THE EFFECT OF USING ABCYA! GAMES ON GRADE NINE STUDENTS' VOCABULARY ACHIEVEMENT AT SMP NEGERI 12 PEMATANGSIANTAR

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ABSTRACT

This study investigated the effect of using ABCya! Games on the vocabulary achievement of Grade Nine students at SMP Negeri 12 Pematangsiantar. A quantitative quasi-experimental design was applied involving 64 students from two existing classes: IX-8 as the experimental group and IX-9 as the control group, with 32 students in each group. The experimental group received vocabulary instruction using ABCya! Games, whereas the control group received conventional instruction. Data were collected through a 25-item multiple-choice vocabulary test administered as a pre-test and post-test. The test measured three word-meaning indicators: Form and Meaning, Concept and Referents, and Associations. The experimental group's mean score increased from 56.00 to 76.50 (mean gain = 20.50; mean N-Gain = 0.429). The control group's mean score increased from 53.62 to 66.38 (mean gain = 12.75; mean N-Gain = 0.267). The Shapiro–Wilk test did not indicate a significant departure from normality in either group. Levene's test showed unequal N-Gain variances (p = 0.0232); therefore, the Mann–Whitney U test was used. The test indicated a statistically significant difference in N-Gain score distributions (U = 678.500; p = 0.0255), with a higher mean rank for the experimental group. The findings suggest that ABCya!-based instruction was associated with greater normalized vocabulary improvement in the participating experimental class. The results are limited to the two intact classes and the conditions of this study.

Keywords: ABCya! Games, vocabulary achievement, digital game-based learning, word meaning

ABSTRAK

Penelitian ini bertujuan mengetahui pengaruh penggunaan ABCya! Games terhadap pencapaian kosakata siswa kelas IX di SMP Negeri 12 Pematangsiantar. Penelitian menggunakan pendekatan kuantitatif dengan desain kuasi-eksperimen

yang melibatkan 64 siswa dari dua kelas utuh, yaitu IX-8 sebagai kelompok eksperimen dan IX-9 sebagai kelompok kontrol, masing-masing terdiri atas 32 siswa. Kelompok eksperimen memperoleh pembelajaran kosakata menggunakan ABCya! Games, sedangkan kelompok kontrol mengikuti pembelajaran konvensional. Data dikumpulkan melalui tes kosakata pilihan ganda sebanyak 25 butir yang diberikan sebagai pre-test dan post-test. Tes mengukur tiga indikator makna kata, yaitu Form and Meaning, Concept and Referents, serta Associations. Nilai rata-rata kelompok eksperimen meningkat dari 56,00 menjadi 76,50 (gain rata-rata = 20,50; N-Gain = 0,429). Kelompok kontrol meningkat dari 53,62 menjadi 66,38 (gain rata-rata = 12,75; N-Gain = 0,267). Uji Shapiro–Wilk tidak menunjukkan penyimpangan normalitas yang signifikan pada kedua kelompok. Uji Levene menunjukkan varians N-Gain tidak homogen (p = 0,0232), sehingga digunakan uji Mann–Whitney U. Hasil uji menunjukkan perbedaan yang signifikan pada distribusi skor N-Gain (U = 678,500; p = 0,0255), dengan mean rank kelompok eksperimen lebih tinggi. Temuan ini menunjukkan bahwa pembelajaran menggunakan ABCya! Games berkaitan dengan peningkatan kosakata ternormalisasi yang lebih tinggi pada kelas eksperimen. Hasil penelitian terbatas pada dua kelas dan kondisi penelitian ini.

Kata kunci: ABCya! Games, pencapaian kosakata, pembelajaran berbasis permainan digital, makna kata

A. INTRODUCTION

English plays an important role in education because it enables learners to access information, communicate ideas, and participate in academic and social contexts. In English as a Foreign Language (EFL) settings, students may have limited opportunities to encounter and use English outside the classroom. Classroom instruction therefore becomes an important environment for developing language knowledge. Vocabulary is a fundamental component of this development because learners need sufficient knowledge of words to understand messages, interpret texts, express ideas, and communicate meaning.

Vocabulary learning involves more than memorizing isolated translations. Nation (2022) explains that knowing a word includes knowledge of its form, meaning, and use. Learners need to recognize words, connect forms with meanings, and understand how words function in context. Schmitt (2019) also distinguishes receptive vocabulary, which enables learners to recognize and understand words, from productive vocabulary, which enables them to use words when producing language. When students have

insufficient vocabulary knowledge, they may experience difficulty understanding texts, following instructions, answering questions, and expressing ideas in English.

