The Effect of Augmented Reality on Vocabulary Mastery of Seventh Grade Students

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Abstract:

This research aims to investigate the effect of Augmented Reality (AR) on students' vocabulary mastery among seventh-grade students at SMP Negeri 19 Palu. Vocabulary is a fundamental aspect of language learning, yet many students struggle to master it due to lack of motivation and conventional teaching methods. To address this problem, the researcher applied AR-based learning using the Assemble Edu application, which provides 3D visuals and interactive features to improve engagement. This study used a quasi-experimental method with two groups: an experimental class that received AR-based instruction and a control class that received traditional instruction. Both classes were given a pre-test and post-test to measure vocabulary mastery. The results showed a significant improvement in the experimental class, with an average post-test score of 82.00, compared to 59.80 in the pre-test. Meanwhile, the control class only increased from 63.00 to 72.40. Statistical analysis using SPSS showed that the difference between the two groups was significant (Sig. 2-tailed = 0.001), indicating that AR had a strong positive effect on vocabulary acquisition. These findings support previous research showing that AR enhances motivation, memory retention, and contextual understanding in language learning. The use of AR aligns with constructivist learning theory and supports the Merdeka Curriculum, which emphasizes student-centered and technology-integrated learning. In conclusion, AR-based learning can effectively improve students' vocabulary mastery and is recommended as a modern instructional strategy in English language teaching

Keywords: *Augmented Reality, Vocabulary Mastery, English Learning, Interactive Media*

INTRODUCTION

Vocabulary mastery is a fundamental element in learning English. Without sufficient vocabulary, students will struggle to understand texts, speak, write, or even listen effectively. Vocabulary serves as the foundation for developing all four language skills. As stated by Katemba (2021), the most important words to learn in a language are vocabulary. Without vocabulary, learners cannot speak, write, read, or understand what is being said in the listening and speaking process.

Learning vocabulary can be particularly challenging for EFL learners. Many Indonesian students, for example, find it difficult because English words and their spelling are often very different from how they sound or are pronounced (Marpaung, 2023). This creates an additional barrier in acquiring new vocabulary. According to Marpaung and Situmeang (2020), vocabulary is a huge part of learning English. We use thousands of words every day to communicate, making it essential for learners to build a broad vocabulary base.

To overcome these challenges and achieve effective vocabulary mastery, students need to be provided with appropriate teaching methods and engaging learning strategies. Moreover, vocabulary is not isolated—it is closely linked with other components of language learning such as listening, speaking, reading, writing, grammar, and pronunciation. As noted by Usman et al. (2015), all of these aspects are interconnected, and vocabulary plays a crucial role in understanding them.

However, based on initial observations at SMP Negeri 19 Palu, many seventh-grade students had difficulty in mastering basic vocabulary. This resulted in low motivation to learn and limited students' ability to use vocabulary contextually in daily communication. This problem is exacerbated by conventional teacher-centered learning methods, which tend to be less interactive and have not integrated technology into the learning process optimally.

In the contemporary era of Society 5.0, individuals are expected to seamlessly integrate virtual and physical spaces to complete their work following established standards efficiently (Usman et al., 2024). In Society 5.0 era, education is required to transform in line with technological development and the demands of 21st-century learners. Innovative, collaborative, and technology-based learning models are becoming a necessity. One of the promising solutions is the use of augmented reality (AR) a technology that merges real and virtual environments in real-time to create more engaging and immersive learning experiences (Arafah et al., 2020).

Several studies have shown that the use of AR in language learning can improve motivation, memory retention, and contextual understanding of vocabulary (Khan et al., 2023). However, a significant research gap still exists, particularly regarding the application of AR in English vocabulary instruction at the junior high school level in Indonesia, especially within the framework of the Merdeka Curriculum, which emphasizes independent and experiential learning.

