

CHAPTER III

METHOD OF INVESTIGATION

A. Research Design

The research design that used in this research is quantitative research. It is a means for testing objective theories by examining the relationship among variables.³³ An experimental study is defined as a situation in which one observes the relationship between two variables by deliberately producing a change in one and looking to see whether this alteration produces a change in the other.³⁴

Sugiyono added that experimental research is a research method used to investigate the effect of certain treatment toward that on controlled condition. Thus, there is a treatment and control group on this study.³⁵ Experimental research closely follows the logic and principles found in natural science research. To conduct an experiment, it is created a situation and examines its effects on study

³³ W.Creswell, John, *Research Design*, (United State of America: Sage publication, 2009), p.4.

³⁴ Rodgers and Brown, *Doing Second Language Research*, (Cambridge: Oxford Press, 2002), p.211.

³⁵ Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, (Bandung: Alfa Beta, 2009), p. 72.

participants.³⁶ The subject of this research are divided into two groups: experimental class, which are taught circle the sage technique and the control class, which are taught without using circle the sage technique but by using conventional method.

In this study, the approach uses quantitative approach because the data that is gained are numeric and is analyzed by using statistical compilation. The kind of this experimental is true experimental design in form of pretest posttest control group design.

The writer will use pre-test – post-test control group design with one treatment as the design for this study.

This is the scheme³⁷:

$E = O_1 X O_2$ $C = O_3 Y O_4$

Figure 3.1 Research Design

Where:

E : The symbol for experimental class

C : The symbol for control class

³⁶ Neuman, Laurence W., *Understanding Research*, (USA: Pearson, 2012), p. 11.

³⁷ Arikunto, Suharsimi, *Prosedur Penelitian Suatu Pendekatan Praktik*, (Jakarta : PT Rineka Cipta, 2006), p. 125.

O_1 : Pre-test for experimental class
 O_2 : Post-test for experimental class
 O_3 : Pre-test for control class
 O_4 : Post-test for control class
 X : Treatment using circle the sage technique
 Y : Treatment using conventional method

Here, there are two groups which have been chosen with cluster random sampling technique. Both groups are given pretest to know the first condition whether there is a significant difference of competence level, proficiency level between the sample or not. The pretest result is good if there is no significant difference between both groups. It means that the sample of experimental and control group has same or equal condition of competence level and proficiency level. After being gives a pretest, the experimental group is given a certain treatment while the control one is not.

B. Source of Data/Participants and Setting

The research was conducted in SMP Islam Al-Kautsar Semarang. The subject of the research is the eighth grade students of SMP Islam Al-Kautsar in academic year of 2013/2014. This research will be conducted in the second semester.

C. Subject of The Study

1. Population

Population is a larger collection of units from which a sample is taken.³⁸ The populations of the research are all eighth grade students of SMP Islam Al-Kautsar Semarang in the academic year of 2013/2014. There are three classes. Every class consists of 28-35 students.

2. Sample

Sample is taking of a part population using certain procedure. Arikunto said that sample is representative of population which is observed. It is subject of population. She is also said that sample can be taken between 10% - 15% - 25%.³⁹ So that can be expected to represent the population.

Two classes were taken as the sample of this research. The class which gets learning circle the sage technique is experimental class. Then, the class which gets learning technique without using circle the sage technique but through conventional method is control class. In addition, the sample in this research is two classes that chosen by cluster random sampling technique.

³⁸ Neuman, Laurence W., *Understanding Research*, (USA: Pearson, 2012), p. 88

³⁹ Arikunto, Suharsimi, *Prosedur Penelitian: Suatu Pendekatan Praktik*, (Jakarta: Rineka Cipta, 2006), p. 130

3. Sampling Technique

In this research, the writer used cluster random sampling technique. The object are regarded that each of groups has the equal chance to be chosen as the sample.⁴⁰ And this was done after paying attention to the characteristics of participants who got material. Besides, the participants who become the object of the research are in the level of the same class and the distribution of the class did not have the supreme class.

