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Brain-Based Learning (BBL) Strategy on Students' Vocabulary Mastery

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Abstract

The researcher used the Brain-Based Learning Strategy to help students understand the vocabulary contained in descriptive reading texts. Brain-based learning strategies are also used to describe applying a theory about the brain to help children maximize their learning potential. A quasi-experimental pre-and post-test design was used in this research. The population of this research is the seventh-grade students of SMPN 1 Sumberjaya West Lampung. The researchers used a cluster random sampling technique for sample selection. The researcher used instruments (Multiple Choice Questions) in the form of research with pre-tests and post-tests to collect data. This research has normal and homogeneous data results, so the hypothesis test used a parametric, independent sample t-test. Based on the analysis of data calculations in hypothesis testing, a significant effect could be seen in the dependent sample t-test table where the value of Sig. (2tailed) of the same variant, which is 0.01 < 0.05, means that Ho is rejected, and Ha is accepted that the Brain-Based Learning Strategy could positively and better influence students' Vocabulary mastery.

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INTRODUCTION

First, to understand the title of this research and avoid misunderstanding, the researcher feels the need to explain some words which become the title of this Research the Influence of Using Brain-Based Learning (BBL) Strategy on Students' Vocabulary Mastery. Influence is often described as the capacity (of persons or things) to be a compelling force on or to have an effect, changing how someone or something develops, behaves or thinks (Manuel, 2018). Based on this definition, influence is a solution construction that one does by giving advice or guidance to others, establishing purposes and goals, and improving quality continuously to students. So, the students can upgrade their knowledge of their vocabulary mastery by incorporating something into their class or lesson. A list or collection of words or phrases, usually alphabetically arranged and explains or defines what is meant by vocabulary. So, the vocabulary is a summary or stock of terms employed by a language, group, individual, or work or about a subject. Based on this definition, vocabulary is understanding words and their meanings.

According to Hiebert and Kamil, the other definition of vocabulary is the knowledge of a word's meanings (Hiebert. and Michael, 2005). Vocabulary is all the words that have meaning, for example, a list of words found in a book, novel, or dictionary. All we know the importance of and use to

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communicate with other people, such as in a conversation, writing a letter, or reading something in another language, is called vocabulary.

Vocabulary is significant in supporting the student's ability to learn English as a foreign language. However, sometimes teachers need help teaching English subjects, especially in effectively teaching vocabulary to their students. The difficulty stems from students' understanding of what they must learn and how they should be taught. Because some of the students did not know what they should learn to master vocabulary. To effectively teach vocabulary, an English teacher must be selective in selecting and implementing appropriate techniques or strategies.

The researcher founds through onterview in preliminary research most of the students said that they lacked vocabulary. After all, they are not interested in learning English especially in vocabulary because the students have trouble translating the word. Due to their limited vocabulary and fear of making a mistake when responding to a teacher's question, the students cannot participate in class activities. The students cannot respond to the questions from the teacher or tests given by their teachers because they difficult in memorizing vocabulary and do not understand the questions' meanings. Instead, they constantly consult dictionaries to learn new words.

These language issues must be resolved since they may make it difficult for students to advance to the next level or grade. Additionally, students may need more motivation to learn English because they believe learning vocabulary is challenging. And then the students will bored in English class. The researcher can use an exciting way to upgrade students' vocabulary mastery based on the problem mentioned above with the students. In this study, strategies will be used as a process of teaching vocabulary.

The quality and quantity of language skills students can be influenced by the teaching method or strategy that will be given by the teacher in school when teaching in class. Students require interesting strategies for learning vocabulary to be acceptable, enjoyable, and active participants in the teaching-learning process. Because of this condition, they will be fine. They will not be bored with the teaching materials or the class situation, making learning the material and vocabulary easier.

In education, a strategy is a plan, method, or series of activities designed to achieve a specific educational goal. Thus, learning strategies can be considered planning, including the circuit of tasks to accomplish particular educational purposes.

Brain-Based Learning is a comprehensive instruction approach using current neuroscience research (Froschl and Sprung, 2005). Brain-based learning theory focuses on research on how the brain works and how teachers can use this knowledge to help second language students learn English quickly and efficiently. Like Jensen, Brain-based learning strategies is a way of thinking about the learning process. It is a set of principles and a foundation of knowledge and skills through which we can make better decisions about the learning process [Eric, 2000]. As a learning approach, Brain-Based Learning is based on the structure and function of the human brain. This strategy involved interaction with the material and students. They can communicate the problem in a group and share their idea and thinking. In class, learning must be interspersed with things that can make students re-focus and maintain concentration.

