercultural understanding (Cindy et al., 2025). Mastering English is essential for effective communication and academic success, especially for students in circumstances where English is not their first language. Pranawengtias (2022) outlines therefore, the use of

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English should be an integral component of the learning process, incorporated into all other activities.

When it comes to mastering English, there are some language skills that must be learned, for example reading, speaking, writing, listening. Meanwhile, vocabulary, grammar, pronunciation are language components. Then, one of the important aspect that must be learned by students in English is vocabulary mastery. Research by Adrefiza et al. (2024) states that vocabulary is a collection of words that have value within a certain language, domain, or context utilized by an individual or group for communication. Vocabulary is an essential component of language development and is required for success in reading, writing, listening, and speaking. Improving a student's vocabulary and word knowledge can have a substantial impact on their ability to speak and comprehend a foreign language (Nguyen, 2025).

Robin and Aziz (2022) states that learning to expand vocabulary is crucial in studying English language, because the meanings of new terms are frequently highlighted in textbooks or in the classroom. Acquiring a good vocabulary will help students enhance their capacity to communicate successfully. Students with an extensive vocabulary tend to have better reading comprehension, participate more actively in conversations, and feel more confident when writing and during learning. Expanding vocabulary increases the ability to convey the right meaning when speaking directly without having to translate first because of knowing what it means and interacting with various topics, which is a crucial focus in English education.

Despite its recognised importance, vocabulary instruction in English as a Foreign Language (EFL) contexts continues to face persistent challenges that have been widely documented in the literature. Conventional vocabulary teaching is often criticised for relying heavily on rote memorisation, decontextualised word lists and teacher-centred drilling. These approaches tend to produce short-term retention rather than long-lasting lexical knowledge (Anggraeny & Khongput 2022; Efendi & Arijanto, 2025). The discrepancy between receptive recognition and productive use is particularly problematic since students may recognise a word's meaning when reading, yet struggle to retrieve and apply it accurately when speaking or writing. These limitations suggest that the fundamental issue in vocabulary instruction is not just how much vocabulary is taught, but also how it is taught, and whether the method encourages active engagement and long-term retention

In SMK Negeri 2 Purworejo particularly at tenth grade marketing, vocabulary is essential to students' comprehension of materials in texts such as narrative text. Narrative texts were chosen for this study because they align with the material currently being studied this semester and are also relevant to the students, thereby increasing their interest and motivation to expand their vocabulary. Narrative texts recount events in a systematic chronological order, often incorporating imaginative or fictional elements. One of the core competencies in English for tenth grade students is the ability to understand narrative texts by identifying the purpose, types, structure and linguistic features of narrative texts, including the various vocabulary used within them. These texts serve as a valuable resource for students, as they provide a kind of personal dictionary that helps them understand word meanings and sentence patterns simultaneously.

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In addition to the importance of vocabulary especially in narrative text, it was found that there are many students who have difficulty in mastering vocabulary, namely they find it difficult to pronounce words in English because they are not familiar with the word and are afraid of being wrong when trying to pronounce the word. Another difficulty is the unsupportive environment, as they perceive English as a difficult subject, which discourages them from wanting to learn vocabulary. When the environment is not supportive, the interest of students who want to learn decreases because of the lack of appreciation from those closest to them. The next problem is the lack of vocabulary provided during classroom instruction or self-directed learning. This explains why students' vocabulary never expands even though English is taught in class.

To address the problems faced by students above, a more interactive and student-centered approach to vocabulary mastery is needed one that suits the learning needs of tenth grade students in the marketing at SMK Negeri 2 Purworejo. An effective step that can be applied to overcome students' vocabulary comprehension problems is by using gamified learning strategies. Research by Aco and Suwandi (2025) strongly demonstrates that gamified learning environments have been shown to greatly boost student motivation and vocabulary retention. And one of the gamified learning strategies that can be used by students at school is Zep Quiz. Gamified English language learning, such as Zep Quiz or other similar platforms, has transformed the way vocabulary is typically taught through regular learning in class. This is demonstrated by the fact that students frequently find learning English vocabulary tiresome because it necessitates memory and repetition, particularly when these words must be acquired and used in productive abilities like speaking and writing. To address this common learning experience, gamification practices like Zep Quiz in vocabulary teaching and learning have begun to emerge, with the capacity to turn repetition and rote memorization into a fun learning process.

Zep Quiz is a digital platform that combines and leverages game-like features with interactive quizzes that can be used instantly, incorporating competitive and engaging elements as well as unique visual game-based learning (Zulfah et al., 2025). In contrast to other systems that mostly deal with flashcards or choices formats, Zep Quiz incorporates gaming characteristics including collaborative activities with pre-made templates, adaptive questioning, and real-time competitive challenges. Tafrica et al. (2025) further explain that Zep Quiz is a game-based application with a tournament-style quiz structure, enabling teachers to present questions in an entertaining and competitive manner.