In getting sample of the research, the researcher took the procedure called the lottery method.⁴¹ It is each group of the population was presented by small piece of paper. The small piece of paper was placed in a box and well mixed, and a sample of the required size was selected.

The use of the lottery method of random sampling was easy because of the fact that it did not need difficult procedure. In this case, each of the classes' names was written on piece of paper. And then the paper was rolled and put into a slot of a box. After being well

⁴⁰ Sudjana, *Metode Statistika* (Bandung: Tarsito, 2001), 6th Ed, p. 173.

⁴¹ Hadjar, Ibnu, *Dasar-dasar Metodologi Penelitian Kuantitatif dalam Pendidikan*, (Jakarta: PT. Raja Grafindo Perasada, 1996), p. 138.

mixed, a paper was dropped out of the slot and these become the sample of the research. So, the researcher will take two classes as a sample. There are experimental class and control class. And both of the classes have the same teacher who teaches them.

D. Variable and Indicator

A variable is anything that can take on differing or varying values. The values can differ at various times for the same object or person, or at the same time for different objects or persons.⁴² There are two kind of variable in this research i.e. independent and dependent variable.

Independent variable is one that influences the dependent variable in either a positive or negative way. That is, when the independent variable is present, the dependent variable is also present, and with each unit of increase in the independent variable.⁴³ Independent variable in this research is the implementation of Circle the Sage in teaching Degrees of Comparison.

⁴² Sekaran, Uma and Roger Bougie, *Research Methods for Business: A skills Building Approach Sixth Edition*, (United Kingdom: John Wiley and son, 2013) p. 87

⁴³ Sekaran, Uma and Roger Bougie, *Research Methods for Business: A skills Building Approach Sixth Edition*, p. 89

Dependent variable is the variable of primary interest to the researcher. The researcher's goal is to understand and describe the dependent variable, or to explain its variability, or predict it. In other words, it is the main variable that lends itself for investigation as a variable factor.⁴⁴ Dependent variable in this research is the students' understanding on Degrees of Comparison. The indicator is the students' achievement score on post test. They are:

1. Students are able to identify the pattern of Degrees of Comparison.
2. Students are able to identify the form of adjective used in Degrees of Comparison.
3. Students are able to identify the use of Degrees of Comparison.
4. Students are able to make example of Degrees of Comparison.

E. Data Collection Technique

In quantitative researches, the technique of collect data is using Documentation and Test (Pre Test and Post Test). It represents to the ways that can be used by researcher to collect the data. There are:

⁴⁴ Sekaran, Uma and Roger Bougie, *Research Methods for Business: A skills Building Approach Sixth Edition*, p. 88

1. Documentation

It refers to the archival data that helps the researcher to collect the needed data. The researcher used the document related to the object research such as; students name list and their English score in previous time. It helped the researcher in doing the experiment. Students' name list and score used in determining the team for the experiment. In this case, the data was gained by the help of the English teacher.

2. Test

In simple terms, test is as a method which is used to measure competence, knowledge, intelligence, and ability of talent which is possessed by individual or group to collect data.⁴⁵ Test is a set of question and exercises used to measure the achievement or capability of the individual or group.⁴⁶ This method is used to get data about score of the pre-test and post-test was given for both of groups, the experiment class and control class.

In this research, the researcher used multiple choice test in this study for pre-test and post-test

a. Pre-test

⁴⁵ Brown, H. Douglas, *Language Assessment: Principles and Classroom Practices*, (San Fransisco: Longman, 2004), p.3.

⁴⁶ Arikunto, Suharsimi, *Prosedur Penelitian Suatu Pendekatan Praktik*, (Jakarta : PT Rineka Cipta, 2006), p.150

Before the teacher taught new material by using circle the sage technique, the teacher gives a test to the students to measure students' understanding on Degrees of Comparison. Pre-test was given to the experiment class and the control class. This test was given before the experiment is delivered.

b. Post-test

Post-test was given to the experiment class and the control class. The test is given in order to know the development of students' understanding on Degrees of Comparison. The post- test is given to the experiment class and control class after receive treatment. The experiment class is taught Degrees of Comparison by using circle the sage technique. And the control class is taught without using circle the sage technique.