Brain-based learning strategy is the engagement of strategies based on principles derived from an understanding of the brain [Eric, 2008]. The strategy of brain-based learning (BBL) in education provides a concept for developing knowledge that is oriented toward empowering student's potential brains. In other words, BBL focuses on how the brain learns and functions and how students are prepared to learn.

Three types of research have been conducted related to Brain-based Learning strategy. Izzgheche conducted the first research, "The Role of Brain-based Learning Strategy in developing middle school Pupils' vocabulary retention" (Izzgheche, 2020). Retaining what has been learned as vocabulary for a long time is challenging for many pupils. Students are always prone to forget their learned vocabulary throughout the learning process due to many causes. Accordingly, the present research investigated the efficiency of brain-based learning in enhancing pupils' vocabulary retention. Moreover, it sought to explore teachers' attention toward the brain-based learning strategy. This study hypothesized that a brain-based learning strategy can help pupils develop their vocabulary retention. The descriptive qualitative research method was adopted to achieve the intended aims and test the hypotheses. To gather data, a semi-structured questionnaire and a semi-structured interview were used as data collection methods. The population of this study was middle

school pupils and teachers. The findings revealed that brain brain-based learning strategy is a teaching and learning strategy that helps, to a great extent, pupils to promote their learning and, thus, their retention. In addition, teachers have a positive attitude toward the strategy and are willing to initiate it. Thus, it can be concluded that the research hypotheses were confirmed.

Learning on achievement retention, attitude and the learning process. This study used experimental design and qualitative data. This study found that a Brain-Based Learning environment positively affects higher-level learning, retention of learning and the attitude toward the course of university students (Tüfekçi and Damirel, 2009). An other relevant study is the research conducted by As'ari titled "Improving Students' Vocabulary Mastery Through Brain-Based Learning (BBL) Strategy". This research aims to determine whether the Brain-Based Learning (BBL) Strategy can improve Students' Vocabulary Mastery. This study used classroom action research to take the data. Based on the result of this research, the researcher assumed that teaching English lessons, especially teaching vocabulary using the Brain-Based Learning Strategy, can improve students' vocabulary mastery without causing stress and boredom (As'ari, 2019)

Based on the explanation above, it can be concluded that vocabulary is the essential language component utilized in speaking, listening, reading, and writing. As a result, if students want to become language masters, they must also master vocabulary. There are so many strategies that teachers can used in teaching vocabulary to enhance student vocabulary mastery, such as brain-based learning, which is one of the strategies that students can used in education. This study was analyzed the influence of using a brain-based learning (BBL) strategy on students' vocabulary mastery.

METHOD

An experimental research design was used by the researcher in this research. According to Ary, quasi-experimental designs are similar to randomized experimental designs in that they involve the manipulation of an independent variable but differ in that subjects are not randomly assigned to the treatment groups (Ary, 2002). Quasi-experimental research was used by the researcher because, in quasi-experimental research, the subject was not randomly assigned to the treatment groups. It means that the researcher does not have the opportunity to assign students to particular groups in different conditions randomly. It would disrupt the classroom learning. In this research, neither the experimental class nor the control classes were selected not randomly, so the design in this study is in the form of a design Nonrandomized Control Group, Pre-test - Post-test Design.
The research design is as follows:

Table 1. Research Design

Group	Pre-test	Treatment	Post-test
E	Y_1	X_1	Y_1
C	Y_2	-	Y_2

A good instrument should have three criteria to measure students' vocabulary mastery: word meaning, word use, and grammar. The research used multiple choice questions (MCQ) as a tool for testing students' vocabulary mastery. The test items consist of 100 items (the test content consists of 50 items with 50 alternative options). This test was divided into 50 items for the pre-test before validity (25 items with 25 alternative options) and 50 items for the post-test before validity (25 items with 25 alternative options). This test aims to measure student's influence on vocabulary mastery. The researcher used two instruments: pre-test and post-test.
There are three steps conducted in this research. They are:

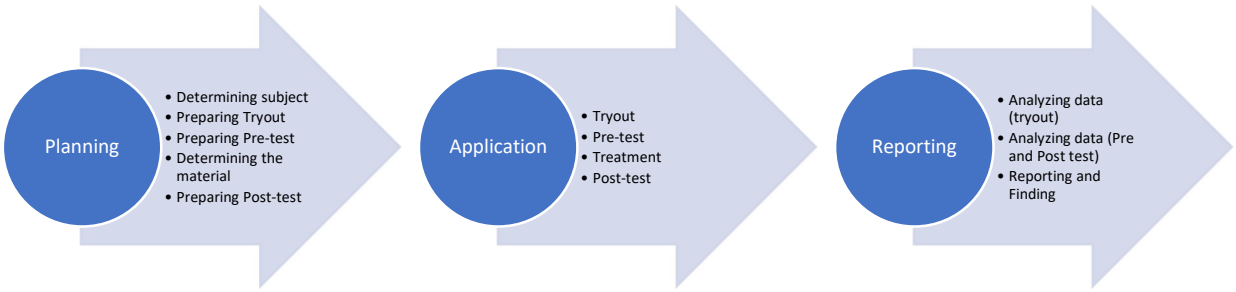

Figure 1: Research Procedure

Validity and Reliability of the Instrument

Validity is a measurement that shows the levels of validity or the reality of the instrument. A valid instrument has a high validity. On the other hand, the instrument which lacks validity has a low validity (Arikunto, 2002). While Setiyadi says that generally, validity is a measurement to show how far measurements measure something that must be measured. The criteria of a good test are validity (content validity, construct validity, and internal validity) and reliability (Setiyadi, 2006)

Reliability means that sores from an instrument are stable and consistent (Creswell, 2012). A test is reliable if the test can give constant results even though the test is given repeatedly to the same individuals or sample. Reliability test consistent and dependable. The reliability of a test may best be addressed by considering some factors that may contribute to the unreliability of a test. Consider the following possibilities: fluctuations in the students, in scoring, in test administration, and in the test itself (Brown, 2003). In this research, the researcher used ANATEST to calculate the reliability of the test. Below are the criteria for the reliability test (Sugiono, 2011):

0.800 – 1000: Very high

0.600 – 0.800: High

0.400 – 0.600: Medium

0.200 – 0.400: Low

0.00 – ≤ 0.200: Very low

From the criteria of reliability before, it can be concluded that the result for the pre-test had high reliability since it amounted to 0.78, and the result for the post-test had high reliability since it amounted to 0.66. it means that the pre-test and post-test reliability was high so that the test instrument can be used for the pre-test and post-test.

Fulfillment of the Assumption

The normality test was used to determine whether the data in the experimental and control classes were usually distributed. The researcher used statistical computation using SPSS (*Statistical Package for Social Science*) 26 statistical software windows in this research. The normality test used the Shapiro Wilk, considering the number of test samples is less than 50. The hypothesis for the normality

The hypothesis for the normality test is formulated as follows:

H_o: The data have a normal distribution.

H_a: The data do not have a normal distribution.

The criteria for acceptance or rejection of the normality test are as follows:

H_o is accepted if Sig. > α = 0.05

H_a is accepted if Sig. < α = 0.05

The following is the procedure for carrying out the Shapiro-Wilks test to identify data normality if sample data ≤ 50.

1. Determine the null hypothesis and the alternative hypothesis.
   H_0 = sample data comes from a normally distributed population
   H_a = sample data comes from a population that is not normally distributed.
2. Determine the significant level (α).
3. Data are sorted from smallest to largest and divided into two groups for conversion in Shapiro Wilks.
4. Calculating Shapiro-Wilks test statistics [1]:

$$T_3 = \frac{1}{D}\sum_{i=1}^{n} ai \;\; (x_{n-i+1} - x_i)^2 \quad [1]$$

5. Determine test significant
   To determine the significance of the test, the researcher used the Shapiro-Wilks table to see the position of the probability value (p); if ρ > α, then accept the null hypothesis $H_{.0.}$ conversely, if ρ < α, then rejected the null hypothesis $H_{.0}$.