The integration of gamification into vocabulary instruction has been recognized as an effective approach to engage and motivate students in meaningful learning contexts. Rodjanagosol (2024) found that a gamification approach significantly improves vocabulary mastery compared to conventional methods. Similarly, Waluyo and Leal (2021) demonstrate that gamified learning environments can enhance students' problem-solving skills, collaborative abilities, and independent learning. This is further supported by Wen and Sulaiman (2026) who argue that gamified learning strategies not only promote high retention and boost motivation, but also serve as effective methods for achieving sustainable learning outcomes, particularly in schools with limited resources. Therefore, Zep Quiz holds

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considerable potential as an instructional tool for improving students' vocabulary mastery in English language learning.

Prior studies have shown that the use of game-based/gamified learning or similar platforms offers many benefits. Game-based learning using Zep Quiz in the classroom can improve students' vocabulary and their grades in English language learning, as well as have a positive influence on the student performance. The use of game-based learning with English vocabulary is quite effective in the classroom compared to conventional teaching approaches. Furthermore, when students participate actively in the learning process through interactive activities such as game-based learning and quizzes, they tend to build a deeper knowledge of linked concepts especially in learning English vocabulary (Suja et al., 2024; Adipati et al., 2021; Salim et al., 2025; Zeng et al., 2024 in Putra et al., 2025). This aligns with a prior study that says gamified learning strategies like Zep Quiz not only promotes high retention among students but also developed a student-centered learning atmosphere and increases motivation and serves as an effective method for achieving sustainable learning outcomes in schools with limited resources (Utami et al., 2025; Wen & Sulaiman, 2026). Another study from Rahayu et al. (2024) state that gamified learning, such as WordWall, which is similar to Zep Quiz also has a positive influence on students ability to master the material independently, supporting learning tailored to individual needs and vocabulary development at each student's own pace. Previous study has shown that the Zep Quiz also improves students' attitudes and motivation toward learning. Students demonstrated greater enthusiasm and eagerness to participate in vocabulary-building activities. One student noted that the use of game-based technology makes the learning process more interactive than simply listening to the teacher's explanations (Solihat et al., 2026).

While earlier research provides useful information, there are some important limitations that reduce the strength of the existing claims. For example, many studies have measured general vocabulary mastery without distinguishing between vocabulary depth, breadth, or long-term retention. This makes it unclear whether the observed gains reflect durable learning or short-term recall. Additionally, gamified vocabulary platforms have predominantly been tested at high school or vocational level using vocabulary tied to narrow domains (e.g. hospitality-specific vocabulary in studies using Baamboozle or Wordwall), rather than vocabulary embedded within specific genres of text, such as narrative, descriptive or report texts. These limitations suggest that, while the current evidence base is broadly optimistic, gamified platforms such as Zep Quiz have not yet been adequately tested under classroom conditions that more closely resemble real instructional constraints. These constraints include limited contact time and scheduling at the end of the school day — conditions known to affect student focus and engagement.

These inconsistencies and limitations point to a conceptual gap, not just a geographical one. The existing literature has not adequately examined the effectiveness of gamified platforms such as Zep Quiz when vocabulary instruction is tied to a specific text genre, such as narrative text, rather than general vocabulary lists. Nor has it clarified how variation in intervention duration and classroom scheduling conditions might moderate learning outcomes in vocational school settings, where students' practical, career-oriented learning needs differ from those in general academic tracks. Simply replicating previous gamification

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studies in a new school or region does not constitute a meaningful contribution to this body of knowledge.

This study addresses this gap by examining the effect of the Zep Quiz on vocabulary mastery in narrative texts among tenth grade Marketing students. This combination of population and text genre has received limited empirical attention. Beyond testing effectiveness, this study contributes to the literature in three ways. Initially, it provides a more contextually grounded evaluation of gamified vocabulary learning by incorporating authentic classroom constraints, such as limited instructional time and end-of-day scheduling, rather than idealised experimental conditions. This offers vocational school teachers pedagogically relevant insights. Next, by reporting findings that diverge from the largely positive outcomes reported in prior gamification research, this study provides a balanced perspective to a body of work that may otherwise be biased towards publishing favourable results. This study also helps to clarify the conditions under which Zep Quiz and gamified learning can be expected to produce significant vocabulary gains. Finally, this study extends the application of Zep Quiz from general vocabulary instruction to vocabulary embedded within a specific text genre. This offers insight into whether the benefits of gamification transfer when vocabulary is taught in a genre-specific instructional context rather than a generic one.

This study aims to investigate the effectiveness of Zep Quiz in improving students' vocabulary mastery in narrative texts. Specifically, the study focuses on tenth-grade Marketing students at SMK Negeri 2 Purworejo and seeks to examine whether the integration of Zep Quiz as an interactive learning medium contributes positively to their vocabulary development. By exploring students' vocabulary achievement before and after the implementation of Zep Quiz, this research intends to determine the extent to which the platform influences vocabulary mastery. Accordingly, the study addresses the following research question: Does the use of Zep Quiz significantly affect the vocabulary mastery of tenth-grade Marketing students at SMK Negeri 2 Purworejo?

