

CHAPTER III

RESEARCH METHODOLOGY

A. Research Methodology

1. Research Design

The researcher takes an interest in implementing a pre-experimental design. Sugiyono (2014: 109), says that Pre-experimental design is a design that includes only one group or class that is given pre and post-tests. This one group pre-test and post-test design was carried out on one group without a control or comparison group. Research design is a strategy for managing research settings in order to obtain valid data. According to Kothari (2009:27), research design is a conceptual structure in which research is conducted. Based on this understanding, it is clear that research techniques are ways of conducting research. Experimental studies involve changing the value of a variable called the independent variable and observing the effect of that change on another variable called the dependent variable (Cohen et al. 2007: 271). In this study, two variables were included; independent variable and dependent variable.

Researchers use a quantitative approach in this design. Creswell (2012: 19) says that in quantitative research, researchers rely on statistical analysis (mathematical analysis) of the data, which is usually in numerical form. This type of research is an experiment with a one-group pre-test and post-test design.

At first the researcher gave a pre-test to students before being given treatment and after that the researcher applied the treatment. The form of treatment is to find out information about vocabulary in the media word square. After the treatment the researcher gave a post-test to find out the results. Researcher used the results of the pre-test and post-test and compared them to find out whether the treatment was effective or not.

Table 3.1
One Group Pre-Test and Post-Test Design

Pre-Test	Treatment	Post-Test
Y ₁	X	Y ₂

Source; Ary *et al* (2010:304)

Based on the table above, the researcher held a pre-test (Y1) to see the basic state or initial state of the dependent variable, then after getting the pre-test results, the writer implemented the independent variable as a form of "intervention" (X) in the hope of finding an effect or change in the results of pre-test After going through several treatment stages the researcher conducted a post-test (Y2) which was conducted to see what changes or influences were caused by the independent variables on the dependent variable.

2. Population and Sample

a. Population

Population is overall object in the research and general nature. According to Creswell (2012:625) population is a group of individuals who comprise the same characteristics. The population in this research was taken from students SMP 1 Sungai Kuyit in the academic year 2023. The population of this research is all of the students in eight grade of SMP 1 Sungai Kuyit. It consists of 2 classes. They are VIII A and VIII B.

Table 3.2
The Population of the Research

Class	Total of Students
VIII A	27
VIII B	26

b. Sample

The sample is a representation of the population, and the results represent the entire population studied. A sample, according to Creswell (2012:627), is a subset of the target population that the researcher intends to analyse in order to make generalizations about the target population. This signifies that the sample is a subset of the population being studied. As a result, the sample is a subset of the population being studied. This study's sample is a representative of the population. Cluster sampling was used as a sample approach in this investigation. According to Singh (2006:89), cluster sampling is the selection of the entire group as a whole.

The stages in applying this technique, for the first step, the researcher prepared a paper on which the name of the eighth grade class was printed. The researcher then pours all of the paper into a glass and shakes it. The researcher then took one of the papers and opened it. For these classes, the researcher chose random sampling to gather the research sample.

B. Technique and Tool of Data Collection

1. Technique of Data Collection

The data collection technique in this study is a measurement technique. Measurement is a process of mapping aspects of a domain into other aspects of a range according to several correspondence rules (Kothari, 2004:69). In line with that, Creswell (2012: 623) states that measurement means researcher observe and record scores on an instrument. This measurement technique is intended to measure changes in students' vocabulary before and after the word square treatment.