The broader educational context also highlights the importance of strengthening students' language-related abilities. OECD (2023) reported that 25% of Indonesian 15-year-old students reached Level 2 or higher in reading in PISA 2022, compared with 74% across OECD countries. Although PISA reading performance does not directly measure English vocabulary achievement, it provides a broader indication of challenges in understanding written information. Strengthening foundational language knowledge, including vocabulary, remains relevant to English instruction in Indonesian EFL classrooms.

Digital technology has created additional opportunities for teachers to provide alternative ways for students to encounter and practice English vocabulary. APJII (2024) reported 221,563,479 internet users in Indonesia, representing 79.5% internet penetration. However, access to technology alone does not automatically produce effective learning; digital resources need to be connected to instructional purposes. Digital Game-Based Learning (DGBL) integrates educational content with game-based tasks and interactions. Reinders and Wattana (2017) discussed the role of games in language learning, while Chen et al. (2018) and Tsai and Tsai (2018) reported positive potential for digital games in vocabulary learning.

Rasti-Behbahani (2021) identified motivation, authenticity, repetition, dual encoding, interactivity, and feedback as recurring features through which digital games may contribute to vocabulary acquisition. Vnucko and Klimova (2023) similarly noted the potential of digital game-based vocabulary learning while emphasizing game design, learner characteristics, and implementation context. These findings suggest that digital games can provide useful learning conditions when their features are connected to clear instructional objectives. Their effectiveness, however, should not be assumed to be automatic.

ABCya! Games is an educational digital platform that organizes games by grade level and subject area. Its language arts activities include vocabulary-related word activities, spelling, grammar, and word searches.

The platform can provide opportunities for students to interact with language content through game-based tasks rather than relying only on conventional exercises. Repetition, interaction, and feedback may be relevant to vocabulary learning because learners need opportunities to encounter, process, and retrieve word meanings. Nevertheless, the availability of language-related games does not itself demonstrate an effect on a particular group of learners. The platform therefore needs to be examined empirically in the classroom context of this study.

Previous research has examined digital games and vocabulary learning in various educational settings. Jia et al. (2024) investigated digital game-based vocabulary learning among EFL learners and reported effects on receptive and productive vocabulary knowledge. Yang et al. (2024) found improvements in English vocabulary and content learning in a digital game-playing environment. Studies in Indonesian junior high school contexts have also examined Wordwall and reported improved vocabulary outcomes (Aisy et al., 2025; Sinaga et al., 2025). These studies provide relevant evidence, but their platforms, participants, and settings differ from the present study.

The research gap concerns the use of a specific platform with a specific group of junior high school students. Previous studies have examined a broad range of digital games or applications such as Wordwall, while this study focuses on ABCya! Games and Grade Nine students at SMP Negeri 12 Pematangsiantar. The study also examines the meaning dimension of vocabulary knowledge through three indicators: Form and Meaning, Concept and Referents, and Associations. These indicators provide a more specific focus than treating vocabulary achievement as an undifferentiated outcome.

Based on this rationale, this study investigated whether the use of ABCya! Games significantly improves Grade Nine students' vocabulary achievement at SMP Negeri 12 Pematangsiantar. It compared the vocabulary improvement of students who learned through ABCya! Games with that of students who received conventional vocabulary instruction. The findings are expected to provide classroom-based evidence about the use of digital game-based learning as an alternative medium for English vocabulary instruction.

B. RESEARCH METHOD

This study employed a quantitative approach with a quasi-experimental design involving an experimental group and a control group. The research used two existing classes rather than assigning students individually at random. Class IX-8 served as the experimental group and received vocabulary instruction using ABCya! Games, while class IX-9 served as the control group and received conventional vocabulary instruction. Both groups completed a pre-test and a post-test based on the same vocabulary indicators.

Table 1. Quasi-Experimental Research Design

Group	Pre-test	Treatment	Post-test
Experimental	Y_1	ABCya! Games (X_1)	Y_2
Control	Y_1	Conventional (X_2)	Y_2

The research was conducted at SMP Negeri 12 Pematangsiantar. The population comprised 287 Grade IX students distributed across nine classes. Class IX-6 had 31 students, while the other eight classes had 32 students each. The research sample consisted of class IX-8 and class IX-9, each with 32 students, for a total of 64 participants.