METHODS

This study employed a quantitative research design. This quantitative research method is commonly used to collect and analyze numerical data in order to test hypotheses and objectively quantify connections between variables. The study used a quasi-experimental approach with non-equivalent control groups. The non-equivalent control group design was explicitly chosen since the two groups were not randomly produced, but rather pre-existing school courses with students who may differ in their baseline vocabulary knowledge. As Creswell (2014) notes, this approach allows the researcher to compare the outcomes of an experimental group that receives a treatment to a control group that does not, while measuring both groups before and after the treatment to assess any potential effect. Moreover, this approach aimed to determine whether the use of Zep Quiz has an effect on vocabulary mastery in narrative texts among tenth grade marketing students.

The research population consisted of two tenth grade marketing classes currently in the second semester of the 2025/2026 academic year at the SMK Negeri 2 Purworejo. The two classes had a total of 40 students, with each class consisting of 20 students aged 15–16

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years. The actual total number of students is 36 each class, but during the research, many students were absent from class because some were sick, others were attending student council training/OSIS, and many were on duty at the school marketing cafetaria. The classes used were X Marketing 1 and X Marketing 2. For this study, X Marketing 1 was the control class that received instruction using traditional/conventional methods without exposure to Zep Quiz, while X Marketing 2 was the experimental class that received instruction using Zep Quiz.

To verify content validity, this instrument was developed based on the indicators, theories, and instructional materials for narrative text vocabulary learning as specified in the second-semester syllabus. The draft instrument then underwent expert review (content validation) by two experts in the field of English Education serving as validators, who reviewed the test items regarding content relevance, clarity of wording, and alignment with the specified vocabulary indicators. Items identified as ambiguous or inconsistent during this review were revised as needed before the instrument was finalized for use as a pre-test and post-test. After data collection, the instrument's internal consistency was tested using Cronbach's Alpha, which yielded a coefficient of 0.701, indicating an acceptable level of reliability.

Data was collected using vocabulary test for pre-test and post-test in each class. The assessment instrument consisted of 20 vocabulary questions, comprising multiple choice, fill in the blank, and true or false questions on the narrative text material being studied in the second semester. The grading system works as follows 0 point for a wrong answer and 1 point for a correct answer. Since there are 20 questions, the total is multiplied by 5 to yield 100 points. The score will range from 5 (for the lowest score) to 100 (for a perfect score).

This study was conducted over three sessions. In the first session, both the control and experimental classes took a vocabulary pre-test to determine their baseline scores before being introduced to narrative text material for vocabulary mastery. In the second session, the experimental class had three sessions and was given the Zep Quiz treatment. In the experimental class, students were introduced to narrative text material that covered the purpose, types, general structure, and linguistic characteristics of narrative texts.

During instruction using Zep Quiz, students learned the vocabulary used in narrative texts—such as verbs, nouns, adjectives, adverbs, and common phrases—and were also given practice questions to complete using the Zep Quiz app. Through these activities, students were trained to locate questions and provide appropriate answers, while Zep Quiz also provided an engaging game-based learning experience. Meanwhile, in the control class also had three sessions, the material and practice questions taught were the same, but the students did not receive the treatments. The control class was taught using traditional or conventional methods. For the third session, both classes were given a vocabulary post-test to determine the final results after instruction and the intervention. The learning sessions in both the experimental and control classes lasted 2 class periods, with each period lasting 45 minutes, making a total of two periods, or 90 minutes. Similarly, students were given the same amount of time to complete the pre-test and post-test.

To minimize threats to internal validity inherent in a non-equivalent control group design, several controls were applied during the research process. First, instrumentation

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was controlled by giving both classes the identical pre-test and post-test instrument, administered under the same time allocation of 90 minutes, which controlled for differences due to instrument variation. Second, a teacher/instructor control was applied by having both classes taught by the same instructor, which minimized threats related to teacher effect or differences in teaching style or delivery quality. Third, material and time were controlled by giving both classes the same instructional material, in the same sequence, for the same total duration of three sessions at 90 minutes each, which controlled for differences in content exposure or instructional time. Fourth, a history/diffusion control was applied by scheduling and monitoring the two classes to prevent contact or exchange of materials between groups during the treatment period, thereby reducing the risk of treatment diffusion between the experimental and control classes. Despite these controls, selection bias remains a limitation of this study's design.

The experimental class obtained a mean pre-test score of 70.00, while the control class obtained a substantially higher mean pre-test score of 81.25 — a gap of 11.25 points prior to any treatment. This indicates that the two groups were not equivalent in their baseline vocabulary mastery, which is a recognized limitation of the non-equivalent control class design when intact classes are used instead of randomly assigned participants.