Most previous studies have focused on higher education settings, learners with special needs, or foreign language acquisition other than English. For instance, (Rapti et al., 2022) studied AR for special-needs students in Greece, while (Muangchan & Yanhua 2024) focused on Mandarin vocabulary learning at a Thai university. Therefore, few studies have specifically examined the use of AR for English vocabulary instruction among seventh-grade students in public junior high schools in Indonesia, particularly in regions such as Palu.

To address this gap, this research aims to investigate the effect of using augmented reality technology through the Assemble Edu application on improving English vocabulary mastery among seventh-grade students at SMP Negeri 19 Palu. This application is selected for its interactive features, such as 3D object visualization, educational games, and instant feedback, which allow students to learn vocabulary in a fun and meaningful way.

By integrating AR into vocabulary instruction, it is expected that the learning process will become more engaging, enjoyable, and relevant, enhancing students' participation and

motivation. This study not only contributes to the development of technology-based learning methods but also supports the implementation of the Merdeka Curriculum, which promotes contextual, digital, and student-centered learning.

METHODS

This study employed a quantitative approach with a quasi-experimental design to examine the effectiveness of the Augmented Reality media in improving the vocabulary mastery of seventh-grade students at SMP Negeri 19 Palu

Research design

This research is a quasi-experimental study. In a quasi-experiment, there are two groups or classes: the experimental group and the control group. The experimental group is the group that receives treatment using the Augmented Reality method to determine students' cognitive learning outcomes, while the control group does not receive any treatment.

The research design used in this study is a nonequivalent control group design. This design is almost the same as the pretest-posttest control group design, except in this design the experimental group or the control group is not selected randomly. In this design, two groups are not selected randomly: the first group (experimental) is treated with the Augmented Reality method, while the second group (control) uses the conventional method. The pretest and posttest design remains the best choice in quasi-experimental research because it allows researchers to measure significant changes, control known external variables, and enhance internal validity. In short, quasi-experimental is more practical and relevant for researching the influence of augmented reality on students' vocabulary mastery in a real classroom setting. According to (Sugiyono 2017), the nonequivalent control group design is as follows:

Table 1
The nonequivalent control group design

O_1	X	O_2
O_3		O_4

(Sugiyono 2017)

Description:
O_1: Experimental Class Posstest
X : Treatment
O_3: Control Class Posstest

Research participants and Sampling Procedures
Population is the total collection of elements about which we want to make some inference. A population element is the subject on which the measurement is being taken. It is the unit of study. The researcher chose seventh-grade students from SMP Negeri 19 Palu as the population for this study.

Data Collection

This study used various data collection strategies, including a pre-test, post-test, and treatment, to assess how well the learning method using Augmented Reality (AR) was applied to improve students' vocabulary. The pre-test was administered to evaluate students' initial vocabulary mastery and to determine whether the class was equivalent in terms of vocabulary achievement before the treatment was given. After conducting the pre-test, the researcher provided treatment to the students using Augmented Reality-based learning. The treatment was carried out over four sessions, with specific lesson plans prepared for each session. Following the treatment, a post-test was administered to measure the students' vocabulary mastery after receiving the intervention.

RESULTS AND FINDINGS

The findings of this study relate to the answer to the problem formulation, which aims to determine the improvement of students' vocabulary. Researchers gave pretests and posttests as research instruments. The tests were given to the experimental and control classes. The experimental class was given treatment by the researcher. Meanwhile, the control class was taught using conventional methods. At the last meeting, the researcher gave the final test to the experimental and control classes to find out whether augmented reality can improve students' vocabulary. The pretest was given to the seventh-grade students of SMP Negeri 19 Palu. The purpose of the pretest was to evaluate students' initial vocabulary knowledge before using augmented reality. This test helps to see if students are at the same level before the treatment is given. The researcher conducted the initial test on 7 May, 2025. The researcher gives the class a post-test following the use of augmented reality media in the teaching and learning process. It is carried out in order to evaluate the pupils' vocabulary following treatment. In June 2025, the post-test was administered. The result of pre-test and post-test presented in the following table:

Table 2
Pre-test and Post-test of Experimental class

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test Experimental	20	44	80	59.80	9.578
Post-Test Experimental	20	68	96	82.00	8.052
Valid N (listwise)	20				

According to the pre-test results showed that students' initial ability in vocabulary mastery was still relatively low. The average score obtained of 59.80 has not reached the school's graduation standard. Only a small number of students scored above the standard, while most were still in the low and very low categories. After being given treatment in the form of learning using Augmented Reality media, the post-test scores increased quite high with an average of 82.00. All students showed an increase in scores, and no one scored below

the minimum standard. Most students have reached or even exceeded the standard score, and there are no more students in the very low score category.

