

**THE EFFECT OF ASSEMBLR EDU APPLICATION ON STUDENTS'
VOCABULARY MASTERY
(QUASI-EXPERIMENTAL STUDY AT THE EIGHTH GRADE OF JUNIOR HIGH
SCHOOL 20, BENGKULU CITY, ACADEMIC YEAR 2025–2026)**

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ABSTRACT

Vocabulary mastery is an essential component of English learning because it supports students' reading, writing, speaking, and listening skills. However, many students still have limited vocabulary mastery due to the use of conventional teaching methods that rely on memorization and translation. Therefore, innovative learning media are needed to enhance students' vocabulary learning. This study aims to determine the effect of using the Assemblr Edu app on the vocabulary mastery of Eighth Grade of Junior High School 20, Bengkulu City during the 2025–2026 school year. This study employed a quantitative approach with a quasi-experimental non-equivalent control group design. The research sample was selected using purposive sampling and consisted of an experimental class and a control class. Data were collected through vocabulary tests pretest and posttest. The experimental class received instruction using the Augmented Reality (AR)-based Assemblr Edu app, while the control class received conventional instruction using printed picture media. The data were analyzed using an independent samples t-test with SPSS version 27. The results show a significance value (Sig., 2-tailed) of 0.003, which is less than 0.05 ($0.003 < 0.05$). Thus, the alternative hypothesis (H_a) is accepted and the null hypothesis (H_o) is rejected. It can be concluded that the Assemblr Edu app is effective in improving students' vocabulary mastery and can serve as an alternative learning medium in English language instruction.

Keywords: interactive learning Media, Vocabulary Mastery, Assemblr Edu Application.

ABSTRAK

Penguasaan kosakata merupakan salah satu komponen penting dalam pembelajaran bahasa Inggris karena mendukung kemampuan membaca, menulis, berbicara, dan menyimak siswa. Namun, banyak siswa masih memiliki penguasaan kosakata yang rendah akibat penggunaan metode pembelajaran konvensional yang berfokus pada hafalan dan penerjemahan. Oleh karena itu, diperlukan media pembelajaran yang inovatif untuk meningkatkan penguasaan kosakata siswa. Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan aplikasi Assemblr Edu terhadap penguasaan kosakata siswa kelas VIII SMP Negeri 20 Kota Bengkulu tahun ajaran 2025–2026. Penelitian ini menggunakan pendekatan kuantitatif

dengan desain kuasi eksperimen tipe non-equivalent control group design. Sampel penelitian dipilih menggunakan teknik purposive sampling yang terdiri atas kelas eksperimen dan kelas kontrol. Data dikumpulkan melalui tes kosakata pretest dan posttest. Kelas eksperimen memperoleh pembelajaran menggunakan aplikasi Assemblr Edu berbasis Augmented Reality (AR), sedangkan kelas kontrol diajar menggunakan metode konvensional dengan media gambar cetak. Data dianalisis menggunakan uji Independent Samples t-Test dengan bantuan SPSS versi 27. Hasil penelitian menunjukkan nilai signifikansi (Sig. 2-tailed) sebesar 0,003 yang lebih kecil dari 0,05 ($0,003 < 0,05$). Dengan demikian, hipotesis alternatif (H_a) diterima dan hipotesis nol (H_o) ditolak. Dapat disimpulkan bahwa aplikasi Assemblr Edu efektif dalam meningkatkan penguasaan kosakata siswa dan dapat digunakan sebagai media alternatif dalam pembelajaran bahasa Inggris.

Kata Kunci: *Media Pembelajaran Interaktif, Penguasaan Kosakata, Aplikasi Assemblr Edu.*

A. Introduction

Vocabulary is the main foundation in learning English as a foreign language (EFL), because vocabulary plays a direct role in developing reading, writing, speaking, and listening skills. Zeng et al. (2025) emphasize that vocabulary mastery determines students' communication skills and access to more complex academic material. This is in line with Biseko (2025), who refers to vocabulary as the core of communicative competence in the EFL context. Vocabulary development also occurs through repeated exposure through listening, speaking, reading, and writing activities (Chiriac, 2021). Thus, vocabulary mastery is not merely memorizing the meaning of words, but a continuous process that

requires rich and meaningful interaction.