This baseline imbalance has important implications for interpreting the treatment outcome. Because the control class began at a considerably higher level, it had comparatively less room for improvement (a potential ceiling effect), while the experimental class, starting from a lower baseline, had more room to show gains regardless of the instructional method used. This asymmetry means that observed post-test differences (or the lack thereof) cannot be attributed to the treatment alone with full confidence, and the result of no statistically significant effect should be interpreted with this baseline imbalance in mind rather than as a definitive indication that Zep Quiz had no effect. Future research using random assignment, matching procedures, or covariate-adjusted analysis is recommended to reduce the influence of baseline non-equivalence on outcome interpretation.

The data were analyzed utilizing IBM SPSS Version 20. Descriptive statistics were employed to assess the pre-test and post-test data, where the experimental class obtained a mean pre-test score of 70.00 and post-test score of 74.75, while the control class obtained a mean pre-test score of 81.25 and post-test score of 78.25. A normality test was performed using the Shapiro-Wilk test, producing a p-value of 0.000 for the pre-test of the control class, indicating that the data were not normally distributed.

Because the normality assumption was violated, a parametric test such as an independent-samples t-test was not appropriate. An analysis of covariance (ANCOVA), which could statistically adjust for the baseline (pre-test) difference between groups, was also considered; however, ANCOVA relies on assumptions of normally distributed residuals and homogeneity of regression slopes across groups, both of which are unlikely to be satisfied given the non-normal distribution already detected at pre-test and the non-random, intact-class sampling used in this study. Applying ANCOVA under violated assumptions risks producing misleading covariate-adjusted estimates. For this reason, the non-parametric Mann-Whitney U Test was selected, as it does not require the assumption of normality and is appropriate for comparing two independent groups measured on an interval/ordinal

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scale. The Mann-Whitney U Test yielded a U value of 174.500 with an asymptotic significance value of 0.488 ($p > 0.05$). Effect size was calculated using rank-biserial correlation, yielding $r = 0.110$, categorized as a small effect size. The findings revealed no statistically significant effect of using Zep Quiz on vocabulary mastery in narrative text among tenth-grade marketing students at SMK Negeri 2 Purworejo, when interpreted in light of the baseline group differences discussed above.

RESULTS

This section presents that the study was conducted in two tenth grade marketing classes, each consisting of 20 students. The two classes were X Marketing 1 class, serving as the control class, and X Marketing 2 class, serving as the experimental class that used Zep Quiz. Both classes took pre-tests and post-tests to determine the average score between the control class and the experimental class regarding vocabulary mastery. The results of each test are presented in the following tables:

Reliability Statistics

Before the instrument was administered in the main study, a reliability test was conducted to ensure the consistency and dependability of the test items. In this study, Cronbach's Alpha was employed as the reliability coefficient, as it is the most widely accepted measure of internal consistency for multiple-item instruments (Hair et al., 2010). According to Nunnally (1978), an instrument is considered to have acceptable reliability if the Cronbach's Alpha value reaches a minimum threshold of 0.70, as this value reflects a sufficient level of internal consistency among the test items. The reliability test was administered to 35 respondents using a 20-item vocabulary test.

Table 1. Reliability statistic

Cronbach's Alpha	N
0.701	20

Based on the statistical data above in Table 1, the analysis yielded a Cronbach's Alpha value of 0.701, which marginally meets the minimum acceptable reliability threshold of 0.70 as established. This result demonstrates that the 20 test items possessed adequate internal consistency, meaning the items were sufficiently coherent in measuring the same underlying construct namely, students' vocabulary mastery in narrative text. Although the value is at the lower boundary of acceptability, it is nonetheless considered statistically sufficient to confirm that the instrument produced consistent and dependable measurements across respondents. The instrument was therefore deemed reliable and appropriate for use in the main data collection of this study.

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Pre-Test and Post-Test Results

Table 2. Raw scores of students on the pre-test and post-test

Experimental Class			Control Class		
Students	Pre Test	Post Test	Students	Pre Test	Post Test
S1	50	55	S1	95	95
S2	40	45	S2	35	55
S3	85	90	S3	95	100
S4	90	95	S4	80	85
S5	40	50	S5	80	95
S6	60	85	S6	60	60
S7	60	60	S7	90	90
S8	70	75	S8	85	85
S9	70	90	S9	85	85
S10	75	95	S10	95	100
S11	80	95	S11	90	90
S12	65	65	S12	90	90
S13	75	75	S13	70	65
S14	70	100	S14	65	55
S15	85	80	S15	85	80
S16	70	60	S16	85	80
S17	80	75	S17	80	45
S18	85	65	S18	85	80
S19	80	75	S19	85	55
S20	70	65	S20	90	75

Table 2 shows the original scores of both classes. The experimental class showed significant improvement in scores from the pretest to the posttest. However, some students showed a decline in scores, namely students S16, S17, S18, S19, and S20. Similarly, the control class initially showed good scores on the pretest, though these differed from those of the experimental class. In the control class, there were also several students whose scores declined, including S13, S14, S15, S16, S17, S18, S19, and S20. This indicates a difference in initial understanding between the control class and the experimental class.

