THE EFFECT OF USING MIND MAPPING ON STUDENTS' VOCABULARY ACHIEVEMENT IN THE TWELFTH GRADE OF SMA YAYASAN RAKYAT PANCUR BATU

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ABSTRACT

Vocabulary is a crucial component of language learning because it enables learners to understand texts, express ideas, and communicate effectively in both academic and real-life contexts. In the Indonesian educational setting, however, many students continue to experience difficulties in mastering vocabulary. Traditional teaching methods that rely heavily on memorization, limited practice, and lack of interactive activities often fail to engage learners, resulting in low achievement and limited speaking proficiency. This gap highlights the need for more effective instructional strategies that can support vocabulary development in meaningful and engaging ways. The purpose of this study was to investigate the effect of the Mind Mapping technique on students' vocabulary achievement at SMA Yayasan Rakyat Pancur Batu. The study employed a quasi-experimental design using a one-group pre-test and post-test model. The participants consisted of 20 twelfth-grade students selected through purposive sampling. A vocabulary test of 25 multiple-choice questions was administered before and after the treatment. During the intervention, students were taught using the Mind Mapping strategy, which allowed them to organize words visually into categories to improve retention and understanding. Data analysis included mean comparison, normality and homogeneity testing, and the t-test. The findings indicated that students' mean vocabulary score improved from 40.25 in the pre-test to 82.5 in the post-test. The t-test calculation showed that the obtained t-value (5.54) exceeded the t-table value (2.09) at the 5% significance level, confirming that the treatment had a significant effect. In conclusion, the Mind Mapping technique proved to be an effective strategy to enhance vocabulary mastery. It encouraged active learning, improved retention, and created a more engaging classroom atmosphere, thereby supporting better English proficiency and communication skills.

Keywords: *Mind Mapping, vocabulary, language learning*

INTRODUCTION

Vocabulary is a fundamental component of language learning and serves as the basis for communication. Without sufficient vocabulary, students find it difficult to express ideas clearly, understand spoken or written texts, and engage effectively in both academic and social interactions. (Nation, 2022) emphasizes that vocabulary is the cornerstone of language proficiency; even with good grammar knowledge, learners cannot communicate meaningfully without an adequate vocabulary repertoire.

In the context of English as a foreign language, vocabulary mastery supports the development of the four language skills: listening, speaking, reading, and writing. Productive skills such as speaking and writing demand an active command of vocabulary to construct meaningful sentences, while receptive skills like reading and listening require sufficient vocabulary knowledge to interpret messages accurately. (Akbar et al., 2024) argue that communicative competence can only be achieved when students build a robust foundation in vocabulary. Similarly, (Hai & Vu, 2023) highlight that the Indonesian 2013 Curriculum underscores the importance of vocabulary in supporting communicative ability and overall academic success.

However, many students continue to face challenges in vocabulary acquisition. Observations at SMA Yayasan Rakyat Pancur Batu revealed low motivation, limited practice opportunities, and overreliance on monotonous strategies such as rote memorization and translation. These conditions resulted in poor engagement, weak vocabulary retention, and overall achievement far below the Minimum Mastery Criterion (KKM). Teacher reports further indicated that students often forget newly learned vocabulary due to the lack of meaningful practice and interactive learning environments. (Harmer, 2007) notes that when learners are not actively engaged in language learning, newly acquired vocabulary is easily forgotten.

To address these issues, innovative teaching methods are required to increase engagement and improve vocabulary retention. One promising approach is mind

mapping, a visual tool introduced by Buzan (2006) that organizes concepts hierarchically and highlights relationships between ideas. Mind maps employ images, colors, and structured layouts that stimulate both logical and creative thinking, thereby supporting long-term retention and deeper comprehension. Previous studies have also demonstrated its effectiveness. Putri and Safitri (2021) found that junior high school students taught with mind maps achieved higher vocabulary scores and showed greater involvement in learning compared to those taught with traditional methods. Feng et al. (2023) reported that mind mapping improved vocabulary retention, although their research was primarily conducted in urban schools with sufficient resources, leaving rural contexts underexplored. Febrianti (2023) revealed that rural Indonesian schools still rely heavily on teacher-centered approaches, limiting the application of student-centered strategies like mind mapping.