Although it is very important, vocabulary learning still faces various challenges, especially at the junior high school level. The low exposure to English in everyday life makes it difficult for many students to develop new vocabulary naturally, thereby hindering the acquisition of low-frequency words (Chen, 2025). In addition, conventional methods such as memorizing word lists, drilling exercises, or the use of word lists only help with short-term retention but are not effective for long-term understanding (Ganesan et al., 2025). Mujaddid et al. (2025) also refers to memorization as a boring and unproductive method for students. Other studies show that vocabulary learning is often not interactive and still

heavily relies on textbooks, making learning monotonous and uninteresting (Syamsinar et al., 2025). This results in students becoming passive, having difficulty retaining new vocabulary, and experiencing problems with pronunciation and language interference (Rahmi et al., 2025). This situation indicates that vocabulary learning requires more visual, contextual, and engaging media.

At Junior High School 20 Bengkulu City, the results of researchers' observations during Field Practice (PLP) in October 2024 showed that the vocabulary mastery of eighth-grade students was still low. Many students have difficulty understanding English texts and using vocabulary appropriately in speaking and writing. The teaching methods used by teachers are still conventional, namely asking students to memorize vocabulary, write it down in a diary, or simply state the meaning of words orally. As a result, students tend to be passive, forgetful, and unmotivated. The use of technology-based learning media, especially interactive ones, is still minimal, making learning monotonous and uninteresting.

Currently, the integration of information and communication technology (ICT) in the learning process is an inevitable necessity in educational development. The use of educational technology is realized using interactive learning media design to support the teaching and learning process more effectively. Interactive media can provide an authentic, repetitive, and meaningful learning experience, thus that students are more active in the learning process (Yang & Song, 2024 in Liu et al., 2025). Furthermore, the use of technology in learning allows teachers to deliver material in a more relevant manner that suits students' learning needs (Akram et al., 2022). Technology-based media also provides easy access to learning, increase interactivity and allows for the adjustment of material based on the needs, preferences and learning speed of each student (Huang & Sun, 2023). Therefore, innovations in educational technology play an important role in improving the quality of English language learning, especially in vocabulary mastery.

In practice, teachers have utilized various digital and multimedia applications in learning. Game-based

applications such as Kahoot have been proven to increase enjoyment, engagement, motivation, and the usefulness of learning for students (Altawalbeh & Irwanto, 2023). The use of gamification applications such as Wordwall, Kahoot, Blooket, and Quizizz has also been proven effective in improving students' vocabulary learning (Villacres et al., 2024). In addition, teachers rely heavily on online resources such as YouTube, digital textbooks, Microsoft PowerPoint, and Google Slides in delivering material, as well as Google Classroom and Quizizz in managing and accessing learning (Juhari & Zakaria, 2024).

Amidst the various technology-based learning media that can be utilized in English language learning, this study specifically focuses on the use of Assemblr Edu as a learning medium. Assemblr Edu is an Augmented Reality (AR)-based learning application designed to support the learning process through the visualization of 3D objects, labels, and interactive animations integrated with the real environment. In the context of learning, the use of AR has been proven to help students understand abstract concepts more

concretely through 3D visualization and interactive animations, as well as to increase student motivation, interest, and engagement in learning (Zuo et al., 2025; Saepullah et al., 2025).

Several previous studies have shown that AR has a positive impact on language learning. Ngo & Vo (2025) emphasize that AR supports various learning styles, including visual, auditory, and kinesthetic, consequently it can be used inclusively in English language learning. Ji & Wang (2024) state that AR can significantly increase student motivation, achievement, and engagement. Fithrotul 'aini et al. (2025) show that the use of AR can increase students' motivation and vocabulary learning outcomes in seventh grade. Hwang et al. (2025) found that AR at the elementary school level can increase enthusiasm and vocabulary retention, while Milad & Fayez (2025) show that AR can shape positive perceptions in the development of academic writing skills at the higher education level.