Descriptive Statistic

The descriptive statistics were obtained to provide an overview of students' vocabulary mastery scores in both the experimental and control classes.

Table 3. Descriptive statistic of pre-test and post-test

Class	N	Mean	SD
Pre-Test Experimental	20	70.00	14.235

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Post-Test Experimental	20	74.75	16.341
Pre-Test Control	20	81.25	14.407
Post-Test Control	20	78.25	16.723

Table 4. Percentage of improvement and learning gain by class

Class	Pre-test	Post-test	Mean Gain	% Change	N-gain	Category
Experimental	70.00	74.75	+4.75	+6.79%	0.16	Low
Control	81.25	78.25	-3.00	-3.69%	-0.16	Decline

As presented in Table 3 and 4, the experimental class obtained a mean pre-test score of 70.00 with a standard deviation of 14.235. Following the implementation of Zep Quiz as the gamified learning media, the post-test mean score of the experimental class increased to 74.75 with a standard deviation of 16.341. This indicates a mean improvement of 4.75 points after the treatment was applied. Meanwhile, the control class which received conventional method without the exposured of Zep Quiz recorded a mean pre-test score of 81.25 with a standard deviation of 14.407. At the post-test in control class, the mean score slightly decreased to 78.25 with a standard deviation of 16.723, reflecting a decline of -3.00 points.

The mean gain represents the raw difference between post-test and pre-test scores, while the percentage of improvement expresses this change relative to each class's initial score. The N-gain (normalized gain), calculated following Hake's formula, indicates the proportion of possible improvement that was actually achieved. Although the experimental class's N-gain of 0.16 still falls within the "low" category, it represents a positive and consistent upward movement, whereas the control class showed a negative change, indicating an overall decline in vocabulary scores across the same period.

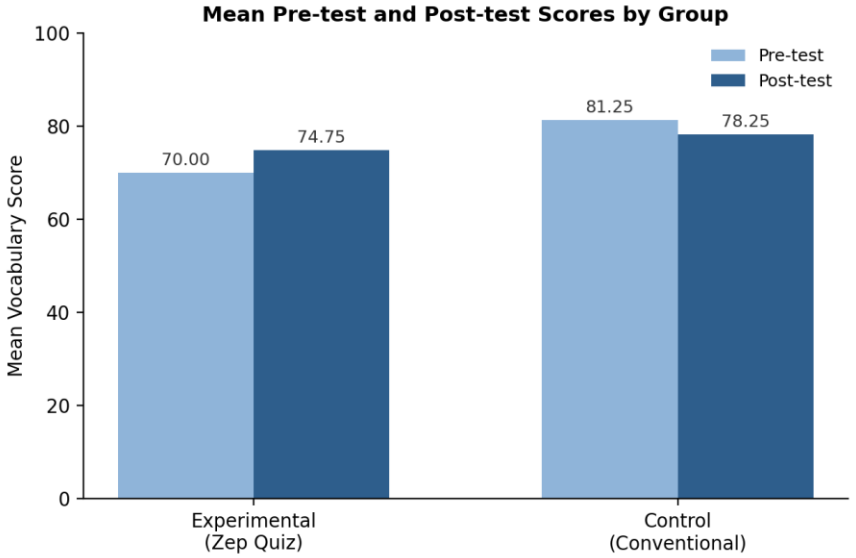


Figure 1. Mean vocabulary score

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As shown in Figure 1 that the two classes moved in opposite directions between the pre-test and post-test. From an educational perspective, this divergence is significant: students in the experimental class, who engaged with vocabulary material through Zep Quiz's gamified, interactive format, showed a modest but consistent improvement in their scores. This suggests that repeated, game-based exposure to vocabulary items may support short-term retention. In contrast, the control class, which received conventional instruction without any interactive reinforcement between the two testing points, showed a decline in average scores. This may reflect reduced engagement or a lack of retention support following a purely conventional teaching approach. However, it is important to note that the pre-test mean score of the control class (81.25) was notably higher than that of the experimental class (70.00). This indicates that the two classes were not equivalent in terms of baseline vocabulary performance, with a gap of 11.25 points between them. This finding suggest that the experimental class demonstrated a modest improvement in vocabulary mastery following the implementation of Zep Quiz, whereas the control class experienced a slight decrease in performance over the same period.

Normality Test Result

Table 5. Normality test result (Shapiro-Wilk)

Group	Test	N	Shapiro-Wilk *p*	Interpretation
Experimental	Pre-test	20	0.070	Normally Distributed
Experimental	Post-test	20	0.411	Normally Distributed
Control	Pre-test	20	0.000	Not Normally Distributed
Control	Post-test	20	0.071	Normally Distributed

The normality test was conducted using the Shapiro-Wilk test, given that the sample size in each class was 20, which is less than 50. Based on the results presented in Table 5, three out of four data classes were found to be normally distributed, as their significance values exceeded 0.05, namely the Pre Test Experimental (Sig. = .070), Post Test Experimental (Sig. = .411), and Post Test Control (Sig. = .071). However, the Pre Test Control class yielded a significance value of .000, which is below the threshold of 0.05, indicating that the data was not normally distributed.