The change from the average score of 59.80 to 82.00 shows a significant improvement in vocabulary mastery. This is evidence that the use of Augmented Reality media can significantly improve student learning outcomes. The initial vocabulary mastery of students was low, with an average score of 59.80 below the school's standard. However, after utilizing Augmented Reality media for learning, post-test scores significantly improved, with an average of 82.00. All students demonstrated score increases, with most reaching or surpassing the minimum standard. The shift from 59.80 to 82.00 concluded there is a enhancement in vocabulary mastery, indicating the effectiveness of Augmented Reality in enhancing students' learning outcomes.

The control class followed the learning as usual without the help of Augmented Reality. The pre-test and post-test results are shown in the following table:

Table 3
Pretest and Posttest Result of Control class

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test Control	20	48	84	63.00	8.790
Post-Test Control	20	56	88	72.40	9.349
Valid N (listwise)	20				

The control class also experienced an increase in the average score from 63.00 to 72.40 after the learning process. However, the increase was not as big as the experimental class. Some students reached the standard score, but there were still some who did not meet the standard. This difference in results shows that although conventional learning still has an effect on improving students' abilities, its use is not as effective as learning with Augmented Reality media.

A normality test is a test that is used to determine whether the data was normally distributed or not. Tests of normality vary in how powerful they are and how simple they are to calculate. They also vary in whether they need special critical values (Yazici & Yolacan, 2007). For this research, the researcher used something called Shapiro-Wilk statistics to get the data about normality tests. The Shapiro-Wilk test looks at how the data relates to each other. The normal score is one of the most commonly used tests for checking if data follows a normal distribution. Diagnostics. It has strong power qualities (Rani Das & H.M. Rahmatullah Imon, 2016).

Table 4
Tests of Normality

	Class	Kolmogorov-Smirnov[a] Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
Result study (Vocabulary)	Pre-Test Experimental	.142	20	.200*	.968	20	.720
	Post-Test Experimental	.148	20	.200*	.956	20	.463
	Pre-Test Control	.145	20	.200*	.957	20	.483
	Post-Test Control	.133	20	.200*	.956	20	.476

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The normality test results show that all significance values are greater than 0.05. Thus, the data can be concluded to be normally distributed because all significance values in Kolmogorov-Smirnov and Shapiro-Wilk are greater than 0.05 and data analysis can proceed using parametric tests.

Parametric test is a type of statistical test that is used when the data meets certain assumptions, one of which is normally distributed. Because the results of the normality test in this study show that all data have a significance value greater than 0.05, parametric tests can be used to test the hypothesis. Parametric statistics are statistics that consider the type of data distribution that is normally distributed and has a homogeneous variant. In general, the data used in parametric statistics are intervals and ratios (Siregar 2014). In this research, the parametric test used was the Independent Samples t-Test, which is a t-test of two independent samples. This test is used to determine whether there is a significant difference between two unrelated groups, namely the experimental class and the control class, based on their post-test results.

Table 5
Independent Sample Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Result Study (Vocabulary)	Equal variances assumed	.183	.671	3.479	38	.001	9.600	2.759	4.014	15.186
	Equal variances not assumed			3.479	37.183	.001	9.600	2.759	4.010	15.190

The difference in the post-test averages between the experimental and control classes is not due to chance, but rather to the influence of the treatment, namely the use of augmented reality learning media. The t-test results are significant, as evidenced by the 2-tailed Sig. value of 0.001. Since this value is less than 0.05, it can be concluded that there is a significant difference between the two classes. In other words, using Augmented Reality learning media significantly improves students' vocabulary mastery. Students taught with this media showed higher results than those taught conventionally, proving it to be significantly more effective in improving vocabulary mastery.