F. Data Analysis Technique

The researcher analyzed the data through giving test to the students. It needed some steps in analyzing of the data. The data analysis method which used in this research is quantitative analysis. Quantitative is concerned with the amount or number. The following are the steps taken by the researcher:

1. Try-Out Instrument of Test

Try out test analysis is mean to get the validity, reliability, index difficulty and discriminating power.

a. Validity of Test

The validity is an important quality of any test. It is a condition in which a test can measure what is supposed to be measured. According to Arikunto, “a test is valid if it measures what it purpose to be measured”.⁴⁷ The validity of an item can be known by doing item analysis. It is counted γ_{pbi} formula:

$$\gamma_{pbi} = \frac{M_p - M_t}{S_t} \sqrt{\frac{p}{q}}$$

Where:

γ_{pbi} : The correlation coefficient bi-serial

M_p : The average of subject score who can answer right on the items which the validity is looked for

M_t : The average of total score

S_t : The deviation standard of total score

p : The student proportion who can answer right

$$p = \frac{\text{total of student who can anwer right}}{\text{total of the whole student}}$$

q : The student proportion who answer wrong

⁴⁷ Arikunto, Suharsimi, *Prosedur Penelitian Suatu Pendekatan Praktik*, (Jakarta : PT Rineka Cipta, 2006), p. 65.

($q=1-p$)

Calculation result of γ_{pbi} is compared with r table of product moment by 5% degree of significance. If γ_{pbi} is higher than r table, the item of question is valid.⁴⁸

b. Reliability of Test

It means “consistent”.⁴⁹ Reliability refers to the consistency of test scores. Besides having high validity, a good test should have high reliability too. Alpha formula is used to know reliability of test is K - R. 20.⁵⁰

$$r_{11} = \left(\frac{n}{n-1} \right) \left(\frac{S - \sum pq}{S^2} \right)$$

Where:

r_{11} : The reliability coefficient of items

n : The number of item in the test

P : The proportion of students who give the right answer

⁴⁸ Arikunto, Suharsimi, *Dasar-dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed., p.78

⁴⁹ Heaton, J.B, *Writing English Language Tests* (London: Longman, 1975), p. 155.

⁵⁰ Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, (Bandung: Alfa Beta, 2008), p. 132.

q : The proportion of students who give the wrong answer

S^2 : The standard deviation of the test

c. Degree of test difficulty

A good question is a question that is not really difficult and not really easy. Formula for degree of test difficulty is.

$$P = \frac{B}{JS}$$

Where:

P : The difficulty's index.

B : The number of students who has right answer.

JS : The number of students.⁵¹

The criteria are:

$0.00 < P \leq 0.30$ is difficult

$0.30 < P \leq 0.70$ is medium

$0.70 < P \leq 1.00$ is easy

d. Discriminating Power

The discriminating power is a measure of the effectiveness of a whole test. The higher and low values of discriminating power are the more effective the test will be.

⁵¹ Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, (Bandung: Alfa Beta, 2008), p.207-208.

$$D = \frac{BA}{JA} - \frac{BB}{JB}$$

Where:

D : discrimination index.

JA : member of student in upper group.

JB : member of student in low group.

BA : member of students in upper group who answer the item correctly.

BB : member of students in low group who answer the item correctly.

The criteria are:

$D < 0.2$ is poor.

$0.2 < D \leq 0.4$ is satisfactory.

$0.4 < D \leq 0.7$ is good.

$0.7 < D \leq 1.00$ is excellent.