Other studies also point out significant gaps in the literature. Setianingsih et al. (2022) highlighted the scarcity of experimental or quasi-experimental studies investigating the actual impact of mind mapping on vocabulary learning at the senior high school level. Meanwhile, Sari et al. (2023) observed that students' perceptions and motivation toward using mind mapping remain rarely analyzed, reducing understanding of how learners respond to this technique. These findings indicate that further research is necessary to clarify the effectiveness of mind mapping, especially in Indonesian high schools.

Considering these gaps, the present study is entitled "The Effect of Using Mind Maps on Students' Vocabulary Achievement at SMA Yayasan Rakyat Pancur Batu." It aims to examine whether the integration of mind mapping into vocabulary instruction can enhance students' engagement, retention, and achievement, thereby contributing to more effective and innovative English language teaching practices.

LITERATURE REVIEW

Definition of Vocabulary

According to Sipayung (2022) Vocabulary is the basis of communication,

vocabulary knowledge is often considered necessary means for second language learners because the narrow vocabulary of the second language prevents effectual communication. Vocabulary refers to a person's understanding of the meaning of words. According to Hornby (2006) Vocabulary denotes the assortment of words utilised by an individual, collective, or industry, tailored to their specific objectives and domain. This indicates that vocabulary differs based on the context in which language is employed. For instance, individuals in educational contexts may employ distinct terminology in contrast to those in professional or informal settings. Consequently, vocabulary acquisition must be tailored to the individual learner's objectives and practical requirements.

Vocabulary knowledge is typically divided into receptive and productive categories. Receptive vocabulary encompasses the words that learners can comprehend when encountered in auditory or written form, whereas productive vocabulary consists of the words they can effectively use in their writing or speaking endeavours. As Teng (2021) explains, most learners know more words receptively than they can use productively, which means teaching should help them develop both recognition and active usage of vocabulary.

According to Ghanbari & Esmaeili (2020), students learn vocabulary more effectively when it is presented in meaningful context, not in isolation. They argue that vocabulary instruction should involve activities that include usage, context, pronunciation, and word forms. Teaching vocabulary with interaction and repetition helps learners understand how words function in real situations.

Moreover, vocabulary learning is not merely about memorizing word lists or translations. Schmitt & Schmitt (2020) argue that vocabulary lies at the heart of communicative competence, and learners tend to focus more on words than grammatical structures. This means vocabulary instruction should be meaningful, contextual, and interactive to help learners internalize words deeply.

Teaching Vocabulary for Senior High School

According to Sukirlan (2020), teaching vocabulary at the senior high school level is crucial for enhancing students' overall English proficiency. The

emphasis should be on both receptive and productive vocabulary. Receptive vocabulary refers to the recognition and comprehension of words via reading and listening, whereas productive vocabulary pertains to the capacity to employ words correctly in speaking and writing. Effective learning requires explicit vocabulary instruction within meaningful contexts, facilitating students' retention and application in real communication.

Senior high school students frequently encounter challenges in vocabulary acquisition, attributed to the growing complexity of reading materials and academic content. As noted by Fitriyani & Sulistyo (2022), educators should implement strategies that foster active engagement, including the use of context clues, word mapping, and group discussions. These methods facilitate the connection of new vocabulary to learners' background knowledge and personal experiences, thereby enhancing retention and comprehension.

Vocabulary instruction must be integrated with the four language skills: listening, speaking, reading, and writing. Without targeted vocabulary instruction, students may fail to develop an adequate lexicon. Pratiwi & Apsari (2021), It is recommended that educators implement structured vocabulary strategies, including semantic mapping, thematic grouping, and visual media, to enhance the interactivity and accessibility of vocabulary acquisition for senior high school students. Visual learning tools, such as mind mapping, are recognised as effective methods for teaching vocabulary to high school students.

Kinds of Vocabulary

According to Suparno & Mulyono (2021), vocabulary is classified into two primary categories: receptive vocabulary and productive vocabulary. Receptive vocabulary encompasses words that learners can identify and comprehend during reading or listening activities, whereas productive vocabulary consists of words that learners can utilise in speaking and writing tasks. Receptive vocabulary typically exceeds productive vocabulary in size, as it does not necessitate active word production. However, productive vocabulary indicates a more profound understanding, as it entails accurate application in communication.