The homogeneity test was used to determine whether the data obtained from the sample was homogeneous. In this research, the researcher used statistical computation using SPSS (Statistical Package for the Social Sciences). The test of homogeneity employed is the Levene Test. Testing with the Levene test can be done with the following formula [2]:

$$= \frac{(n-k)=\sum_{i=1}^{k} n_1(\bar{Z}_i+\bar{Z})^2}{(k-1)\sum_{i=1}^{k}\sum_{j=1}^{k} n_1\left(\bar{Z}_{ij}+\bar{Z}_\iota\right)^2} \quad [2]$$

Hypothesis Testing

The hypotheses of the research are:

Ha: There is a significant Influence of Using Brain-Based Learning (BBL) Strategy on Students' Vocabulary Mastery

Ho: There is no a significant Influence of Using Brain-Based Learning (BBL) Strategy on Students' Vocabulary Mastery

Table 2. Hypothesis testing

Comparison	Hypothesis	
	Ho	Ha
Sig.> α	Rejected	Accepted
Sig.< α	Accepted	Rejected

The criteria for acceptance or rejection of the test are:

Ha is accepted if Sig. > α = 0.05

Ho is accepted if Sig. < α = 0.0

The value of significance obtained by the independent sample t-test was Sig. (2-tailed) 0.01 < 0.05. In other words, Ho is rejected; however, Ha is accepted. Thus, brain-based learning strategy significantly influences students' vocabulary mastery

RESULTS AND DISCUSSION

The data was collected from students' pre-tests and post-tests of both classes. The data which is obtained is described in three tables. Table 3 shows the descriptive statistics in the experimental and control class.

Table 3. Descriptive Statistic

	N	Minimum	Maximum	Mean	Std. Deviation
Pre -Test Experimental Class	34	50	81	62.79	7.036
Post-Test Experimental Class	34	65	89	75.00	5.263
Pre-Test Control Class	34	50	70	61.59	5.511
Post-Test Control Class	34	60	80	72.00	4.805
Valid N (listwise)	34				

Based on Table 4.1 above, there is an average difference between the experimental class and the control class. Based on these data, the experimental class data is 62.79, and the average in the control class is 61.59. So, there is an average difference from the pre-test of the two classes. In the table, to ensure significant differences, the statistical test of student learning outcomes in the post-test obtained an average of 75.00 data in the experimental class and 72.00 in the control class. So, from the description of the data table above, there is a significant average difference

Result of Pre-Test

a. Experimental Class

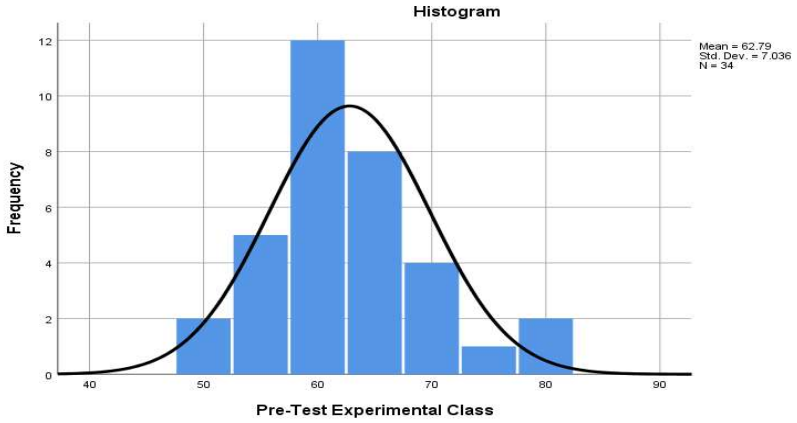

Figure 2. Result of Pre-Test Experimental Class

Based on the findings, the mean pre-test score of the experimental class was 62.79, the standard deviation was 7.036, the number of participants was 34, the lowest score was 50, and the highest score was 80.

b. Control Class

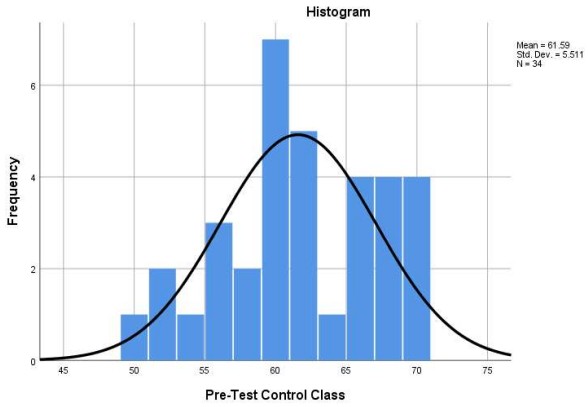

Figure 3. Result of Pre-Test Control Class

Based on the findings, the mean post-test score of the experimental class was 61.59, the standard deviation was 5.511, the number of participants was 34, the lowest score was 50, and the highest score was 70.

