

THE EFFECTIVENESS OF USING CLUSTERING TECHNIQUE TO IMPROVE STUDENTS' VOCABULARY MASTERY

(The Quasi-Experimental Research Conducted in the Second Grade of Junior
High School)

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Abstract

The research paper is entitled “The Effectiveness of Using Clustering Technique to Improve Students’ Vocabulary Mastery”. This research was conducted in the first semester of the second grade of SMP Tunas Pembangunan Ciparay in the academic year of 2024/2025. This used quasi experimental design with the treatment held in three meetings, and the total sample in this research was 50 students’ that were taken from two classes, 25 students in VIII A and 25 students in VIII B. In collecting the data, the researcher used instruments, pre-test, post-test and questionnaire. After giving the post-test, the researcher analysed the data to compute independent sample t-test. With the $df = N1+N2-2 = 50-2 = 48$, at $P = 0.05$ of two-tailed of significance, the critical value of t is 2.009. As the value of the derived t (to) exceeds or is higher than that of the critical value of t ($4.073 > 2.009$). It means that the Null Hypothesis (H_0) is rejected and the Alternative Hypothesis (H_a) is accepted. This means that the using of clustering technique to improve students’ vocabulary mastery is effective. Additionally, the students’ responses to the use of clustering technique to improve students’ vocabulary mastery is good and positive.

Keywords: *Vocabulary Mastery, Clustering Technique*

INTRODUCTION

Language as a tool of conversation plays on crucial role in society. Human beings use language to communicate amongst human beings whether or not in their society or internationally. And the language that’s regularly utilized in worldwide conversation is English language. In Indonesia, national education has designated English as a foreign language taught in schools from elementary to college level. In learning English, there are four skills that students must master, namely listening, speaking, reading, and writing. Before students master these four skills, they must know the vocabulary first to support them in language learning.

The importance of vocabulary in English language gaining knowledge of is the valuable awareness. Richards (2001) said that vocabulary is one of the essential parts of language and is one of the topics that linguistics studies. They will be more capable in other areas if they can grasp a large amount of English vocabulary. To grasp English effectively, students need to have a rich and diverse vocabulary. However, many students who have learned English for several years in school still faced some difficulties when they have to memorize and understand English words. Based on teaching experience (PPL) at SMP Pasundan Majalaya, the students there, especially the second grade, are still very poor in understanding large amounts of words or vocabulary in English. Therefore, an innovative and powerful approach is needed to enhance vocabulary comprehension. It

Clustering technique is listing words in the form of a bubble diagram and the list of the words is developed from a word that is connected to the related words. Fulwiler (2002) states that cluster starts by writing out a general topic area in the center of a sheet of paper and putting a circle around it. By grouping words based totally on certain patterns or relationships, students can support their understanding and improve vocabulary retention. Clustering approach has capability as a powerful alternative in vocabulary guidance.

Based on the explanation above the researcher is fascinated with enhancing students' vocabulary and tries to observe the clustering technique as a method of teaching vocabulary. This technique can make it easier for the students to determine the meaning word, memorize it, and use it when they find the right scheme based totally on the context clue they've recognized. By implementing the clustering technique in learning the vocabulary, students can develop their vocabulary by clustering them with the linking word. It is also engaging so that the students will find that getting to know the language is enjoyable.

Therefore, the researcher is interested in conducting a research entitled "The Effectiveness of Using Clustering Technique to Improve Students' Vocabulary Mastery".

Research Question

Based on the background of the research, the research will formulate research questions as follows:

1. Does clustering technique as a means of improving students' vocabulary mastery to the second grade of SMP Tunas Pembangunan Ciparay have significantly better result than the conventional method?
2. What are students' responses toward the use of clustering technique in improving students' vocabulary mastery?

Literary Review

In order to avoid misunderstanding on the reader, clarification of term is to define and interpret the meaning of terms or phrases used in this research, as the following:

1. According to Hornby (1995) Vocabulary is the total numbers of words in language or all the words known to a person or used in particular book, subject and a list of words with their meaning, especially one that the accompanies a textbook. This definition suggests that vocabulary is the basic or the primary element that ought to be mastered in learning a language, mainly English after which it is observed using another component in English.
2. According to Lunsford (2010) as cited by Somantri & Rahim (2022) that clustering is a strategy employed by authors to produce ideas using a visual schema or chart before writing. Using a visual schema or chart, the person clustering data will attempt to locate items relevant to the theme, making it another creative exercise. Developing subtopics and comprehending the connections between various aspects of a large topic are beneficial. Students can find ideas simply by applying the clustering technique.