Given that one of the data groups did not meet the normality assumption, the overall data distribution cannot be considered fully normal. Consequently, the use of a non-parametric statistical test would be more appropriate for the subsequent hypothesis testing, as nonparametric tests do not require the assumption of normality to be fulfilled.

Nonparametric Test

Since the normality assumption was not fully fulfilled, as evidenced by the non-normal distribution of the pretest control class, the Mann-Whitney U test was selected as a nonparametric alternative to the independent samples t-test. This test is appropriate for comparing two independent groups when the data do not meet the normality assumption and the measurement scale is at least ordinal (Corder & Foreman, 2014). This test evaluates

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whether there is a statistically significant difference in the rank distributions of scores between the two classes. The hypotheses tested were as follows:

Ha: There is a significant effect of using Zep Quiz on vocabulary mastery in narrative text among tenth-grade Marketing students at SMK Negeri 2 Purworejo.

H_0: There is no significant effect of using Zep Quiz on vocabulary mastery in narrative text among tenth-grade Marketing students at SMK Negeri 2 Purworejo

Table 6. Rank summary for the Mann–Whitney u test

Class	N	Mean Rank	Sum of Ranks
Post Test Experimental Class	20	19.23	384.50
Post Test Control Class	20	21.78	435.50

Table 7. Mann–Whitney U test results

Statistic	*Value*
Mann–Whitney *U*	174.50
X	−0.693
p (two-tailed)	.488

As displayed in Tables 6 above, the mean rank of the experimental class (19.23) was slightly lower than that of the control class (21.78). The Mann-Whitney U Test yielded a U value of 174.500 with an asymptotic significance value of 0.488 ($p > 0.05$). Since the obtained significance value exceeded the predetermined alpha level of 0.05, the null hypothesis (H_0) was accepted and the alternative hypothesis (Ha) was rejected.

These findings indicate that there was no significant effect of using Zep Quiz on vocabulary mastery in narrative text among tenth grade marketing students at SMK Negeri 2 Purworejo.

Effect Size

Since the data were not normally distributed, rank-biserial correlation ($r = |Z|/\sqrt{N}$) was used to measure the effect size as a non-parametric alternative to Cohen's d (Field, 2018). Based on the output of the Mann-Whitney U test (Z = -0.693, N = 40), the effect size was calculated as follows: $r = |-0.693| / \sqrt{40} = 0.110$. According to Cohen (1988) criteria, this value indicates a small effect size ($r < 0.30$). These results suggest that implementing Zep Quiz had a minimal practical impact on students' vocabulary mastery in narrative texts despite the non-significant statistical result (Asymp. Sig. = 0.488 > 0.05).

DISCUSSION

This study examined the effect of Zep Quiz on vocabulary mastery in narrative texts among tenth-grade Marketing students at SMK Negeri 2 Purworejo. The Mann–Whitney U test indicated no statistically significant difference between the experimental and control groups ($U = 174.500$, $Z = -0.693$, $p = 0.488$), leading to the rejection of the alternative hypothesis. Notably, however, the experimental class demonstrated a genuine, if modest,

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upward shift (70.00 to 74.75), while the control class declined slightly (81.25 to 78.25). This divergence in direction—improvement versus decline—without reaching statistical significance is the central puzzle this discussion seeks to explain, rather than a result to simply restate.

This study aligns with Sudirman (2020); Nurhayati and Lolong (2024) who state that there are two factors influencing this difference in means, the first factor is the development of student vocabulary; students come from different educational backgrounds, which means that each student's level of vocabulary mastery varies. Similarly, there is a difference in the average scores between the control class and the experimental class. The second factor is the teacher's ability to teach vocabulary and reading skills to students. Teachers must enrich students' vocabulary and find better ways to teach reading skills. When each class has a different level of vocabulary mastery, this can lead to a significant gap in scores.

Further findings from the normality tests indicate that three of the four data groups are normally distributed, as their respective significance values are greater than 0.05. However, the Pre-test Control group yielded a significance value of 0.000, indicating a non-normal distribution. This violation of the normality assumption necessitates the use of non-parametric tests for hypothesis testing. The non-normal distribution in the Pre-test Control group may be due to pre-existing differences in vocabulary proficiency between the two groups, a common challenge in quasi-experimental research using whole-class groups. Similarly, Sun et al. (2023) confirmed through multivariate analysis that L2 proficiency is the strongest predictor of vocabulary knowledge. This indicates that unequal proficiency levels between the control and experimental class at the start of a study can produce skewed baseline data distributions, as was observed in the pre-test control class in the present study.