DISCUSSION

The results of this study show that using augmented reality (AR) helps seventh-grade students at SMP Negeri 19 Palu learn more vocabulary. The experimental class, which was taught using the Assemble Edu application integrating AR technology, had an average score of 82.00 on the post-test, which is higher than their pre-test score of 59.80. The control class that used traditional methods showed only a small improvement. The data were normally distributed, and an Independent Sample t-Test revealed a significant difference in vocabulary mastery between the two groups (Sig. 2-tailed = 0.001), confirming the effectiveness of Augmented Reality serves as an innovative and effective medium that supports both English teachers and students in enhancing vocabulary learning.

These results are similar to the research done by (Khan et al., 2023), which found that AR helps EFL learners learn new words and have a better opinion of learning. Muangchan and Yanhua (2024) also found that AR helps people remember more Mandarin vocabulary, showing that AR is helpful in different situations for learning languages. Furthermore, (Rapti et al.,2022) showed that AR is effective for students with intellectual disabilities. They found that it increased the students' accuracy in recognizing and retaining vocabulary. This means that the results of this study are similar to other studies and show that AR is an effective way to learn vocabulary.

These findings align with Constructivist Learning Theory, which says that learners create their own knowledge through meaningful, real-world experiences. Augmented reality combines real-world objects with interactive 3D content, which supports experiential learning. According to (Grubert & Grasset 2013) and (Azuma 1997), AR gets students more involved and helps them learn in a way that's right for them. This is similar to the Merdeka Curriculum, which focuses on students learning in their own way and in the real world.Using Assemble Edu in this research let students learn in new ways, not just from textbooks. The presentation of vocabulary terms (e.g., 3D models of objects like "table," "window," or "chair") helped students connect abstract words with real-life objects. This matches with what (Sugiarto 2021) and (Hamilton & Olenewa 2010) said, who stated that AR makes it easier for learners to understand and engage with sensory content, especially when it comes to abstract topics.

Overall, the results of this study show that using AR in English language learning helps students learn more vocabulary and also makes them more motivated, engaged, and better able to understand the context. These are all very important for learning a language.

This suggests that AR-based learning tools can be an effective educational medium in line with modern learning trends.

LIMITATIONS

Despite the efficacy of Augmented Reality (AR) in enhancing vocabulary mastery as evidenced by this study, it is important to note the limitations of the research. Firstly, the study concentrated exclusively on vocabulary mastery and did not address other language skills such as grammar, speaking, or listening. Secondly, certain practical challenges arose during the implementation phase, including unstable internet connections and the absence of several students during one or more learning sessions. These factors may have had an impact on the consistency of the learning outcomes. Finally, the study utilised a single AR application (Assemble Edu), and it is conceivable that the results may vary when employed with alternative AR platforms. It is recommended that future research endeavours encompass a more extensive array of linguistic competencies, enhance technological infrastructure, and employ a range of augmented reality media to facilitate more comprehensive insights.

CONCLUSION

This study was done to see how using Augmented Reality (AR) based learning media affects vocabulary mastery of seventh grade students at SMP Negeri 19 Palu. After looking at the data, it was found that using AR media to learn vocabulary had a positive and significant impact on improving students' vocabulary skills. The results of the post-test in the experimental class show this. The average score increased from 59.80 (before the test) to 82.00 (after the test). The results of the Independent Samples t-Test show a significance value (Sig. 2-tailed) of 0.001. This value is less than 0.05, so we can say that there is a big difference between the experimental and control classes. This means that using AR helps students learn and remember vocabulary better than with traditional learning methods. AR media, like Assemble Edu, uses 3D objects to make vocabulary more interesting and easier to understand. This matches the ideas of constructivist learning theory. This theory says that meaningful and contextual learning experiences are important. Therefore, it can be concluded that AR is an effective way to improve learning outcomes, especially in English vocabulary acquisition.