Result of Post-Test

a. Experimental Class

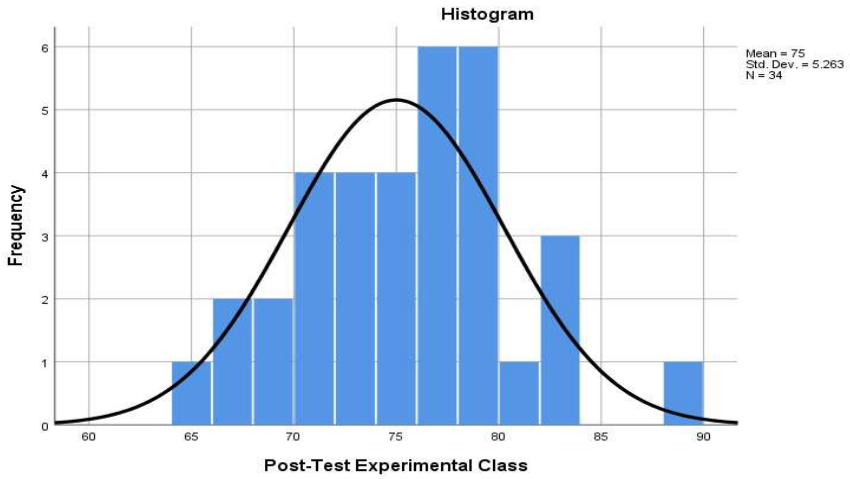

Figure 4. Result of post-test Experimental Class

Based on the findings, the mean post-test score of the experimental class was 75, the standard deviation was 5.263, the number of participants was 34, the lowest score was 65, and the highest score was 89.

b. Control Class

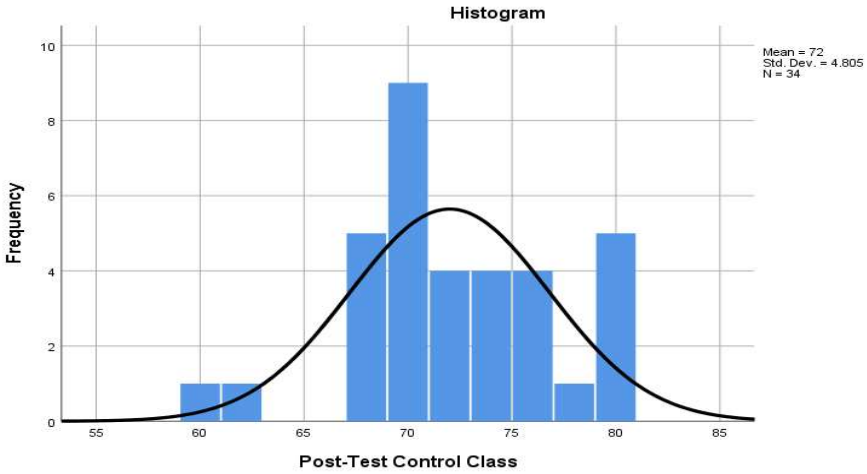

Figure 5. Result of Post-Test Control Class

Based on the findings, the mean post-test score of the experimental class was 72, the standard deviation was 4.805, the number of participants was 34, the lowest score was 60, and the highest score was 80.

Result of the Normality Test

The normality test measures whether the data in the experimental and control classes are typically distributed. This research used statistical calculations for the normality test by SPSS (Statistical Package for Social Science) 26 statistical software windows. The normality test used was the Shapiro Wilk, considering the number of test samples was less than 50.

Table 4. The Normality Test of Experimental and Control Class

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Result of Students' Learning	Pre-Test Experimental Class (BBL)	.112	34	.200*	.963	34	.303
	Post-Test Experimental Class (BBL)	.108	34	.200*	.977	34	.667
	Pre-Test Control Class (WW)	.122	34	.200*	.958	34	.206
	Post-Test Control Class(WW)	.132	34	.142	.950	34	.119

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

a. Lilliefors Significance Correction

The table's significant Shapiro-Wilk score in all pre-test and post-test experimental class and control class data > 0.05 for the normality test indicates a significant influence. Thus, it was concluded that the data are typically distributed. These average data are required for paired sample t-tests or independent sample t-tests.