Table 2. Population of Grade IX Students

Class	Students	Average score
IX-1	32	76
IX-2	32	80
IX-3	32	82
IX-4	32	86
IX-5	32	68
IX-6	31	84
IX-7	32	73
IX-8	32	70
IX-9	32	71
Total	287	—

Table 3. Research Sample

Group	Class	n
Experimental	IX-8	32
Control	IX-9	32
Total	—	64

The independent variable was the use of ABCya! Games as an instructional medium for vocabulary learning. The dependent variable was students' English vocabulary achievement, measured through pre-test and post-test scores. The experimental treatment involved using ABCya! Games in vocabulary instruction, while the control group followed conventional instruction.

Table 4. Research Variables

Variable	Operational focus	Measurement
Independent	ABCya! Games in vocabulary lessons	Treatment implementation
Dependent	Students' vocabulary achievement	Pre-test and post-test scores

Data were collected through a vocabulary test administered in three stages: pre-test, treatment, and post-test. The pre-test identified students' initial vocabulary achievement. The experimental group then received instruction using ABCya! Games, while the control group received conventional vocabulary instruction. The post-test

was administered after the instructional period to measure students' achievement following the treatment.

The instrument consisted of 25 multiple-choice items. It measured three indicators of word meaning based on Nation's (2022) framework: Form and Meaning, Concept and Referents, and Associations. Each correct answer received one point and each incorrect answer received zero. The number of correct answers was converted to a 0–100 score using the formula: score = (correct answers ÷ 25) × 100.

Table 5. Vocabulary Test Blueprint

Indicator	Items	Item numbers
Form and Meaning	10	1–10
Concept and Referents	8	11–18
Associations	7	19–25
Total	25	1–25

The thesis describes item validity as examined through item-total correlation using SPSS. An item was considered valid when its obtained correlation exceeded the critical value at the selected significance level. Reliability was examined using Cronbach's Alpha. The uploaded thesis does not report the numerical item-validity results or the Cronbach's Alpha coefficient; consequently, no coefficient is stated in this article.

Quantitative data analysis included descriptive statistics, normality testing, homogeneity testing, N-Gain calculation, and inferential analysis. Descriptive statistics included the mean, standard deviation, minimum, and maximum. Gain was calculated by subtracting the pre-test score from the post-test score. N-Gain was calculated as (post-test − pre-test) ÷ (maximum score − pre-test). The Shapiro–Wilk test was used to examine normality, while Levene's test was used to examine equality of variances. Since Levene's test indicated unequal N-Gain variances, the Mann–Whitney U test was used to compare the two independent groups. The significance level was .05.

C. RESULTS AND DISCUSSION

1. Descriptive Results

The experimental group consisted of 32 students from class IX-8. Its total pre-test score was 1,792 and its total post-test score was 2,448. The mean increased from 56.00 to 76.50, representing a mean raw gain of 20.50 points. Pre-test scores ranged from 36 to 76, while post-test scores ranged from 56 to 96. Based on individual gain records, 26 students improved, six maintained the same score, and none recorded a lower post-test score. The mean N-Gain was 0.429.

The control group consisted of 32 students from class IX-9. Its total pre-test score was 1,716 and its total post-test score was 2,124. The mean increased from 53.62 to 66.38, representing a mean raw gain of 12.75 points. Pre-test scores ranged from 32 to 80, while post-test scores ranged from 48 to 96. Twenty-eight students improved, four maintained the same score, and none recorded a decrease. The mean N-Gain was 0.267.

Table 6. Descriptive Statistics of Vocabulary Scores

Measure	Experimental	Control
Students (n)	32	32
Pre-test mean	56.00	53.62
Post-test mean	76.50	66.38
Mean gain	20.50	12.75
Mean N-Gain	0.429	0.267
Pre-test range	36–76	32–80
Post-test range	56–96	48–96

Both groups showed higher mean scores after instruction. However, the experimental group recorded a larger mean raw gain (20.50) than the control group (12.75), a difference of 7.75 points. The experimental group also had a higher mean N-Gain (0.429 compared with 0.267), indicating a higher average normalized improvement during the research period.