METHOD

The content of this research methodology includes research design, population and sample, research instruments, and data analysis.

Research Design

In this research, the researcher uses Quasi-Experimental as a research design, type of Quasi-Experimental in this research use two classes, the first group is an experimental group and second group as a control group. The researcher uses pre-test and post-test group design. The students are given pre-test to know their scores for vocabulary mastery before treatment. The experimental group that is given treatment by using clustering technique and the control group uses the conventional method.

Table Quasi-Experimental Research Design

Experimental Group	Pretest	Experimental Treatment	Posttest
Control Group	Pretest	No Treatment	Posttest

By Creswell (2012, p. 310)

Population and sample

In this research, the population becomes all students of the second grade of SMP Tunas Pembangunan Ciparay within the academic year of 2024/2025. The researcher took the students of second grade, which consists of 3 classes and there are 75 students. And the researcher takes two classes, one class as an experimental group and one another as a control group. Two classes are taken from the population, the sample fell into class A and B, which consists of 50 students.

Research instrument

Research instrument is something used to collect data. In this research, the instrument is vocabulary test and questionnaire.

1. Pre-test

Pre-test provides a measure on some attribute or characteristic that you assess for participants in an experiment before they receive a treatment. (Creswell, 2012, p. 297).

2. Post-test

Post-test is a measure on some attribute or characteristic that is assessed for participants in an experiment after a treatment. The topics tested within the post-test is similar to the ones in the pre-test because each of them is used to measure the students' vocabulary mastery and to understand whether there may be a superb effect of the use of Clustering method in the direction of students' vocabulary or not.

3. Questionnaire

Wilson and McLean (1994) in Cohen (2007, p. 317) questionnaire is a widely used and useful instrument for collecting survey information, providing structured, often numerical data, being able to be administrated without the presence of the researcher, and often being comparatively straightforward to analyse.

Data Analysis

Independent t-test

The obtain from the test will be processed using t-test for independent groups. In this research, the researcher uses quantitative research with the use of the independent group t-test formula, as follows:

$$t = \frac{\bar{X}_1 + \bar{X}_2}{\sqrt{\left[\frac{\sum X_1^2 - \frac{(\sum X_1)^2}{N_1} + \sum X_2^2 - \frac{(\sum X_2)^2}{N_2}}{N_1 + N_2 - 2} \right] \cdot \left[\frac{1}{N_1} + \frac{1}{N_2} \right]}}$$

Where:

$\bar{X}_1$ = the mean of the scores of the first group

$\bar{X}_2$ = the mean of the scores of the second group

$\sum X_1^2$ = the sum of the squares of the first group

$\sum X_2^2$ = the sum of the squares of the second group

$(\sum X_1)^2$ = the square of the sum of the scores of the first group

$(\sum X_2)^2$ = the square of the sum of the scores of the second group

N_1 = the total number of scores of the first group

N_2 = the total number of scores of the second group

Experiment Group [X_1], Control Group [X_2]

Questionnaire

To find out the result of questionnaire, the researcher uses the percentage formulas, as follows:

$$X = \frac{y}{z} \times 100$$

Where:

X = percentage (quality of the answer)

Y = given amount (total of the respondent answer)

Z = total amount (total respondent)

The questionnaire is analyzed by using the following steps those are:

1. List the individual answer from the students or respondent in the table form.
2. Count the member of option “yes” and “no” responses from students or respondents. Option “yes” answer is counted 1 while option “no” answer is counted 0.
3. After that, find the frequency and percentage using the questionnaire formula written above.
4. Make an interpretation of the result of this questionnaire.

RESULTS AND DISCUSSION

Results

After getting the data, the researcher calculated the students' pre-test scores by using t-test formula. To make the calculation easier, the data scores of pre-test was tabulated and arranged in the following table:

Table the computation of students' pre-test score

No	Experimental Group			Control Group		
	Sample	Score	Score ₁ ²	Sample	Score	Score ₂ ²
1	Students 1	92	8464	Students 1	72	5184
2	Students 2	48	2304	Students 2	52	2704
3	Students 3	56	3136	Students 3	56	3136
4	Students 4	40	1600	Students 4	48	2304
5	Students 5	40	1600	Students 5	52	2704
6	Students 6	80	6400	Students 6	68	4624
7	Students 7	52	2704	Students 7	80	6400
8	Students 8	68	4624	Students 8	52	2704
9	Students 9	60	3600	Students 9	60	3600
10	Students 10	60	3600	Students 10	68	4624
11	Students 11	64	4096	Students 11	52	2704
12	Students 12	72	5184	Students 12	64	4096
13	Students 13	60	3600	Students 13	72	5184
14	Students 14	72	5184	Students 14	72	5184
15	Students 15	88	7744	Students 15	52	2704
16	Students 16	72	5184	Students 16	56	3136
17	Students 17	40	1600	Students 17	60	3600
18	Students 18	88	7744	Students 18	40	1600
19	Students 19	40	1600	Students 19	44	1936
20	Students 20	52	2704	Students 20	56	3136
21	Students 21	40	1600	Students 21	36	1296
22	Students 22	40	1600	Students 22	36	1296
23	Students 23	36	1296	Students 23	32	1024
24	Students 24	32	1024	Students 24	36	1296
25	Students 25	28	784	Students 25	28	784
Total		1420	88976	Total	1344	76960

From the data above, the researcher did some steps to compute the data using t-test formula, the steps are:

Step 1: Calculate the $\bar{X}_1$ (the sum of mean of experimental group)

$$\bar{X}_1 = \frac{\sum X_1}{N_1}$$

$$\bar{X}_1 = \frac{1420}{25}$$

$$\bar{X}_1 = 56.8$$

Step 2: Calculate the $\bar{X}_2$ (the sum of mean of control group)

$$\bar{X}_2 = \frac{\sum X_2}{N_2}$$

$$\bar{X}_2 = \frac{1344}{25}$$

$$\bar{X}_2 = 53.76$$

Step 3: Calculate the $\sum X_1^2$ (the sum of square of experimental group)

$$\sum X_1^2 = 88976$$

Step 4: Calculate the $\sum X_2^2$ (the sum of square of control group)

$$\sum X_2^2 = 76960$$

Step 5: Calculate the $(\sum X_1)^2$ (the square of sum of the score of experimental group)

$$(\sum X_1)^2 = (1420)^2$$

$$(\sum X_1)^2 = 2016400$$

Step 6: Calculate the $(\sum X_2)^2$ (the square of sum of the score of group group)

$$(\sum X_2)^2 = (1344)^2$$

$$(\sum X_2)^2 = 1806336$$

Step 7: Calculate Df (sum the number of experimental and control group)

$$N_1 = 25$$

$$N_2 = 25$$

$$Df = N_1 + N_2 - 2$$

$$Df = 25 + 25 - 2 = 48$$

Step 8: Enter the values obtained in steps 1-7 into the formula for the t test

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left[\frac{\sum X_1^2 - \frac{(\sum X_1)^2}{N_1} + \sum X_2^2 - \frac{(\sum X_2)^2}{N_2}}{N_1 + N_2 - 2} \right] \cdot \left[\frac{1}{N_1} + \frac{1}{N_2} \right]}}$$

$$t = \frac{56.8 - 53.76}{\sqrt{\left[\frac{88976 - \frac{2016400}{25} + 76960 - \frac{1806336}{25}}{25 + 25 - 2} \right] \cdot \left[\frac{1}{25} + \frac{1}{25} \right]}}$$

$$t = \frac{3.04}{\sqrt{\left[\frac{88976 - 80656 + 76960 - 72253.44}{48} \right] \cdot \left[\frac{2}{25} \right]}}$$

$$t = \frac{3.04}{\sqrt{\left[\frac{8320+4706.56}{48}\right] \cdot \left[\frac{2}{25}\right]}}$$

$$t = \frac{3.04}{\sqrt{\left[\frac{13026.56}{48}\right] \cdot \left[\frac{2}{25}\right]}}$$

$$t = \frac{3.04}{\sqrt{[271.38] \cdot \left[\frac{2}{25}\right]}}$$

$$t = \frac{3.04}{\sqrt{21.71}} = \frac{3.04}{4.65} = 0.653$$

Step 9: Interpret the result of computation

From the calculation above, the researcher obtains the t-test value is 0.65, where t-table at $p = 0.05$ with $Df = N_1 + N_2 - 2 = 25 + 25 - 2 = 48$ at the level of significance 0.653 for two tailed is 2.009. Then the researcher can observe that the t-test is lower than t-table ($0.653 < 2.009$), this means that there is no significance difference between experimental and control group at the beginning of the study of before the treatments were given. Then the researcher may take the next step for giving the treatment for the experimental group.