There are several interrelated explanations that help account for this pattern of non-significant results. Firstly, the two classes were not equivalent at the outset: the control class started with an 11.25-point lead over the experimental class. In this design with unequal control class, this ceiling effect hinders the control class's ability to demonstrate further improvement whilst narrowing the post-test score gap between the two classes, regardless of the actual improvement achieved by the experimental class. In other words, the 4.75-point improvement in the experimental class may reflect genuine learning masked by the initial comparison point, rather than the absence of any teaching effect.

Secondly, from a measurement perspective, a sample of 40 participants (n = 20 per class, based on non-parametric analysis) provides limited statistical power to detect small to moderate effects. The calculated effect size (r = 0.110) falls within the 'small effect' range according to Cohen (1988), but a small effect is not the same as a trivial or non-existent effect—this may simply indicate that this study lacked sufficient power to confirm what the descriptive data had suggested: a real but limited instructional benefit.

Thirdly, and most significantly, the gap between descriptive improvement and inferential irrelevance can be understood through the lens of Cognitive Load Theory Sweller (1988) and Krashen's Input Hypothesis (1982). Zep Quiz, as a game-based vocabulary tool, introduces new interface elements, game mechanics and competitive dynamics alongside the targeted linguistic input. For learners who are not yet accustomed to digital game-based platforms, the additional cognitive load associated with navigating the game itself may

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compete with the relevant cognitive load required for vocabulary encoding, particularly during a single, time-limited intervention period. This would predict the pattern observed here: a positive but statistically moderate improvement, as learners are simultaneously acquiring vocabulary and learning to operate the tool. Krashen's framework further suggests that vocabulary acquisition depends on comprehensible input delivered in low-anxiety conditions; the classroom conditions described below (fatigue, lack of attention, competing obligations) may have heightened the affective filter, thereby limiting how much of the input pupils could process into lasting vocabulary knowledge, even when the tool itself was engaging.

Sadeghi et al. (2022) similarly reported no significant differences in vocabulary achievement between gamified and non-gamified groups, concluding that gamification primarily enhances learner motivation without consistently producing measurable vocabulary gains. The small effect size observed in the present study is consistent with this conclusion. In contrast, Cancino and Viguera (2024) found that students using Quizizz, a platform with game mechanics comparable to those of Zep Quiz, achieved significantly greater vocabulary gains than those in the comparison group. This discrepancy is unlikely to be attributable to differences between the platforms themselves, as both employ similar competitive quiz-based features. Instead, it appears to reflect differences in implementation. Cancino and Viguera (2024) implemented the intervention over a longer period, whereas the present study was conducted within a relatively short treatment period and was affected by inconsistent student attendance. This interpretation is further supported by Bao and Peng (2024), who argued that vocabulary development is strongly influenced by learners' prior second language proficiency and the consistency of learning exposure. Both of these factors were evident limitations in the present study. Collectively, these findings suggest that the effectiveness of gamified vocabulary instruction depends less on the digital platform itself than on the duration of implementation, consistency of learner participation, and students' initial language proficiency. These contextual factors provide a plausible explanation for why the present study did not observe statistically significant improvements despite the motivational benefits associated with gamified learning.

Beyond statistical and methodological considerations, several contextual factors at the research site may have attenuated the potential effect of the Zep Quiz intervention. Unequal baseline proficiency, evidenced by the non-normal distribution of the pre-test control scores (Sig. = 0.000), indicates that the two intact classes were not drawn from comparable vocabulary-ability populations at the outset. Under Creswell (2024) caution regarding non-equivalent control group designs, this is not a peripheral limitation but a direct threat to internal validity: any true treatment effect is structurally difficult to isolate when the comparison group already outperforms the treatment class before instruction begins.

Moreover, inconsistent attendance further diluted treatment dosage. Because vocabulary acquisition through gamified repetition depends on cumulative exposure Nation (2001), students who missed sessions due to illness, OSIS activities, or cafeteria duty effectively received a fraction of the intended intervention, which would systematically bias the experimental class's mean gain downward relative to its true potential. This is not merely

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an administrative footnote; it represents a meaningful erosion of the independent variable itself.

Then, scheduling and classroom climate compounded this problem. Sessions held during the last period of the day coincide with well-documented declines in sustained attention and working memory efficiency Sievertsen et al. (2016), which are directly relevant to vocabulary encoding tasks that rely on active attentional engagement. Combined with observed off-task behavior among both groups, these conditions suggest that the intervention was tested under conditions poorly suited to isolating its instructional potential, rather than under conditions that would allow its effectiveness to be fairly evaluated.