However, although previous research evidence shows the effectiveness of AR, there are several important gaps (research gaps). First,

most studies emphasize AR in general, not the use of specific applications such as Assemblr Edu. Second, previous research has often focused on student perceptions, motivation, or general learning effectiveness, while the direct effect on improving vocabulary mastery among students at State Junior High School 20 Bengkulu City has not been widely studied. Third, the researcher's PLP experience shows that the conventional methods applied by teachers have not been able to optimally improve vocabulary mastery. Therefore, this study was conducted with the aim of determining the effect of using the Assemblr Edu application on the vocabulary mastery of eighth-grade students at State Junior High School 20 Bengkulu City in the 2025–2026 academic year. This study is expected to provide empirical evidence that AR-based applications such as Assemblr Edu are effective in improving students' vocabulary mastery and can be an innovative learning alternative to overcome monotonous conventional methods.

B. Research Method

This study employed a quasi-experimental research design using a

non-equivalent control group design to examine the effect of the Assemblr Edu application on students' vocabulary mastery. This design involved an experimental group and a control group without random assignment, allowing the researcher to compare students' vocabulary achievement before and after the treatment under natural classroom conditions. According to Creswell (2014), a quasi-experimental design is appropriate when researchers cannot randomly assign participants but still aim to investigate the effectiveness of an educational intervention. Both groups completed a pre-test and a post-test, while only the experimental group received instruction through the Assemblr Edu application, whereas the control group learned using conventional teaching methods.

The study was conducted at State Junior High School 20 Bengkulu City during the second semester of the 2025–2026 academic year. The population consisted of all eighth-grade students. The samples were selected through purposive sampling based on recommendations from the English teacher and predetermined criteria. The final sample comprised 56 students, with 28 students in the

experimental class and 28 students in the control class.

The primary instrument used in this research was a vocabulary achievement test consisting of 28 multiple-choice items. The test was developed based on the learning materials in *Love Our World*, covering three instructional units: *Look Around You*, *This Is the Way*, and *Act Now*. Before being administered, the instrument underwent expert validation and a pilot test to examine its validity and reliability. Only valid and reliable items were included in the final version of the test. In addition to the vocabulary test, documentation in the form of students' attendance records, lesson implementation, and classroom activities was collected to support the research findings.

Data were collected through several stages. Initially, both the experimental and control groups completed a pre-test to determine their initial vocabulary mastery. Subsequently, the experimental group received four instructional meetings using the Assemblr Edu application, while the control group participated in four meetings using conventional learning with printed pictures. After the treatment period, both groups were

administered a post-test to measure their vocabulary achievement.

The collected data were analyzed using SPSS version 27. Descriptive statistics, including the mean, minimum score, maximum score, and standard deviation, were used to summarize students' performance. Before testing the hypothesis, the data were examined through normality and homogeneity tests. Finally, an Independent Samples t-test was conducted to determine whether there was a statistically significant difference between the vocabulary mastery of students taught using the Assemblr Edu application and those taught through conventional methods. A significance level of 0.05 was used as the criterion for accepting or rejecting the research hypothesis.

C. Result And Dissscussion

1. Result

a. Descriptive Statistics

Descriptive statistics were used to summarize students' vocabulary achievement before and after the treatment. Table 1 presents the pretest and posttest results of both the experimental and control groups, including the number of participants, mean scores, standard deviations,

minimum scores, and maximum scores. Table 1 presents the descriptive statistics of the pretest and posttest scores for both the experimental and control groups.

Table 1. Descriptive Statistics on the Pretest-Posttest of the Control and Experiment Class

Descriptive Statistics						
	N	Range	Minimum	Maximum	Sum	Mean
Pretest Control	28	43	7	50	759	27.11
Posttest Control	28	68	14	82	1123	40.11
Valid N (listwise)	28					
Pretest Experiment	28	35	11	46	739	26.39
Posttest Experiment	28	75	18	93	1584	56.57
Valid N (listwise)	28					

As presented in Table 1, both groups demonstrated higher posttest scores than pretest scores. The control group improved from a mean score of 27.11 in the pretest to 40.11 in the posttest. Similarly, the experimental group showed an increase from 26.39 to 56.57. The improvement in the experimental group was substantially greater than that of the control group, suggesting that students who learned using the Assemblr Edu application achieved better vocabulary mastery than those who learned through conventional instruction.

b. Assumption Test

1) Normality Test

The normality test in this study was conducted using the Shapiro-Wilk

test because the sample size in each class was less than 50 students ($n = 28$). The decision criterion was that if the significance value (Sig.) > 0.05 , the data were normally distributed, whereas if the significance value (Sig.) < 0.05 , the data were not normally distributed.