To make the calculation easier, the data scores of post-test was tabulated and arranged in the following table:

Table the computation of students' post-test score

No	Experimental Group			Control Group		
	Subject	X_1	X_1^2	Subject	X_2	X_2^2
1	Students 1	100	10000	Students 1	80	6400
2	Students 2	44	1936	Students 2	60	3600
3	Students 3	64	4096	Students 3	52	2704
4	Students 4	60	3600	Students 4	44	1936
5	Students 5	80	6400	Students 5	48	2304
6	Students 6	92	8464	Students 6	48	2304
7	Students 7	60	3600	Students 7	88	7744
8	Students 8	76	5776	Students 8	52	2704
9	Students 9	76	5776	Students 9	56	3136
10	Students 10	84	7056	Students 10	72	5184
11	Students 11	80	6400	Students 11	72	5184
12	Students 12	92	8464	Students 12	60	3600
13	Students 13	84	7056	Students 13	72	5184
14	Students 14	92	8464	Students 14	68	4624
15	Students 15	100	10000	Students 15	56	3136
16	Students 16	88	7744	Students 16	56	3136
17	Students 17	72	5184	Students 17	60	3600
18	Students 18	100	10000	Students 18	44	1936
19	Students 19	68	4624	Students 19	48	2304
20	Students 20	64	4096	Students 20	60	3600
21	Students 21	64	4096	Students 21	44	1936
22	Students 22	40	1600	Students 22	40	1600
23	Students 23	52	2704	Students 23	40	1600
24	Students 24	56	3136	Students 24	44	1936
25	Students 25	60	3600	Students 25	40	1600
	Σ	$\Sigma X_1 = 1848$	$\Sigma X_1^2 = 143872$	Σ	$\Sigma X_1 = 1404$	$\Sigma X_1^2 = 82992$

From the data above, the researcher did some steps to compute the data using t-test formula, the steps are:

Step 1: Calculate the $\bar{X}_1$ (the sum of mean of experimental group)

$$\bar{X}_1 = \frac{\sum X_1}{N_1}$$

$$\bar{X}_1 = \frac{1848}{25}$$

$$\bar{X}_1 = 73.92$$

Step 2: Calculate the $\bar{X}_2$ (the sum of mean of control group)

$$\bar{X}_2 = \frac{\sum X_2}{N_2}$$

$$\bar{X}_2 = \frac{1404}{25}$$

$$\bar{X}_2 = 56.16$$

Step 3: Calculate the $\sum X_1^2$ (the sum of square of experimental group)

$$\sum X_1^2 = 143872$$

Step 4: Calculate the $\sum X_2^2$ (the sum of square of control group)

$$\sum X_2^2 = 82992$$

Step 5: Calculate the $(\sum X_1)^2$ (the square of sum of the score of experimental group)

$$(\sum X_1)^2 = (1848)^2$$

$$(\sum X_1)^2 = 3415104$$

Step 6: Calculate the $(\sum X_2)^2$ (the square of sum of the score of group group)

$$(\sum X_2)^2 = (1404)^2$$

$$(\sum X_2)^2 = 1971216$$

Step 7: Calculate Df (sum the number of experimental and control group)

$$N_1 = 25$$

$$N_2 = 25$$

$$Df = N_1 + N_2 - 2$$

$$Df = 25 + 25 - 2 = 48$$

Step 8: Enter the values obtained in steps 1-7 into the formula for the t test

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left[\frac{\sum X_1^2 - \frac{(\sum X_1)^2}{N_1} + \sum X_2^2 - \frac{(\sum X_2)^2}{N_2}}{N_1 + N_2 - 2} \right] \cdot \left[\frac{1}{N_1} + \frac{1}{N_2} \right]}}$$

$$t = \frac{73.92 - 56.16}{\sqrt{\left[\frac{143872 - \frac{(1848)^2}{25} + 82992 - \frac{(1404)^2}{25}}{48} \right] \cdot \left[\frac{1}{25} + \frac{1}{25} \right]}}$$

$$t = \frac{17.76}{\sqrt{\left[\frac{143872 - 136604.16 + 82992 - 78848.64}{48} \right] \cdot \left[\frac{1}{25} + \frac{1}{25} \right]}}$$

$$t = \frac{17.76}{\sqrt{\left[\frac{7267.84 + 4143.36}{48}\right] \cdot \left[\frac{2}{25}\right]}}$$

$$t = \frac{17.76}{\sqrt{\left[\frac{11411.2}{48}\right] \cdot \left[\frac{2}{25}\right]}}$$

$$t = \frac{17.76}{\sqrt{237.73 \cdot \left[\frac{2}{25}\right]}} = \frac{17.76}{\sqrt{19.01}} = \frac{17.76}{4.36} = 4.073$$

