

CHAPTER III

RESEARCH METHODOLOGY

This chapter presents research method which consists of design of the research, place and time of the research, the population and sample of the research, method of data collection, and method of data analysis.

3.1. The Design of the Research

This research was conducted quantitatively through true-experimental design. The designs are called true experiment because subjects are randomly assigned to groups. Because of the control they provide, they are most highly recommended designs for experimentation in education (Ary et al, 2010:305). In addition, the data was taken from pre- and post-test score in order to know whether or not mind mapping is effective than conventional technique.

1. Experimental Design

The design of experimental research can be described as follows:

$$\begin{array}{c} \boxed{\begin{array}{c} \text{E 01 X 02} \\ \hline \text{C 03 X 04} \end{array}} \end{array}$$

Where, E = experimental group

C = control group

01 = pre-test of the experimental group

02 = post-test of the experimental group

03 = pre-test of the control group

04 = post-test of the control group

(Arikunto, 2013:125)

In conducting this research, the researcher was used several stages to get valid result. Several stages that used in this research are:

a. Pre-test

Pre-test was used in the preliminary study. In this case, the researcher gave pre-test to the experimental and controlled group.

b. Treatment

Treatment is strategy that is used to help students solve their problems in learning activity. In this stage, the researcher gave mind mapping technique as a treatment to the experimental group. Treatment was done for two meetings in both the experimental and controlled group. The explanation can be seen below:

1. Experimental Group

Experimental Group	
Treatment 1	<ul style="list-style-type: none"> ✓ The researcher gave explanation about narrative text and mind mapping. ✓ The researcher asked students to find and identify the generic structure of the text given.
Treatment 2	<ul style="list-style-type: none"> ✓ The researcher reviewed the previous material. ✓ The researcher gave a text and asked students to identify the generic structure of the text and make mind map individually.

2. Control Group

Control Group	
Treatment 1	<ul style="list-style-type: none"> ✓ The researcher explained about narrative text. ✓ The researcher gave a text and asked students to do the exercise in pairs.
Treatment 2	<ul style="list-style-type: none"> ✓ The researcher reviewed the previous material. ✓ The researcher gave a text and asked students to do the exercise individually.

c. Post-test

Post-test was given at the end of the lesson. Here, the researcher gave post-test to the experimental and controlled group after the treatment.

2. Trying Out of the Instruments

a. Validity

Validity is the most important components in evaluating instruments to be tested. Arikunto (2013:211) states that validity is a measurement that indicates the levels of validity of an instrument. An instrument is valid when it has high validity while an instrument is invalid when it has low validity.

b. Reliability

Reliability is a component in making an instrument that can be trusted as a tool for collecting data. According to Ary et al (2010:236) the reliability of a measuring instrument is the degree of consistency with which it measures whatever it is measuring. It means that a good test should give consistent result of a measurement.

c. Item of Difficulty

The difficulty index determines whether instruments will be tested are good or bad. According to Widoyoko (2014:132) the difficulty level of item number is the proportion of testee who can answer the item number correctly.

d. Item of Discrimination

Knowing the discriminating power is very important as a basis of preparing the item number (Sudijono, 2011:386). The discriminatory power can be known by seeing the number of discriminatory index from the higher group and the lower group.

3.2. The Place and Time of the Research

The research was conducted at SMA Islam Al-Hikmah Mayong which is located on Jl. Pancur Gg.1 Pelemkerep, Mayong, Jepara, 59465. This school has 10 classes from the tenth grade up to twelve grade which has two programs; science and social class. This research was carried out for a month, start from August 9th, 2017 to September 9th, 2017 in the odd semester 2017/2018.

3.3. The Population and Sample of the Research

According to Mubarok (2015:31), population is a unit of the object or subject that has certain qualities and characteristics which are studied by the researchers then be deduced. Population here means the person or object that occurs in this world. In this research, the population was four classes of the second grade students of SMA Islam Al-Hikmah Mayong.

Furthermore, the technique of sampling that used by writer is simple random sampling. Simple random sampling is used because it is impossible to change the classroom setting of the school. In this study, 57 students in two classes become the sample of the research. The writer took XI IPA-2 as the experimental class that has 31 students and XI IPS-1 as the controlled class that has 26 students. The experimental class was taught reading comprehension through mind mapping technique, while the other class was taught through conventional technique. The teaching and learning process was done for four meetings.

Finally, the writer only took 26 students' data as sample in the experimental class. This condition happened because there were some students who did not come in each meeting. Therefore, the writer decided to take 52 students as sample of both experimental and controlled class.

3.4. The Method of Data Collection

Data is a piece of information that can be something known in organized form that refers to condition, ideas, or objects. In this research, the writer only use test as the instrument to gain the data from the subjects of the research through multiple choice questions. Arikunto (2013:266) defines test as an instrument to measure ability and achievement. There are two kinds of test used; pre-test and post-test described as follows:

1. Pre-test

Pre-test was given at the first time before the writer implement the treatment in both experimental and controlled class. The pre-test was held on August 24th, 2017 for the experimental class and August 25th, 2017 for the controlled class.

2. Post-test

Post-test was delivered in the last time as a final test after the writer implement the treatment. It was used to know the students' progress in learning reading comprehension after the implementation of the technique and whether or not mind mapping technique effective to teach students' reading comprehension. The post-test was held on September 5th, 2017 for the experimental class and September 9th, 2017 for the controlled class. Moreover, each test was arranged into 20 items of multiple choices taken from students' English book. The tests were given to the experimental and controlled classes' students.