2. Assumption and Hypothesis Testing

The Shapiro–Wilk test was used to examine the distribution of N-Gain scores. The experimental group obtained W = 0.9391 with p = 0.0706, while the control group obtained W = 0.9347 with p = 0.0530. Both p-values exceeded .05; therefore, the test did not provide sufficient evidence of a significant departure from normality in either group.

Table 7. Shapiro–Wilk Normality Test

Group	n	W	p-value
Experimental	32	0.9391	0.0706
Control	32	0.9347	0.0530

Levene's test was conducted to examine equality of N-Gain variances. The test produced a statistic of 5.4184 with p = 0.0232. Since the p-value was below .05, the equal-variance assumption was rejected. The N-Gain variances were therefore considered not homogeneous, and a nonparametric test was selected for the main comparison.

Table 8. Levene's Test for N-Gain

Variable	Statistic	p-value	Decision
N-Gain	5.4184	0.0232	Not homogeneous

The hypotheses tested whether the N-Gain score distributions differed between the experimental and control groups. H_0 stated that there was no statistically significant difference, whereas H_a stated that a significant difference existed. Because Levene's test indicated unequal variances, the

Mann–Whitney U test was used. The test produced U = 678.500 and a two-tailed p-value of 0.0255. Since p was below .05, H_0 was rejected and H_a was supported. The experimental group's mean rank was 37.703, higher than the control group's mean rank of 27.297.

Table 9. Mann–Whitney U Test of N-Gain

Statistic	Value
Mann–Whitney U	678.500
Experimental mean rank	37.703
Control mean rank	27.297
Two-tailed p-value	0.0255
Participants	64

The Mann–Whitney U test compares rank distributions of two independent groups; it is not a direct test of equality of arithmetic means. The result is therefore interpreted together with the descriptive pattern: the experimental group had a higher mean N-Gain and a higher mean rank. The findings provide evidence of a difference in normalized vocabulary improvement under the conditions of this quasi-experimental study.

3. Vocabulary Achievement by Indicator

The vocabulary test measured three indicators: Form and Meaning (items 1–10), Concept and Referents (items 11–18), and Associations (items 19–25). To make the indicators comparable despite different item counts, each student's correct responses within an indicator were divided by the number of items and multiplied by 100. The values in Table 10 represent the mean percentage of correct responses across the 32 students in each group.

Table 10. Mean Correct Responses by Vocabulary Indicator (%)

Indicator	Exp. pre	Exp. post	Ctrl. pre	Ctrl. post
Form & Meaning	59.38	75.94	52.81	63.44
Concept & Referents	49.22	76.95	53.91	72.66
Associations	58.93	76.79	54.46	63.39

In the experimental class, the largest descriptive increase occurred in Concept and Referents, from 49.22% to 76.95% (+27.73 percentage points). Form and Meaning increased by 16.56 points, while Associations increased by 17.86 points. In the control class, Concept and Referents also showed the largest increase (+18.75 points), followed by Form and Meaning (+10.63 points) and Associations (+8.93 points). Thus, the experimental class showed a larger descriptive increase in all three indicators. No separate inferential tests were conducted for the individual indicators, so these differences are descriptive patterns only.

4. Discussion

The descriptive findings show that students in the experimental group achieved a greater average increase in vocabulary scores than students in the

control group. The experimental mean rose from 56.00 to 76.50, while the control mean rose from 53.62 to 66.38. The experimental group's mean raw gain was 20.50, compared with 12.75 in the control group. The mean N-Gain values also showed higher normalized improvement in the experimental group (0.429) than in the control group (0.267). Both groups improved, but the extent of improvement differed.

This pattern suggests that vocabulary instruction using ABCya! Games was associated with stronger measured improvement during the research period. Digital games may provide opportunities to encounter vocabulary through interactive tasks, repeated attempts, and feedback. These features are relevant to vocabulary learning because students need to connect word forms with meanings and retrieve word knowledge. The present study, however, measured vocabulary test performance; it did not directly measure motivation, engagement, attention, or retrieval practice. Those processes may offer a theoretical explanation but cannot be claimed as measured outcomes.

The findings can be considered in relation to Nation's (2022) explanation that vocabulary knowledge involves form, meaning, and use, and that repeated encounters support learning. Rasti-Behbahani (2021) identified repetition, interactivity, and feedback as features that may contribute to vocabulary acquisition through digital games. The ABCya! activities used in this study were intended to connect game-based interaction with vocabulary learning objectives. These theoretical perspectives provide a possible interpretation of the observed score pattern, rather than direct proof of the mechanism responsible for the improvement.