Step 9: Interpret the result of computation

With the degree of freedom / $Df = N_1 + N_2 - 2 = 25 + 25 - 2 = 48$ at $p = 0.05$ of two tailed, the critical value of t is 2.009. As the value of t is bigger than that of the t -table ($4.073 > 2.009$), the Null Hypothesis (H_0) is rejected and the Alternative Hypothesis (H_a) is accepted, stating that there is significant difference in result between clustering technique and the conventional method in vocabulary mastery to the second grade of SMP Tunas Pembangunan Ciparay. This also means that this technique is effective.

After giving the post-test, the researcher gave a questionnaire to the students to find out their responses to using clustering technique in teaching vocabulary. The following line explain the results of the questionnaire.

The result of the questionnaire were then formed into a percentage as follows.

Table percentage result of questionnaire

No	Questions	Yes	No	Percentage Yes	Percentage No
1	Do you like to learn English? (Apakah kamu senang belajar Bahasa Inggris?)	23	2	92%	8%
2	Does learning vocabulary in English learning is important? (Apakah belajar vocabulary dalam pembelajaran Bahasa Inggris itu penting?)	25	0	100%	0%
3	Do you previously known a lot of vocabulary? (Apakah kamu sebelumnya sudah mengetahui banyak kosakata?)	6	19	24%	76%
4	Does the clustering technique help you in improving your vocabulary mastery? (Apakah teknik clustering dapat membantumu dalam meningkatkan penguasaan vocabulary/kosakata kamu?)	24	1	96%	4%
5	Does the clustering technique help you to learn vocabulary easily? (Apakah teknik clustering membantumu dalam belajar vocabulary/kosakata dengan mudah?)	23	2	92%	8%
6	Does clustering technique motivate you in learning vocabulary? (Apakah teknik clustering dapat memotivasi kamu dalam pembelajaran vocabulary/kosakata?)	22	3	88%	12%
7	Does the clustering technique helped you in memorizing the word? (Apakah	22	3	88%	12%

	teknik clustering membantumu dalam mengingat suatu kata?)				
8	Does the clustering technique wasting your learning time? (Apakah teknik clustering membuang waktu dalam pembelajaran kamu?)	4	21	16%	84%
9	Do you like to use the clustering technique to learn English for the future? (Apakah kamu suka menggunakan teknik clustering dalam belajar Bahasa Inggris di kemudian hari?)	20	5	80%	20%
10	Does the clustering technique can be used for long period of time? (Apakah teknik clustering ini dapat digunakan untuk jangka waktu yang panjang?)	24	1	96%	4%

Discussion

After got the result by did some tests to the students both to experimental and control group, the research showed learning vocabulary by using clustering technique to improve students' vocabulary mastery. It means that the alternative hypothesis (H_a) that said 'there is significant difference in the result between clustering technique and the conventional method to the students' is accepted and the null hypothesis (H_o) is rejected. It can be concluded that the clustering technique as means of vocabulary mastery to the second grade of SMP Tunas Pembangunan Ciparay have significantly better results than the conventional method.

The result of the questionnaire above shown some variations in students answer to the questions available. After the researcher analysed the researcher can conclude that the clustering technique in learning vocabulary is preferred by students because the percentage obtained is higher. In the other words, the use of clustering technique to improve students' vocabulary mastery gets a positive response.

CONCLUSION

In this research, the researcher wanted to know how effective the use of clustering technique to improve students' vocabulary mastery and students' responses to the use of technique that had been used in several treatments at second grade of SMP Tunas Pembangunan Ciparay. To get the answers above the researcher conducted this research using quasi-experimental design and the help of several instruments used later.

According to the calculation in the research that has been done in the previous chapter, the result of the research showed that the students who taught by using clustering technique get higher score than the students who taught by using conventional method. Therefore, the calculation the t-test of the students' pre-test and post-test scores showed that the alternative hypothesis (H_a) is accepted, stating that there is significant difference in the result between clustering technique and the conventional method. From this, it can be concluded that the use of clustering technique in improving students' vocabulary mastery is effective.

In addition, based on the questionnaire this research obtained various positive responses from students regarding the use of clustering technique in improving students' vocabulary mastery. Many of them like learning English and thought that learning vocabulary in English is important. Besides that, they also stated that clustering technique can help and improve their vocabulary mastery.

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