Furthermore, According to Rahmatullah (2020), vocabulary is categorised into function words and content words. Function words, including conjunctions, articles, and prepositions, establish grammatical structure within a sentence, whereas content words such as nouns, verbs, adjectives, and adverbs convey the primary meaning. In language acquisition, content words are prioritised as they enhance learners' ability to articulate and comprehend ideas in everyday communication.

According to Buzan (2006) explains that mind mapping mimic the brain's natural associative process, making them ideal for storing and recalling language-related information. To support vocabulary development, various teaching techniques have been applied. One effective method is using visual tools such as mind mapping. Mind maps help students visualize how words relate to each other in categories, contexts, or topics. According to Sari & Wahyuni (2022), students utilising mind mapping for vocabulary acquisition demonstrated increased confidence and improved retention of new words. This technique aids students in structuring vocabulary into coherent patterns, thereby enhancing comprehension and retention.

Definition of Mind Mapping

Mind mapping is a visual learning strategy in which learners organize information by placing a central concept at the center of a page and branching related ideas outward. According to Buzan (2006) mind mapping encourages students to engage in associative thinking and helps them understand the relationships between ideas, thus strengthening vocabulary retention. This technique prompts learners to think critically about word connections and structures, making vocabulary learning a highly engaging and interactive experience.

According to Putri & Safitri (2021), describe mind mapping as a tool that promotes associative thinking by encouraging learners to link new vocabulary to existing knowledge. By involving both visual and cognitive processes, this technique increases student engagement and makes vocabulary learning more

meaningful. It is especially useful in language learning because it allows students to see word categories, synonyms, and examples in a structured and interactive format.

Mind mapping also creates a relaxed and supportive learning environment. According to Wulandari & Fitriani (2020), students who use mind maps in language classes are more confident and motivated, as the activity allows them to explore new vocabulary without the fear of making mistakes. The flexibility of the technique supports creative thinking and helps students actively build vocabulary networks based on their own understanding.

RESEARCH METHOD

This study applied a quasi-experimental research design using a one-group pre-test and post-test model. As Davison and Smith (2018) explain, quasi-experimental research is often employed in educational settings since it allows pre- and post-treatment assessments even without random assignment. The design was chosen to measure the effect of the Mind Mapping strategy on students' vocabulary mastery by comparing their performance before and after treatment. The population consisted of 40 twelfth-grade students at SMA Yayasan Rakyat Pancur Batu, divided into two classes: XII-MIA (20 students) and XII-IIS (20 students). Following Arikunto's (2013) definition of purposive sampling, Class XII-MIA was selected as the experimental group because it had comparable proficiency levels, high attendance, and access to the required learning facilities.

The instrument used to collect data was a vocabulary test comprising 25 multiple-choice questions. Each correct answer was worth four points, with a maximum score of 100. The test was administered twice: a pre-test to measure students' initial vocabulary knowledge and a post-test to determine their improvement after the treatment. Test items were developed based on the taught materials and validated by English teachers to ensure relevance and appropriate difficulty. The procedure consisted of three stages. First, the pre-test was conducted to establish students' baseline vocabulary achievement. Second, the treatment was applied using the Mind Mapping strategy, in which students

organized vocabulary into categories through visual mapping and group activities. Finally, the post-test was given to evaluate the effect of the treatment on students' vocabulary mastery.

The scoring process followed Arikunto's (1992) formula, where students' scores were calculated as the number of correct answers divided by the total items, multiplied by 100. Students' performance was categorized into five levels: Very Good (80–100), Good (66–79), Enough (56–65), Low (40–55), and Fail (0–39). To ensure the validity and reliability of the test, content validation was carried out by subject experts, while statistical analysis using SPSS was applied to measure internal consistency. Validity determined whether the test measured what it intended to measure, while reliability indicated the stability and consistency of the results.

Finally, the data analysis included descriptive statistics (mean and standard deviation) as well as inferential tests. A normality test (Liliefors) and a homogeneity test (Bartlett) were performed prior to hypothesis testing. An independent sample t-test was then used to examine whether there was a significant difference in students' vocabulary achievement after the implementation of the Mind Mapping strategy.