1. Statistic of Pre-test

The aim of statistic of pre-test is to know whether the experiment class and control class had the same average of score before treatment. The data was used from pre-test.

a. Normality Test

To know the normality is using Chi Square formula, which is as follow:⁵²

⁵² Hadi, Sutrisno, *Statistik*, Vol. 2, (Yogyakarta: Andi, 2004), p. 259.

$$\chi^2 = \sum \frac{(f_o - f_h)^2}{f_h}$$

Which:

χ^2 : chi square

f_o : frequency from sample

f_h : frequency which hoped from sample

b. Homogeneity Test

Homogeneity test is used to compare variance in a group of three categories data or more and its categories can be compared fairly if the categories are homogeneity. By:

- 1) Calculate variants both classes (experimental and control classes), with the formula:

$$S_1^2 = \frac{\sum (x - \bar{x})^2}{n_1 - 1} \text{ And } S_2^2 = \frac{\sum (x - \bar{x})^2}{n_2 - 1}$$

- 2) Determine

$$F = \frac{Vb}{Vk}$$

Where:

Vb : Bigger Varian

Vk : Smaller Varian

Determine dk = $(n_1 - 1) : (n_2 - 1)$

- 3) Determine F_{table} with $\alpha = 5\%$

4) Determining the distribution homogeneity with test criteria:

If $F_{count} > F_{table}$, the data is not homogeneous and the other way if the $F_{count} < F_{table}$, the data is homogeneous.⁵³

c. Hypothesis Test

It is used to test of hypothesis that had been mention above. In this research, the researcher will use t-test to analyze the data of this research.

The formula is:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

With

$$S = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}}$$

Where:

$\overline{X}_1$: The mean score of the experimental group

$\overline{X}_2$: The mean of the control group

⁵³ Sugiyono, *Statistika Untuk Penelitian*, (Bandung: Alfabeta, 2007), p. 140.

n_1 : The number of experimental group

n_2 : The number of control group

S_1^2 : The standard deviation of experimental group

S_2^2 : The standard deviation of control group

S : The standard deviation of both groups

The hypotheses are:

H_o : $\mu_1 = \mu_2$

H_a : $\mu_1 \neq \mu_2$

μ_1 : average data of experimental group

μ_2 : average data of control group

With $\alpha = 5\%$ and $dk = n_1 + n_2 - 2$.

If $t_{count} > t_{table}$ so H_o is rejected and there is no difference of average value from both of groups. Moreover, the other way if the $t_{count} < t_{table}$ so H_o is accepted and there is significant difference of average value from both of groups.

2. Post Test

Post-test was held after all treatments are conducted. This test was used to measure students' achievement after they are given treatments and to know is there any score difference after treatment. The data was used from post-test.

The formula has been defined as above. This aim is to compare between the pre test and post test. Then, the overall

result is counted by using *t-test* formula in order to know the significances of the research. Hypothesis being tested as follow:

$$H_0 : \mu_1 \leq \mu_2$$

$$H_a : \mu_1 > \mu_2$$

μ_1 : average data of experimental group

μ_2 : average data of control group

The statistical equation which being used is⁵⁴:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

With

$$s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

Where:

$\bar{x}_1$: average of experimental group

$\bar{x}_2$: average of control group

n_1 : the number of the experimental group

n_2 : the number of the control group

s : standard deviation

s^2 : variance

⁵⁴ Arikunto, Suharsimi, *Prosedur*, p.239-243.

Testing criteria that apply H_a is accepted if $t_{count} > t_{table}$ with determinate $df: (n_1 + n_2 - 2)$ and the significant $\alpha = 5\% (1-\alpha)$.

3. Statistic of Variants pretest and posttest

To calculate between variants of pretest and posttest of experimental class and control class, the researcher used two ways of ANOVA. The hypotheses are:

H_o : $\mu_1 = \mu_2$

H_a : $\mu_1 \neq \mu_2$

μ_1 : average score of pretest and posttest have same variant/ homogeneous.

μ_2 : average score of pretest and posttest have no same variant/ there is a significant difference between average score of pretest and posttest.