Table 2. Normality Test Pretest Control and Experiment Class

Tests of Normality							
		Kolmogorov-Smirnov ^a		Shapiro-Wilk			
Kelas		Statistic	df	Sig.	Statistic	df	Sig.
Hasil Belajar Pretest	Pretest Control	.148	28	.122	.968	28	.536
	Pretest Experiment	.147	28	.127	.935	28	.082

a. Lilliefors Significance Correction

Based on the values in the table above, the posttest score for the control class is 0.536 and for the experimental class is 0.082. Both classes have values greater than 0.05, so it can be concluded that both classes follow a normal distribution.

Table 3. Normality Test Posttest Control and Experiment Class

Tests of Normality							
		Kolmogorov-Smirnov ^a		Shapiro-Wilk			
Kelas		Statistic	df	Sig.	Statistic	df	Sig.
Hasil belajar Posttest	Posttest Control	.096	28	.200*	.956	28	.274
	Posttest Experiment (Assemblr Edu)	.164	28	.051	.931	28	.065

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the values in the table above, the posttest score for the control class is 0.274 and for the experimental class is 0.065. Both classes have values greater than 0.05, so it can be concluded that both classes follow a normal distribution.

2) Homogeneity Test

The homogeneity test was conducted at a significance level (α) of 0.05. The decision criterion is that if the significance value (Sig.) is greater than 0.05, the data are homogeneous; if the significance value (Sig.) is less than 0.05, the data are not homogeneous.

Table 4. Homogeneity Test Pretest Control and Experiment Class

Tests of Homogeneity of Variances					
		Levene			
		Statistic	df1	df2	Sig.
Hasil Belajar	Based on Mean	.009	1	54	.926
Pretest	Based on Median	.002	1	54	.966
	Based on Median and with adjusted df	.002	1	53.027	.966
	Based on trimmed mean	.018	1	54	.894

Based on the table above, the homogeneity test result for the pretest of the experimental and control classes is 0.926. Since this value is greater than 0.05, it can be concluded that the data groups are homogeneous.

Table 5. Homogeneity Test Posttest Control and Experiment Class

Test of Homogeneity of Variance					
		Levene			
		Statistic	df1	df2	Sig.
Hasil belajar	Based on Mean	3.745	1	54	.058
Bahasa Inggris	Based on Median	3.658	1	54	.061
	Based on Median and with adjusted df	3.658	1	51.596	.061
	Based on trimmed mean	3.832	1	54	.055

Based on the table above, the result of the posttest homogeneity test for the experimental and control classes is 0.058. Since this value is greater than 0.05, it can be concluded that the data groups are homogeneous.

c. Hypothesis Testing

To determine whether there were differences in initial ability between students in the experimental and control groups before the intervention, an independent samples t-test was conducted on the pretest data. To determine whether there were differences in initial ability between students in the experimental and control groups before the intervention, an independent samples t-test was conducted on the pretest data. The purpose of this test was to compare the mean pretest scores of the two groups and ensure that they had

comparable initial ability, thereby making them suitable for use in the experimental study.

Table 6. Independent Sample Test Pretest

		Independent Samples Test		
		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Hasil Belajar Pretest	Equal variances assumed	54	.782	.714
	Equal variances not assumed	53.844	.782	.714

Based on the results of the Independent Samples t-Test, a significance value (two-tailed) of 0.782 was obtained. Since this significance value is greater than 0.05 ($0.782 > 0.05$), there is no significant difference between the pretest scores of the experimental class and the control class. This indicates that the initial abilities of the two classes were relatively similar before the treatment was administered, so the two groups can be considered equivalent at the start of the study

Table 7. Independent Sample Test Posttest Result

		Independent Samples Test		
		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
Hasil Belajar Posttest	Equal variances assumed	54	.003	-16.464
	Equal variances not assumed	52.411	.003	-16.464

Based on the test results, a Sig. (2-tailed) value of 0.003 was obtained. This value is smaller than the significance level of 0.05 ($0.003 < 0.05$), so it can be concluded that there is a significant difference between the posttest learning outcomes of students in the experimental and control classes.