Result of the Homogeneity Test

Table 5. Test of homogeneity of variance

		Levene Statistic	df1	df2	Sig.
Result of students' learning	Based on Mean	.317	1	66	.576
	Based on Median	.312	1	66	.578
	Based on the Median and with adjusted df	.312	1	65.571	.578
	Based on trimmed mean	.298	1	66	.587

The homogeneity of variance results from tests in Levene's Statistics column demonstrated that Sig. (based on mean) 0.576 > 0.05. Ha was rejected, whereas Ho accepted. This demonstrated that data variance came from a homogeneous population.

Result of Hypothetical Test

The researcher employed the independent sample t-test because the normality and homogeneity test assumptions were fulfilled. For a hypothetical test in this research, the researcher employed statistical calculations with SPSS (Statistical Package for Social Science) 26 statistical software windows. The purpose of using SPSS in this research was to conduct the research practically and efficiently. The hypotheses of this research are:

H_a: There is a significant Influence of Using Brain-Based Learning (BBL) Strategy on Students' vocabulary Mastery

H_0: There is no significant influence of using brain-based learning (BBL) strategy on students' vocabulary mastery

The criteria for acceptance or rejection of the test are:

H_0 is accepted if Sig> $\alpha = 0.05$

Ha is accepted if sig < $\alpha = 0.05$

Table 6. Group Statistics

	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Result Students' Learning	Post-Test Experimental Class	34	75.00	5.263	.903
	Post-Test Control Class	34	72.00	4.805	.824

Table 7. Independent Sample Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Result of Students' Learning	Equal variances assumed	.317	.576	2.455	66	.017	3.000	1.222	.560	5.440
	Equal variances are not assumed.			2.455	65.462	.017	3.000	1.222	.559	5.441

The value of significance obtained by the independent sample t-test was Sig. (2-tailed) 0.01 < 0.05. In other words, Ho is rejected; however, Ha is accepted. Thus, brain-based learning strategy significantly influences students' vocabulary mastery.

Discussion

The data showed that a brain-based learning strategy could influence students' vocabulary. This can be seen in Table 3 about Descriptive Statistics. Based on its use, brain-based learning is an appropriate strategy and makes students understand how to distinguish one word from another, which only differs by kind of vocabulary. This strategy was used in descriptive text using present tense following the material from the syllabus and lesson plan. The researcher provided an example of descriptive text for each meeting. This text contains examples of vocabulary words to be used in the teaching and learning process so students become more concerned and careful about how to find the correct word.

The list of words contained adjectives, nouns, and verbs explained by the researcher in a different meeting. In the experimental class, the students were taught vocabulary with the brain-based learning strategy so that the difference in changes from the pre-test and post-test scores in the experimental class could be seen. In contrast, in the control class, the researcher used the ordinary strategy used by the teacher, which is the drilling strategy. However, the results from the control class were lower than the experimental class after the treatment was given.

Following the previous explanation of the treatment process, at the first meeting, the problems encountered were the students needed more time to know the word, and the students still needed clarification about how to distinguish the vocabulary. The researcher provided a solution to familiarize students with using the brain-based learning strategy and familiarize students in the classroom. Then, the problem in the second treatment was that only a few students were enthusiastic when teaching the learning process; because of that, the class was not conducive, and students did not understand, so when students tried to find the vocabulary, the students were still wrong. This problem was also experienced by Ari, Wardhani, and Sumartono, that the students still feel confused about the words. When they found a new word related to the topic, students feel confused about how to distinguish the words. So, students are not confident in tell the meaning of the word. It needs longer time allocation for students to memorize a new word and understand the meaning of the word. It happens because they still lack vocabulary. The solution to this problem, as stated by Pollard that the disadvantage can be solved using group work. Pollard supports it, "Group work involves

students working together in groups of 3/4/5 people, etc. The advantages of using groups are that students can use time more efficiently and are more actively involved in their work, without making noise in the classroom". With the existence of problems in the treatment process, it gave good results in the experimental class post-test using a brain-based learning strategy.