The Mann–Whitney U test showed a statistically significant difference in N-Gain score distributions between the two groups ($U = 678.500$, $p = 0.0255$). The experimental group also had a higher mean rank. Since the test evaluates rank distributions, the result should not be described as a direct test of arithmetic mean differences. Interpreted alongside the descriptive statistics, it indicates that the experimental group generally achieved higher normalized improvement scores than the control group in this sample.

The indicator-level analysis showed improvement in all three word-meaning indicators. The largest increase in the experimental class

occurred in Concept and Referents (+27.73 percentage points), followed by Associations (+17.86) and Form and Meaning (+16.56). This may indicate that students made a particularly noticeable improvement in identifying the concepts or referents represented by English words in the test tasks. The control group also improved in all indicators, with its largest increase in Concept and Referents (+18.75). Because no separate significance tests were conducted for each indicator, the study cannot establish that ABCya! had a statistically stronger effect on one indicator than another.

The direction of the findings isgenerally consistent with earlier research on digital game-based vocabulary learning. Chen et al. (2018) and Tsai and Tsai (2018) reported positive effects of digital games across the studies included in their meta-analyses. Rasti-Behbahani (2021) discussed repetition, interactivity, and feedback as relevant game features, while Vnucko and Klimova (2023) emphasized the potential of digital games alongside the importance of implementation and context. Jia et al. (2024) and Yang et al. (2024) also reported positive vocabulary outcomes in digital game-based environments. Indonesian studies by Aisy et al. (2025) and Sinaga et al. (2025) examined Wordwall and provide related evidence, although they used a different platform and learner context.

Several limitations need to be considered. First, the study involved two existing classes at one school, and students were not individually randomized. Class membership may therefore be associated with differences not represented in the score data. Second, the item-level indicator analysis was descriptive; no separate inferential tests were conducted for the three indicators. Third, the score data do not measure students' motivation, engagement, confidence, or attitudes toward ABCya! Games. Fourth, the thesis does not independently document every aspect of treatment implementation, including attendance, exact duration, and fidelity to each lesson plan. These limitations restrict generalization beyond the participating classes and research conditions.

D. CONCLUSION

This study examined the effect of using ABCya! Games on the vocabulary achievement of Grade Nine students at SMP Negeri 12 Pematangsiantar. It involved 64 students: 32 students from class IX-8 in the experimental group and

32 students from class IX-9 in the control group. The experimental group received vocabulary instruction using ABCya! Games, while the control group received conventional instruction. Vocabulary achievement was measured through 25 multiple-choice items focusing on word meaning.

The descriptive results showed that the experimental group's mean score increased from 56.00 to 76.50, producing a mean gain of 20.50 points and a mean N-Gain of 0.429. The control group's mean increased from 53.62 to 66.38, producing a mean gain of 12.75 points and a mean N-Gain of 0.267. The experimental group therefore recorded a higher average normalized improvement. The Shapiro–Wilk test did not indicate a significant departure from normality in either group, but Levene's test showed that the N-Gain variances were not homogeneous ($p = 0.0232$). Accordingly, the Mann–Whitney U test was used and showed a statistically significant difference in N-Gain score distributions ($U = 678.500$, $p = 0.0255$). The experimental group's mean rank (37.703) was higher than the control group's mean rank (27.297).

Based on these findings, the use of ABCya! Games was associated with a significantly higher rank distribution of normalized vocabulary improvement among the experimental students than among the control students in this study. ABCya! Games may therefore be considered a potentially useful instructional medium when selected activities are connected to specific vocabulary objectives. This conclusion is limited to the two participating classes and should not automatically be generalized to all students or schools.

English teachers may consider using ABCya! Games as part of planned vocabulary lessons. Games should be selected according to students' level, vocabulary needs, and lesson objectives, and should be combined with pre-teaching, guided practice, discussion, and follow-up exercises. Students should focus on understanding why an answer is correct rather than merely completing a game. Schools may support appropriate use by providing suitable devices, internet access, and opportunities for teachers to develop technology-supported lesson plans. Future researchers are encouraged to involve more classes and schools, extend the research period, include delayed post-tests, document treatment implementation, and examine the three word-meaning indicators

through appropriately planned inferential analyses.

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