2. Discussion

The results of the Independent Samples t-Test showed that the Sig. (2-tailed) value was 0.003, which is lower than the significance level of 0.05. This indicates a statistically significant difference between the experimental and control classes after the treatment. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted, indicating that the use of Assemblr Edu had a significant effect on students' vocabulary mastery. Furthermore, the experimental class obtained a higher mean posttest score than the control class, suggesting that Augmented Reality-based learning media provide a more effective learning experience than conventional instruction.

This finding can be explained through the concept of vocabulary acquisition. According to Radzuan &

Arif (2025), vocabulary acquisition involves recognizing, understanding, storing, and using vocabulary appropriately in different communicative contexts. García (2024) further argues that new vocabulary becomes part of learners' mental lexicon when meaningful connections are formed between words and their meanings. In this study, Assemblr Edu facilitated this process through interactive 3D visualizations that enabled students to observe concrete representations of vocabulary, making new words easier to understand and remember.

The improvement in students' vocabulary mastery was also influenced by the instructional strategy implemented during the learning process. Assemblr Edu was integrated with explicit vocabulary instruction, in which the teacher introduced target vocabulary, explained word meanings, and guided students to explore three-dimensional objects before discussing the vocabulary in context. As explained by Masrul & Wicaksono (2023) and Compton (2024), explicit vocabulary instruction helps learners understand both word meanings and communicative functions. Therefore, the improvement should be attributed

not only to the technology itself but also to the structured instructional approach.

This finding is also supported by Mayer's (2002) Cognitive Theory of Multimedia Learning, which states that meaningful learning occurs when information is presented through verbal and visual channels simultaneously. In this study, Assemblr Edu combined teacher explanations, written text, images, and interactive 3D objects, enabling students to establish meaningful connections between vocabulary and its visual representations, thereby improving comprehension and retention.

In addition, the learning activities reflected contextual vocabulary instruction. Students observed 3D objects, predicted the meanings of unfamiliar words, and connected new vocabulary with their prior knowledge. These activities encouraged active meaning construction rather than simple memorization, indicating that the effectiveness of Assemblr Edu lies not only in its Augmented Reality technology but also in its ability to support meaningful and contextual learning.

The findings are consistent with Zulvi et al. (2024), who reported that

Assemblr Edu significantly improved students' vocabulary mastery, and Kurnia et al. (2025), whose study found significantly higher posttest scores in the experimental group ($p = 0.000$). These similarities strengthen the evidence that Augmented Reality-based learning positively influences vocabulary mastery.

However, the results differ from Belda-Medina and Marrahi-Gomez (2023), who found no significant difference between the experimental and control groups despite students showing positive motivation toward Augmented Reality. This difference suggests that the effectiveness of AR depends not only on the technology itself but also on how it is integrated into classroom instruction. In the present study, Assemblr Edu was supported by explicit vocabulary instruction, contextual visualization, and continuous teacher guidance, making the technology an effective pedagogical tool rather than the sole factor influencing learning outcomes.

Overall, the findings support previous empirical studies and reinforce theories of vocabulary learning. More importantly, this study demonstrates that the effectiveness of Augmented Reality depends on its

ability to facilitate explicit, contextual, interactive, and meaningful learning experiences. Consequently, Assemblr Edu can be considered an effective instructional medium for improving junior high school students' vocabulary mastery.

D. Conclusion

The use of the Assemblr Edu app has a significant effect on the English learning outcomes of eighth-grade students at State Junior High School 20 in Bengkulu City. This is evidenced by the results of the Independent Samples *t*-Test, which showed a significance value (Sig. 2-tailed) of 0.003, which is less than 0.05. Thus, there is a significant difference between the learning outcomes of students who learned using the Assemblr Edu application and those who learned using conventional teaching methods. This finding answers the research question regarding whether the use of the Assemblr Edu app has a significant effect on student learning outcomes. The research results show that students who received instruction using Assemblr Edu achieved better learning outcomes compared to students in the control group.

Therefore, the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected.

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