Furthermore, these findings offer several practical implications for future researchers and English teachers who intend to integrate game-based platforms such as Zep Quiz into vocabulary instruction. Rather than suggesting that gamification is ineffective, the results highlight the importance of careful implementation. First, the duration of the intervention should be sufficiently long, as brief or single-session implementations are unlikely to produce measurable improvements in vocabulary learning. Sustained and repeated use over several weeks is more likely to provide adequate time for students to become familiar with the platform while reinforcing vocabulary acquisition. Second, the timing of implementation should be carefully considered. Conducting gamified vocabulary activities earlier in the school day, when students are generally more attentive, may enhance learning outcomes. Third, teachers should recognize that the novelty of a new digital platform can initially divert students' attention from learning tasks. Providing an orientation session before the formal implementation can help reduce unnecessary cognitive demands and enable students to focus more effectively on vocabulary learning. Finally, differences in students' initial proficiency levels should be taken into account. When teaching classes with varying levels of ability, instructors should adapt gamified activities to learners' proficiency rather than assuming that the same approach will benefit all students equally. Under these conditions, game-based platforms such as Zep Quiz are more likely to translate students' increased engagement into meaningful gains in vocabulary achievement.

This study's scope was limited to Marketing-track students at a single vocational school, which restricts generalizability to other majors or institutional contexts. Future research should extend the intervention period to capture longer-term retention effects, employ randomized or matched-group designs to mitigate baseline inequality, and consider multidimensional English proficiency outcomes beyond single-text-type vocabulary mastery. A longitudinal design in particular would help clarify whether the directional improvement observed here would strengthen into a statistically detectable effect under more controlled and sustained implementation.

Overall, this study does not support the conclusion that Zep Quiz has no instructional value. Instead, it suggests that methodological constraints, including unequal baseline proficiency, inconsistent exposure, unfavorable scheduling, and a limited intervention period, may have obscured a genuine but modest treatment effect. Viewed within the

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broader gamification literature, these findings reinforce the perspective that game based vocabulary tools can consistently enhance student engagement, whereas their measurable effects on vocabulary learning depend greatly on the quality and consistency of implementation. Therefore, future research should employ more rigorous experimental controls and longer intervention periods to provide a clearer evaluation of the instructional effectiveness of Zep Quiz.

CONCLUSION

This study aimed to determine whether Zep Quiz has a measurable impact on vocabulary mastery in narrative texts among tenth grade Marketing students at SMK Negeri 2 Purworejo. Although hypothesis testing did not confirm a statistically significant effect, the experimental class's consistent, albeit modest, improvement in contrast to the decline observed in the control class suggests a genuine instructional value, albeit modest, that could not be established with statistical certainty within the confines of a single short intervention.

In terms of classroom practice, these findings suggest that gamified tools such as Zep Quiz should not be evaluated based on a single brief trial. Teachers in vocational English as a Foreign Language (EFL) settings are encouraged to treat gamification as one component of a sustained instructional design, rather than a quick fix. This involves allowing adequate exposure time across several weeks, scheduling sessions when students are less fatigued and providing a brief orientation to the platform before formal use, so that the novelty of the platform does not compete with vocabulary encoding. Differentiating gamified content by students' existing proficiency level, rather than assuming a uniform benefit across an intact class, may also help such tools convert engagement into measurable vocabulary gains.

This study makes three contributions to the literature on EFL vocabulary instruction. Firstly, it broadens the scope of gamified vocabulary research from generic word lists to vocabulary embedded within a specific genre of text, narrative and provides evidence as to whether the benefits of gamification extend to genre-specific instruction. Secondly, by evaluating Zep Quiz in an authentic classroom setting with limited contact time, end-of-day scheduling and irregular attendance rather than in idealized experimental conditions, the study provides vocational school teachers with findings that are more relevant to their teaching practice than those obtained in a controlled laboratory setting. Thirdly, by reporting a non-significant outcome, the study provides a counterbalance to a body of gamification research that tends to favor the publication of significant results. This helps to temper expectations of what tools like Zep Quiz can realistically achieve within the constraints of an ordinary classroom.

The limitations identified above suggest specific areas for future research. As the two classes were not equivalent at baseline, future studies should use random assignment. Where intact classes are unavoidable, matching procedures or a covariate-adjusted analysis should be used to isolate the treatment effect from pre-existing group differences. As the intervention period was short and attendance was inconsistent, future research should extend the treatment period to a full semester and track attendance as a covariate. This would clarify whether the positive trend observed here strengthens into a statistically significant and long-lasting effect over time. As the sample was confined to one vocational

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subject at one school, replication across other subjects and institutions is required to establish generalizability. Finally, as this study only measured vocabulary mastery within one text genre, future research could examine whether Zep Quiz's effect differs across other genres and vocabulary dimensions, such as depth and breadth, as well as productive versus receptive knowledge. This would provide a more comprehensive understanding of its instructional value.

Finally, this study does not conclude that Zep Quiz is without instructional merit. Rather, it demonstrates how baseline inequality, limited dosage and unfavorable scheduling can obscure a real but modest treatment effect. It also offers vocational English as a Foreign Language (EFL) teachers and future researchers a more grounded basis for designing and evaluating gamified vocabulary instruction.

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