2. Tool of Data Collection

The tool test was employed by the researcher in this study. A test is a tool that consists of a few questions that are designed to gauge how well students comprehend the subject matter. According to Ary et al. (2010: 201)

a test is defined as a series of stimuli given to a subject in order to elicit responses from them, from which a score may be calculated. In other words, it is a list of inquiries that must be addressed and responded to using a sample. The researcher employed a multiple-choice vocabulary exam. To arrive at the achievement score, the test was given twice. The first test is referred to as a pre-test, and the second test is referred to as a post-test. A pre-test gives a measurement of some traits or features that the researcher wants to evaluate for experiment participants before the students receive a treatment.

a. Reliability Test

Reliability is an index that indicates whether or not the instrument used to gather data is reliable. According to Cohen et al. (2007: 146), "a reliable instrument for a piece of research will generate similar data.

b. Validity Test

The researcher examined the test items for validity by consulting a validator to ensure the test's content validity. According to Dornyei (2009:93), validity refers to how well an instrument measures what it was supposed to measure. Furthermore, the amount to which an instrument measures what it claims to measure was specified. According to Ary et al (2010:225), the focus of current validity views is not on the instrument itself, but on the interpretation and meaning of the score produced from the instrument. The type of validity used in this study was content validity. According to Hendryadi (2014: p1), content validity is estimated by checking the feasibility of the content with a competent person using rational analysis and ensuring that the measurement comprises a representative group of items conveying the concept.

C. Technique of Data Analysis

Because the majority of the data in the experimental study is in numerical form, the researcher required certain formulas to describe it in intelligible sentences. To answer the first study question, the researcher first assessed the

students' individual scores, then the students' mean scores, students' standard deviation, normality test, and hypothesis testing. Finally, in order to address the second study question, the researcher examined the effect size. The formulas for each data analysis technique utilized by the researcher in this study are listed below:

1. Student`s individual scores of pre-test and post-test

In order to analyse the students` individual scores, the researcher used the formula below:

$$X1 = \frac{A1}{N} \times 100 \qquad X2 = \frac{A2}{N} \times 100$$

Where:

X1 = Students` score pre-test

X2 = Students` score post-test

A1 = Number of correct items pre-test

A2 = Number of correct items post-test

N = Total number of scoring item pre-test and post-test

Taken from Cohen et al (2007:423)

To calculate the students' individual score, from a test result, the number of students' correct answer is multiplied by 100 and then divided by the total number of test items. After finding the individual score the researcher continued to analyse the means score.

2. Students` mean score of pre-test and post-test

After the experimenter calculated the whole individual score the coming step is to calculate the mean score of the individual score. OPE Mean or arithmetic average is the sum of all the scores in a distribution divided by the number of cases (Ary et al, 2010:108) Likewise, the formula on changing the Mean score as follows:

a) Pre-test

$$X_1 = \frac{\sum X_1}{N_1} \qquad \text{Taken from Singh (2007; 138)}$$

Where:

X_1 = Mean Score

$\sum X_1$ = the sum of the Scores

N_1 = Total samples

b) Post-test

$$\bar{X}_1 = \frac{\sum X_1}{N_1} \quad \text{Taken from Singh (2007; 138)}$$

Where:

\bar{X}_1 = Mean Score

$\sum X_1$ = The sum of the Scores

N_1 = Total samples

3. Standard Deviation

The researcher uses standard deviation to calculate the depth of the Mean that was previously gathered by the researcher. In depth, this means that the correct formula to use to see the distribution or dispersion around the Mean score is the Standard Deviation calculation. The formula of standard deviation is as follow:

$$SD = \sqrt{\frac{\sum d^2}{N-1}}$$

Taken from Cohen, Manion and Morrison (2007:512)

Where:

d^2 = the deviation of the score from the mean (average), squared

\sum = the total value of

N = the number of subject

According to Cohen, Manion and Morrison (2007: 512) claim that "A low standard deviation implies that the scores cluster together, while a high standard deviation shows that the scores are widely spread. In other words, finding the dispersal rate of the mean scores is an excellent way to supplement the findings of this research.