FINDINGS AND DISCUSSION

Data Analysis

The researcher created a frequency distribution table after collecting the results of the students' abilities in vocabulary both before and after applying the Mind Mapping technique and vocabulary mastery. This was done to determine the mean, standard deviation, and standard error of the pre-test and post-test scores.

Table 1: Distribution of Students' Scores in Vocabulary Pre-Test

X	F	FX	x	x^2	fx^2
32	2	64	−8,25	68,06	136,12
36	4	144	−4,25	10,06	72,25
40	6	240	−0,25	0,06	0,37
44	5	220	−3,75	14,06	70,31
48	3	144	−7,75	60,06	180,19
	N = 20	$\Sigma FX = 812$			$\Sigma fx^2 = 459{,}24$

1. Calculate the mean of students score post-test:

$$\overline{X} = \frac{\Sigma f_1 x_1}{\Sigma f_1}$$

$$\overline{X} = \frac{1650}{20} = 82{,}5$$

2. Calculate the standart deviation post-test:

$$SD_X = \sqrt{\frac{\Sigma f x^2}{N}}$$

$$SD_X = \sqrt{\frac{532{,}00}{20}} = 5{,}16$$

3. Calculate the standart error post test:

$$SE_{MX} = \frac{SD_X}{\sqrt{N-1}}$$

$$SE_{MX} = \frac{5{,}16}{\sqrt{30-1}} = 1{,}18$$

From the data above, it is shown that the highest score in the post-test was 92 and the lowest score was 72. Additionally, the standard deviation was 5.16, the standard error was 1.18**,** and the average score for the data above was 82.5**.** The data was then analyzed after the researcher determined the mean, standard deviation, and standard error before and after applying the Mind Mapping Technique. Data analysis was carried out using the Liliefors normality test, the F test for homogeneity, and the t-test for hypothesis testing.

4. Calculating the standard error of group X and Y

$$SE_{M1-M2} = \sqrt{(SE_{M1})^2 + (SE_{M2})^2}$$
$$= \sqrt{(1{,}18)^2 + (1{,}10)^2}$$
$$= \sqrt{1{,}39 + 1{,}21}$$
$$= \sqrt{2{,}6}$$
$$= 1{,}6$$

Normality Test

Pre-test group (X)

The researcher employed *Liliefors* test as their standard measure of

normality. Below is a table showing the result of the normality for the variable X:

Table 2: The Normality Test for Pre-test Group

X	F	fKum	Zi	F(Zi)	S(Zi)	L
32	2	2	-1,72	0,04	0,10	0,06
36	4	6	-0,89	0,19	0,30	0,11
40	6	12	-0,05	0,48	0,60	**0,12**
44	5	17	-0,78	0,78	0,85	0,07
48	3	20	-1,62	0,95	1,00	0,05

The highest absolute value (L_{count}) is 0.1208 based on the table above. The critical value (L) was then consulted with Lcount at a level α = 0,05 (5%). Where N=20. So, $L_{count} < L_{table}$ (0.12 < 0.188). It proved that the data of variable X were normally distributed.

Post-test group (Y)

The normality test that the writer used was normality test by *Liliefors.* The table of normality test for variable Y could be seen below:

Table 3: The Normality Test for Post-test Group

X	F	fKum	Zi	F(Zi)	S(Zi)	L
72	1	1	-2,03	0,02	0,05	0,03
76	4	5	-1,26	0,10	0,25	0,15
80	5	10	-0,48	0,32	0,50	**0,18**
84	5	15	0,29	0,61	0,75	0,14
88	4	19	1,06	0,86	0,95	0,09
92	1	20	1,84	0,97	1,00	0,03

Based on the table above, the greatest value among the absolute value (L_{count})= 0.18. Then, L_{count} was consulted with critical value (L) at the level α = 0,05 (5%). Where N=20. So, $L_{count} < L_{table}$ (0.18 < 0.294) the data of variable Y were normally distributed.