Students' vocabulary mastery was poorer before using the brain-based learning strategies, according to pre-test data. The experimental classes mean pre-test score was 62.79, while its mean post-test score was 75.00. After getting the treatments and giving the post-test, it was found that the Experimental Class and the Control Class had significant differences, with the Experimental Class scoring higher on the post-test. The mean control pre-test score of 61.59 and post-test score of 72.00 demonstrate this. It indicated that the Experimental Class had a significant improvement. Employing the brain-based learning strategy influenced student vocabulary mastery.

Before testing the hypothesis, the researcher analyzed the normality and homogeneity of the data. The purpose of analyzing the normality was to see whether the data obtained in the research had been customarily distributed or not. The normality result can be seen by comparing the value of the Significant Score to 0.05. Meanwhile, the homogeneity was analyzed to see whether the data/samples in both experimental and controlled classes were homogenous or heterogeneous.

Analyzing the normality showed that the pre-test and post-test data in the controlled class were distributed normally. According to the criteria of the test, it can be seen in the result that the significant score of the pre-test (0.303) and post-test (0.667) of the experimental class was higher than 0.05 (0.303 and 0.667 > 0.05). Both the pre-test and post-test data in the experimental class also showed that they were distributed normally. According to the criteria of the test, it can be seen in the result that the significant score (pre-test and post-test) > 0.05 (0.206 and 0.116 > 0.05). It means that all the data in both the pre-test and post-test of the experimental and control classes were distributed normally. The following result that the researcher got was from the calculation of homogeneity. The result showed that (0.576 > 0.05.). Based on the criteria, it can be concluded that H_0 is accepted. It means that the sample in the experiment class and controlled class were homogenous.

The final calculation has tested the hypothesis. This was the main calculation to answer the problem formulation of this research: whether there is a significant difference between students' vocabulary mastery using brain-based learning strategy and without brain-based learning strategy. The writer used a T-test formula in the significance degree (α) of 5%. The value of significance obtained by the independent sample t-test was Sig. (2-tailed) 0.01 < 0.05. In other words, Ho is rejected; however, Ha is accepted. Thus, it can be said that brain-based learning strategy significantly influences students' vocabulary mastery.

The results of the pre-test and post-test in this research show that using the Brain-Based Learning Strategy influenced students' vocabulary mastery. This was also reinforced by the results of several previous research as follows. As'Ari, in his thesis, concluded that it successfully influenced students' vocabulary mastery because the success criteria were satisfied. The result of this study shows that in the pre-cycle, the average student score is 61.8. In the first cycle, the average of students' scores is 67.2. In the second cycle, the average student's score is 80.9. From the first and second cycles, the average of students' scores is continuously increasing. It means there is an improvement in students' vocabulary achievement after being taught using the Brain-Based Learning (BBL) Strategy [As'ari, 2019].

Based on the pre-test and post-test results, this research shows that using the brain-based learning strategy influenced students' vocabulary mastery. The researcher got the result from this research that the brain-based learning strategy influenced the students' learning. The finding shows that the mean score of the post-test was higher than the mean score of the pre-test, which concludes that using a brain-based learning strategy influences students' vocabulary mastery.

Based on data analysis and hypothesis testing, the calculation's outcome indicated that the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected. Based on the research's findings, the researcher concluded that students who used the brain-based learning strategy achieved better and higher scores. The mean scores in both classes made this clear. The researcher concluded that the brain-based learning strategy might help students learn English vocabulary after conducting the research. It is interesting to apply this strategy in the classroom because it provides a new reference that helps in mastering vocabulary for students".

CONCLUSION

Before testing the hypothesis, the researcher determined whether the data were normal and homogeneous. This research concluded that the data are normal because of the Sig. Pre- and post-test experimental class and control class results > 0.05. Furthermore, the data are homogeneous, as seen from the Sig. (based on mean) 0.576 > 0.05. This research has normal and homogeneous data results, so the hypothesis test used a parametric, independent sample t-test. Based on the analysis of data calculations in hypothesis testing, a significant effect could be seen in the dependent sample t-test table where the value of Sig. (2-tailed) of the same variant, which is 0.01 < 0.05, means that H_0 is rejected, and H_a accepts that brain-based learning strategy could positively and better affect students' vocabulary mastery. It can be seen clearly from the acquisition of students' scores before treatment and after treatment compared to the values of the control class, which were taught using the ordinary strategy used by the teacher. By applying the brain-based learning strategy, students' vocabulary mastery can be influenced. Hence, based on research conducted by the researcher that there is a significant influence of using the brain-based learning strategy towards students' vocabulary mastery.

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