Before giving the test to the sample of the research, the researcher had tested the tests to XI IPA-1 students of SMA Islam Al-Hikmah Mayong. It was held to know the validity, reliability, difficulty level, and discriminating power of the instrument. Furthermore, it was analyzed by using manual and SPSS calculation.

The result shows that the instruments were reliable. The reliability score is 0.825 where the standard of reliability is 0.396. Hence, it can be concluded that the instruments are reliable. Finally, the researcher limited the questions into 20 from 30 questions that were tested.

3.5. The Method of Data Analysis

Data analysis is an activity in reflecting the data of the research. Analyzing the data is a long process of experimental research. The researcher uses score analysis of pre-test and post-test in analyzing data of the research. It is used to find out the difference of students' reading comprehension achievement in both the experimental and controlled class.

1. T-test

In this research, the writer uses statistical calculation through *t-test* formula in manual calculation and SPSS (Statistic Product and Statistic Solution). It will be used in examining the significant difference of students' reading comprehension achievement between experimental and control group. The formula of t-test as follows:

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

Notes:

M_1 = mean of variable X (experimental class)

M_2 = mean of variable Y (controlled class)

SE = standard error

(Sudijono, 2011:314)

There are several stages used to get the calculation of t-test, it can be seen as follows:

1. Determining Mean of variable X, with formula:

$$M_1 = \frac{\sum X}{N_1}$$

2. Determining Mean of variable Y, with formula:

$$M_2 = \frac{\sum Y}{N_2}$$

3. Determining Standars of Deviation Score of Variable X, with formula:

$$SD_1 = \sqrt{\frac{\sum X^2}{N_1}}$$

4. Determining Standars of Deviation Score of Variable Y, with formula:

$$SD_2 = \sqrt{\frac{\sum Y^2}{N_2}}$$

5. Determining Standard Error Mean of Variable X, with formula:

$$SE_{M_1} = \frac{SD_1}{\sqrt{N_1 - 1}}$$

6. Determining Standard Error Mean of Variable Y, with formula:

$$SE_{M_2} = \frac{SD_2}{\sqrt{N_2 - 1}}$$

7. Determining Standard Error of different Mean of Variable X and Mean of Variable Y, with formula:

$$SE_{M_1 - M_2} = \sqrt{SE_{M_1}^2 + SE_{M_2}^2}$$

8. Determining t_0 with formula:

$$t_0 = \frac{M_1 - M_2}{SE_{M_1 - M_2}}$$

9. Determining Degrees of Freedom (df), with formula:

$$df = (N_1 + N_2) - 2$$

2. Trying Out of the Instruments

a. Validity

A test is valid when it measures what it is supposed to measure. In this research, the instrument will be calculated by using the formula as follows:

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{\{N\Sigma X^2 - (\Sigma X)^2\}\{N\Sigma Y^2 - (\Sigma Y)^2\}}}$$

Notes:

X = item number

Y = total score

r_{xy} = coefficient correlation between variable X and variable Y

(Widoyoko, 2014: 177)

b. Reliability

A test can be reliable when it gives consistent result. The formula to calculate the reliability of the instrument as follows:

$$r_{11} = \frac{2 r_{1/21/2}}{1 + r_{1/21/2}}$$

Notes:

$r_{1/21/2}$ = correlation between two half instruments

r_{11} = reliability of instrument

(Widoyoko, 2014: 195)

c. Item of Difficulty

The index of difficulty level can be determined by using the following formula as follows:

$$P = \frac{\sum b}{N}$$

Notes:

P = difficulty level

$\sum b$ = the number of tester can answer questions correctly

N = the number of tester

(Widoyoko, 2014:132)

The criteria used to determine the difficulty level and quality of item number as follows:

Difficulty Level	Quality of Item Number
0.91 – 1.00	Very easy, question is not good, unused
0.71 – 0.90	Easy, question is unfavorable, revised
0.31 – 0.70	Medium, question is quite good, used
0.21 – 0.30	Difficult, question is unfavorable, revised
0.00 – 0.20	Very difficult, question is not good, unused

d. Item of Discrimination

Discriminating power used to differentiate the higher and lower group. It is used the following formula as follows:

$$D = \frac{B_a - B_b}{\frac{1}{2}N}$$

Notes:

D = discriminating power

B_a = numbers of right answer from higher group

B_b = numbers of right answer from lower group

N = numbers of tester in higher and lower group

(Widoyoko, 2014:136)

The criteria used to determine the discriminating power index and quality of item number as follows:

Discriminating Power	Quality of Item Number
0.41 – 1.00	Excellent, used
0.31 – 0.40	Good, used with revision
0.21 – 0.30	Satisfactory, revised
0.00 – 0.20	Poor, changed

3.6. The Statistical Hypotheses

There are statistical research hypotheses used before deciding the result of hypothesis as follows:

$H_0 : \{ \mu_1 = \mu_2 \}$ $H_a : \{ \mu_1 \neq \mu_2 \}$
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Notes:

H_0 = Null hypothesis

H_a = Alternative hypothesis

μ_1 = students' reading comprehension achievement, who are taught by using mind mapping.

μ_2 = students' reading comprehension achievement, who are taught without mind mapping.

The writer's assumption of those hypotheses are as follow:

1. If $t_o > t_{table}$, the Null Hypothesis (H_0) is rejected and alternative hypothesis (H_a) is accepted. It means that there is a significant difference of students' reading comprehension achievement between students who are taught by using mind mapping and students who are taught without mind mapping.
2. If $t_o < t_{table}$, the Null Hypothesis (H_0) is accepted and alternative hypothesis (H_a) is rejected. It means that there is no a significant difference of students' reading comprehension achievement between students who are taught by using mind mapping and students who are taught without mind mapping.