Testing Homogenity

To test homogeneity, the researcher used Bartlett's test (Sudjana, 1989:261) to determine whether the data were homogeneous or not.For the pre-test group (X) and post-test group (Y) vocabulary scores, the variances were:

$SX^2 = (9{,}21)^2 = 84{,}84$

$SY^2 = (7{,}29)^2 = 53.14$

Degree of freedom (df)

$df = N - 1$

$= 20 - 1 = 19$

After obtaining the data needed for Bartlett's test, the author calculated the combined variance of all samples' (S^2), the value for B, and utilized statistics chi square (X^2). The data on homogenity were calculated as follow.

Table: The Necessary Value for Bartlett's Test

Sample	Df	1/df	S_i^2	Log S_i^2	(df)Log S_i^2
X	19	0,053	84,84	1,93	36,67
Y	19	0,053	53,14	1,73	32,87
	38				69,54

1. The combined variance of the sample

$$S^2 = \frac{\Sigma(n_i - 1)S_i^2}{\Sigma(n_i - 1)}$$

$$= \frac{(n_x - 1)\, S_x^2 + (n_y - 1)S_y^2}{(n_x + n_y) - 2}$$

$$= \frac{(19)(84{,}84)+(19)(53{,}14)}{38}$$

$$= \frac{(1612{,}0)+(1009{,}66)}{38}$$

$$= \frac{2621{,}66}{38}$$

$$= 69{,}0$$

$S^2 = 69{,}0$

Log S^2 = Log 69,0 = 1,84

2. The value for B

$$B = Log\ S^2\ \Sigma\ (n_i - 1)$$

$$= (1{,}84)(38)$$

$$= 69{,}92$$

3. Bartlett's Test by using Chi Square

X^2 = In 10 { B - Σ (n_i-1) Log S_i^2 }

$$= (\ 2{,}3026)(\ 69.92 - 69{,}54)$$

$$= (2{,}3026)(\ 0{,}38)$$

$$= 0{,}88$$

From the calculation above was gotten X^2_{count} (Chi Square) 0,88, X^2_{table} at the level trust 95% (0,05) with df = 19 was 30,14. Thats why, $X^2_{count} < X^2_{table}$ (0,88 < 30,14). It proved that the variance of population was homogen.

Testing Hypotesis

To test the hyphothesis, the researcher used T-test (Sudijono, 2007 : 282-285):

$$t_o = \frac{M_1 - M_2}{SEM_1 - M_2}$$

$$= \frac{82{,}5 - 66{,}1}{2{,}96}$$

$$= \frac{16{,}4}{2{,}96} = 5{,}54$$

Based on the data above, T_{count} = 5,54 at significant level α = 5%, dk (n-1) = (20-1) = 19, so, T_{table} = 2,09. It could be concluded that $T_{count} > T_{table}$ (5,54 >2,09). It meant that $H_O$was rejected and H_a was accepted. It stated that there was a significant differences between students' ability before and after use the Mind Mapping teaching teachnique.

CONCLUSION

Based on the results of the data analysis in the previous chapter, it can be concluded that the application of the Mind Mapping technique had a significant effect on the vocabulary mastery of the twelfth-grade students at SMA Yayasan Rakyat Pancur Batu. The students' vocabulary score before using the Mind Mapping technique was 66,1**,** which is categorized as "poor," while after the application of the technique, the score increased to 82,5**,** which is categorized as "very good." Furthermore, the calculation of T_{count} was 5,54**,** while the T_{table} value at the 5% significance level was 2,09. Since T_{count} was greater than T_{table} (5,54 > 2,09), it can be concluded that the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. This finding indicates that there is a significant effect of using the Mind Mapping technique on the vocabulary mastery of the twelfth-grade students at SMA Swasta Yayasan Rakyat Pancur Batu.

REFERENCES

Akbar, M. R., Korompot, C. A., & Tahir, M. (2024). *Improving the Vocabulary Mastery of Year Eleven Students Using Mind Mapping Method*. 161–167.

Buzan, T., Buzan, B., & Buzan, T. (2006). he Mind Map Book: Unlock your creativity, boost your memory, change your life. *BBC Active.*, *2*, 30.

Febrianti, H. R. (2023). *THE IMPLEMENTATION OF MIND MAPPING IN TEACHING WRITING AT MTSN 6 PONOROGO*.