4. Normality Test

Normality used to determine whether the data is distributed normal or not. The researcher have done a testing the normality of the data both pre-test and post-test.

$$X^2 = \sum \left[\frac{(f_o - f_e)^2}{f_e} \right]$$

Where:

X^2 = value of chi square

f_o = observed frequency

f_e = expected frequency

5. T-test

After calculating mean score, standard deviation and the data is in normal distribution and homogeny, then the researcher analysed the data using t-test analysis. T-test means a statistical procedure for testing hypothesis concerning the difference between two means (Ary et al, 2010:652). The analysis of t-test is used to compare the mean score of two groups. In this case, the mean score from the pre-test result and the mean score of post-test result from the experimental group compared by using t-test analysis. The formula of t-test is as follow:

$$t = \frac{\bar{D}}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{N}}{N(N-1)}}$$

Where:

t = t ratio

\bar{D} = average difference

$\sum D^2$ = different scores squared, then summed

$(\sum D)^2$ = different scores summed, then square

N = the number of elements in a sample

Taken from Ary et al (2010:177)

6. Testing Hypothesis

The researcher employed hypotheses to answer question number one. The hypotheses were tested using the critical value of the t-distribution table test. The crucial value is in the t-table because the degree of freedom (df) is N, N-1 (N-1) and the level of significance is 5% or 0,05 using a two-

tailed test (Hatch and Lazaraton 1991: 595). The following criteria were used:

- a. If the t-test (t_o) exceeds the t-table (t_t) by a significant margin of 0.05, H_a (alternative hypotheses) is accepted. It signifies that the post-test mean score is higher than the pre-test mean score. The use of Word Squares in teaching vocabulary is effective.
- b. If the t-test (t_o)t-table (t_t) is significant at 0.05, the null hypothesis (H_o) is rejected. It signifies that the post-test mean score rates are the same as or lower than the pre-test mean score rates. The using of Word Square is not effective in teaching vocabulary.

7. Effect size

After evaluating the hypotheses, the researcher moved on to the next step in addressing question number two of this study, which is determining the treatment's effect magnitude. Cohen, Manion, and Morrison (2007: 293) define effect size as the degree to which a phenomena exists or the degree to which a null hypothesis is not supported. The formula as follows:

$$ES = \frac{X_2 - X_1}{sd}$$

Where:

ES = Effect size

X_2 = Mean of post-test

X_1 = Mean of pre-test

SD = Standard deviation

Taken from Cohen, Manion and Morrison (2007: 521)

This formula is simple to calculate manually, and the result reveals the magnitude of the treatment's effect size. Furthermore, to understand the result derived from this computation, the author resorts to Cohen, Manion, and Morrison's (2007: 521) interpretation, which is detailed in the table below:

Table 3.3 Effect Size Level

Value	Level
0-0.20	Weak Effect
0.21-0.50	Modest Effect
0.51-1.00	Moderate Effect
>1.00	Strong Effect

Taken from Cohen, Manion “and Morrison (2007: 521)

If the value of the effect size between 0-0.20 means it category in weak effect. If the value between 0.21-0.50 means it category in modest effect, if the value between 0.51-1.00 means it category in moderate effect and if the value more than >1.00 means it category in strong effect.

D. Procedure of Research

In this research, the researcher conducted a research activity to the students of SMP 1 Sungai kunyit. To conduct of research, a procedure required to create the research be on the rule and systematically conduct to gain time efficiency. Crewsell (2012:22) mentioned that since the quantitative studies are traditional mode of research, carefully worked out procedure of this research. So, the research explain the procedure as listed below:

1. Administration

The researcher firstly asked permission to headmaster of SMP 1 Sungai Kunyit to conduct the research. After gaining the permission, the researcher selected the sample from the eight grade class which is VIII A and VIII B classed and contacting the teacher to have permission.

2. Pre-test

The researcher give pre-test where the researcher try to find out the samples real condition before implementing the treatment of Word Square.

3. Giving Treatment

The implementing treatment to the sample class by using Wod Square.

4. Post-test

At this stage, the reserahcer conducted a post-test to know a result of implementing of word square toward the sample.