REFERENCES

Arafah, K., Arafah, A.N.B., & Arafah, B. (2020). Self-Concept and Self-Efficacy's Role in Achievement Motivation and Physics Learning Outcomes. Opción, 36(27), 1607-1623

Azuma, R. T. (1997). A survey of augmented reality. *Presence: Teleoperators & Virtual Environments,* 6(4), 355–385.

Grubert, J., & Grasset, R. (2013*). Augmented reality for android application development. Mumbai: Packt Publishing.*

Hamilton, K., & Olenewa, J. (2010). *Augmented reality in education*. http://www.authorstream.com/Presentation/k3hamilton-478823-augmentedreality-in-education/.

Katemba, C. V. (2021). Enhancing Vocabulary Performance Through Mobile Assisted Language Learning at a Rural School in Indonesia. *Acuity: Journal of English Language Pedagogy, Literature and Culture*, *6*(1), 1-11. https://doi.org/10.35974/acuity.v6i1.2457

Khan, R. M. I., Ali, A., Kumar, T., & Venugopal, A. (2023). Assessing the efficacy of augmented reality in enhancing EFL vocabulary. Cogent Arts & Humanities, 10(1). https://doi.org/10.1080/23311983.2023.2223010

Marpaung, M. S. (2023). Vocabulary Enrichment through Picture Word Inductive Model (PWIM): An Experimental Study. *Acuity: Journal of English Language Pedagogy, Literature and Culture*, *8*(2), 288-302. https://doi.org/10.35974/acuity.v8i2.3123

Marpaung, M. S., & Situmeang, H. J. P. (2020). Enhancing Students' Vocabulary through Authentic Materials and Multimedia. *Acuity: Journal of English Language Pedagogy, Literature and Culture*, *5*(2), 85-101. https://doi.org/10.35974/acuity.v5i2.2247

Muangchan, P., & Yanhua, Z. (2024). Augmented reality technology in a basic Chinese vocabulary course: a study in a Thai university. Cogent Education, 12(1). https://doi.org/10.1080/2331186X.2024.2446088

Rani Das, K., & H.M. Rahmatullah Imon, A. (2016). A Brief Review of Tests for Normality. American Journal of Theoretical and Applied Statistics, 5, 5–12.

Rapti, D., Gerogiannis, D., & Soulis, S. G. (2022). The effectiveness of augmented reality for English vocabulary instruction of Greek students with intellectual disability. European Journal of Special Needs Education, 38(2), 185–202. https://doi.org/10.1080/08856257.2022.2045816

Siregar, S. (2014). Statistik parametrik untuk penelitian kuantitatif. *Jakarta: Bumi Aksara*, *537*.

Sugiarto, A. (2021). *Pengembangan media pembelajaran IPA tiga dimensi pada materi sistem peredaran darah menggunakan augmented reality assemblr EDU di kelas VIII madrasah tsanawiyah negeri (mtsn) batu. Tesis*, Program Pascasarjana, Universitas Muhammadiyah Malang.

Sugiyono. (2017). Metode penelitian kuantitatif, kualitatif dan R & D. Bandung: Alfabeta

Usman, S., Arafah, B., Marhum, M., Munir, S., & Tadeko, N. (2024). The Effect of Technological Pedagogical Content Knowledge (TPACK) on Rural Area Students' English Writing. *Journal of Language Teaching and Research*, *15*(3), 884-892.

Usman, S., Setyosari, P., Widiati, U., & Lembah, G. (2015). Pengaruh metode group work berbantuan media video dan motivasi berprestasi terhadap hasil belajar menulis paragraf deskriptif dalam Bahasa Inggris. *Jurnal Pendidikan Humaniora (JPH)*, *3*(1), 22-30.

Yazici, B., & Yolacan, S. (2007). A comparison of various tests of normality. Journal of Statistical Computation and Simulation, 77(2), 175–183. https://doi.org/10.1080/10629360600678310