Fitriyani, D. I., & Sulistyo, G. H. (2022). Vocabulary Teaching Strategies in Senior High Schools. *Indonesian Journal of English Education, 9(1), 3*(1), 1–12.

Ghanbari, M., & Esmaeili, S. (2020). The Role of Contextualized Vocabulary Instruction in Enhancing Language Proficiency. *Theory and Practice in Language Studies*, *44*(6), 210–218. https://doi.org/10.1080/02702711.2023.2179146

Hai, & Vu, D. T. (2023). Using Mind Maps to Promote 12th graders' English Vocabulary Learning at a High School in Rural Areas. *International Journal of Scientific and Research Publications*, *13*(6), 465–472. https://doi.org/10.29322/ijsrp.13.06.2023.p13856

Hornby. (2006). *Oxford Advanced Learner's Dictionary* (7th ed.). Oxford University Press.

Nation, I. S. P. (2022). Learning vocabulary in another language. *Learning Vocabulary in Another Language*, 1–624. https://doi.org/10.1016/s0889-4906(02)00014-5

Pratiwi, N. S., & Apsari, Y. (2021). The Use of Semantic Mapping to Improve Students' Vocabulary Mastery. *PROJECT (Professional Journal of English Education), 4(2), 5*(2), 261–267.

Putri, A. R., & Safitri, R. (2021). The Use of Mind Mapping Strategy in

Improving Students' Vocabulary Mastery. *English Language in Focus (ELIF), 3(2), 7*(2), 123–132.

Rahmatullah, R. (2020). Teaching Vocabulary in EFL Classrooms: Importance, Challenges, and Solutions. *Lingua Educatia*, *5*(May), 16–24. https://doi.org/10.1007/978-3-319-38834-2_16

Sari, D. P., & Wahyuni, R. (2022). The Effectiveness of Mind Mapping

Technique in Teaching Vocabulary. *Journal of English Language Teaching and Literature, 7(1)*, *2*(2), 45–53.

Sari, W., Ilham, I., & Ismail, H. (2023). Meta-Analysis of Mind Mapping in Vocabulary Learning of the Past Decade. *English Review: Journal of English Education*, *11*(2), 347–356. https://doi.org/10.25134/erjee.v11i2.7610

Schmitt, N., & Schmitt, D. (2020). *Vocabulary in Language Teaching: What Every Teacher Should Know.* Cambridge University Press.

Setianingsih, T., Rosihan, M., & Pardani, S. (2022). THE USE OF MIND MAPPING TO IMPROVE MOTIVATION IN LEARNING VOCABULARY OF SECOND GRADE STUDENTS AT MTs NW MISPALAH PRAYA. *Journal of Languages and Language Teaching*, *6*(2), 125. https://doi.org/10.33394/jollt.v6i2.1264

Sipayung, K. (2022). The Use of Pictionary Game in Teaching Vocabulary to Second Grade Students of SMPN 1 Raya. *Pioneer: Journal of Language and Literature*, *14*(1), 156. https://doi.org/10.36841/pioneer.v14i1.1672

Sudijono, A. (2007). *Pengantar Statistik Pendidikan*. Persada.

Sukirlan, M. (2020). Enhancing Students' Vocabulary Mastery through Concept Mapping Technique. *Journal of English Language Studies, 11*(1), 123–132. https://doi.org/10.24252/ip.v11i1.27912

Suparno, S., & Mulyono, H. (2021). Receptive and Productive Vocabulary Knowledge in EFL Context: A Review. *Journal of Language Teaching and Research, 12(5).*, *6*(11), 853–860. https://doi.org/10.6007/ijarbss/v6-i11/2395

Teng, F. (2021). Vocabulary knowledge and its connection to reading and writing skills in EFL learners. *Language Teaching Research Quarterly*, *February*, 13–28. https://doi.org/10.1111/1467-9817.70000

Wulandari, S., & Fitriani, Y. (2020). Enhancing Vocabulary Mastery through Mind Mapping. Project: Professional. *Journal of English Education, 3(6), 2*(1), 697–703. https://doi.org/10.36312/jolls.v2i1.721