

CHAPTER III

METHOD OF INVESTIGATION

This chapter discusses sources of data, research design, research setting, population and sample of research, variables and indicators of research, methods of data collection, and methods of data analysis.

A. Research Design

This research is quantitative in nature, because the result of the students' achievement in pre test and post test were expressed in the language of mathematic, evaluated consequently and also interpreted by appropriate statistical procedures. In this term, quantitative data refers to the use of T-test.

Experimental Research is an attempt which conducted by the researcher to maintain control over all factors that may affect the result of an experiment. In doing this, the researcher attempts to determine or predict what may occur. An experimental research involved two groups: experimental group and control group. An experimental group will receive a new treatment while control group receives a usual treatment. According to Nunan, experiment is designed to collect data in such a way that threats to the reliability and validity of the research are ministered.¹

¹ David Nunan, *Research Method in Language Learning*, (Cambridge: Cambridge University Press, 1992), p.47

Referring to this research, the experimental and control group are consisting of seventh grade of SMPN 23 Semarang. The experimental group received a new treatment by using *Two Stay Two Stray* as cooperative learning technique while the control group was treated conventionally. This study used pre-test and post-test to measure both groups changes in the period before and after receiving a treatment.

The design of the experiment could be described as follows:²

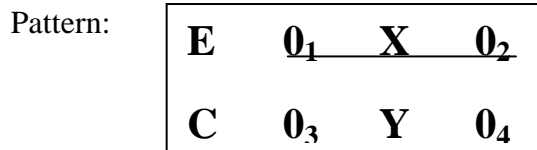


Figure 3.1 Research Design

Where:

E = experimental group

C = control group

O₁ = pre-test for experimental group

O₂ = post test for experimental group

O₃ = pre-test for control group

O₄ = post test for control group

X = treatment using *Two Stay Two Stray* technique

Y = treatment using conventional method

² Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*, (Jakarta:Rineka Cipta, 2006), p. 86.

Based on the above pattern, the subjects of research were classified into an experimental group (top line) and a control group (bottom line). The quality of subjects was first checked by pre-testing them (O_1 and O_3). Then, the experimental treatment (taught by using *Two Stay Two Stray* as cooperative learning technique) was applied to the experimental group. This treatment was symbolized as “**X**” while the control group was taught using conventional method. This treatment was symbolized as “**Y**”. The test was held in the form of written. Then, the results of post-test (O_2 and O_4) were computed statistically.

B. Research Setting

1. Subject and Place of the Research

This study was conducted at SMPN 23 Semarang which is located at Mijen Semarang. The subject of this study is the seventh grade of SMPN 23 Semarang in the academic year of 2014/2015.

2. Time of the Research

This research was conducted from November 11th to 23th 2014 on the first semester in the academic year 2014/2015, counted since the proposal is submitted until the end of the research.

Table 1
List of Time of Study

No.	Activity	Month/ Week			
		November			
		3 rd	4 th	1 th	2 nd
1.	Try-Out Class	√			
2.	Experimental Class				
	a. Pre-Test	√			
	b. Treatment	√	√		
	c. Post-Test		√		
3.	Control Class				
	a. Pre-Test	√			
	b. Explaining	√	√		
	c. Post-Test		√		

C. Source of Data

1. Population

According to Sukardi, population is all members of well defined class of people, events and objects. Population can be divided into two kinds, target of population and access of population. Target of population is population that has been planned in the research planning. And access of population is population that can be accessed when the researcher determined the number of population.³ The population of this research is All 1st grade of SMPN 23 Semarang in the Academic Year 2014/2015 which consists of four classes with thirty two to thirty four students in each class.

³ Sukardi, *Metodologi Penelitian Pendidikan*, (Yogyakarta: Bumi Aksara ,2010), p.53-54

2. Sample and Sampling Technique

Sample means apart of population that will be observed, whose characteristic can represent and describe the real population.⁴ Sample was done by taking the subject/sample which is not based on strata, random, or area but it is based on the consideration of a certain purpose.

Some reasons for using *sample*:

- a. The large amount of population.
- b. The observation that done for all unit of population may damage.
- c. Saving time, money, power.
- d. Be able to give the comprehensive output

In this research, the researcher used cluster random sampling in choosing the sample, because it is one of the techniques that all individual of population may have the same opportunity and have been chosen as the sample.⁵ The researcher took two classes, VII A and VII B as the sample. Each class has 32 students. The two classes were given the same material but with different way. VII A as the experimental class was taught by using cooperative learning type of *Two Stay Two Stray* technique and VII B as control class was taught conventional learning type of *Direct Method*.

⁴ Sugiharto, *Teknik Sampling*, (Jakarta: Gramedia Pustaka Utama, 2003), 2nd Ed, p. 2

⁵ Sukardi, *Metodologi Penelitian Pendidikan*, p.58

D. Variables and Indicators of Research

Every research requires variable since its role is the fundamental elements to support the study. The existence of variables determines the outcome of the research itself. In quantitative research, where variables are central and knowing the right variable ought to be based on its appropriate definition. As variable refers to Suharsimi Arikunto, it simply means the object in which the research is focused.⁶

According to Sugiyono, research variable is an attribute, characteristic, and value of person, object, or the variation of activity which has been determined by researcher to observe and take the conclusion. There are two types of variables based on the term of causation:⁷

1. Independent Variable (X)

Sugiyono said that independent variable can be called *stimulus*, *predictor*, or *antecedent*. Independent variable is variable which has the influence or the cause of change or make the existence of dependent variable. So, the independent variable in this research is the use of *Two Stay Two Stray* as cooperative learning technique in teaching learning process.

⁶ Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*, (Jakarta: Rineka Cipta, 2006), p. 118.

⁷ Sugiyono, *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R & D)*, (Bandung: Alfabeta, 2009), p.61

This variable affects the dependent variable throughout its treatments. The indicators from this variable are:

- a. Give a task to a small group of students.
- b. Assign two persons as spy or pirate to see the answers of other students and share with group.
- c. Group assigns two persons from their group to stay behind and share product or ideas with others who visit their poster or station.
- d. Discussing. The class discusses, first in groups and then as a whole class. All of the groups in the class give an interesting presentation of the topics studied.
- e. Evaluation. In cases where groups pursued different aspects of the same topic. Pupils and teacher evaluated each group's contribution to the work of the class as a whole. Evaluation included either individual or group assessment, or both.

2. Dependent Variable (Y)

Dependent variable is variable which is influenced or became effect of the independent variable.⁸ Dependent variable in this study is students' understanding on narrative reading text. The researcher can measure it based on students' score from the test, and the indicators are:

- a. Identifying the definition of narrative text

⁸Sugiyono, *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R & D)*, (Bandung: Alfabeta, 2009), p.61

- b. Identifying social function, generic structure, language feature.

E. Methods of Data Collection

To get the accurate data, in this study the writer used two ways to collect data, they are follows:

1. Test

Test is an instrument to collect the data that gives response about the question in the instrument, and the students have to show their ability.⁹ In another word, test means a question which is used to measure competence, knowledge, intelligence, and ability of talent which is possessed by individual or group to collect data.¹⁰

The writer gathered the data by analyzing the test based on the material of narrative reading text. He gave the test twice (pre-test and post-test) in both experimental and control class.

a. Pre-Test

Before the teacher explained material by using cooperative leaning type of *Two Stay Two Stray* technique, the teacher gave pre-test to experimental and

⁹ Purwanto, *Evaluasi Hasil Belajar*, (Yogyakarta: Pustaka Belajar, 2009), p. 65.

¹⁰ M. Chabib Thoaha, *Teknik Evaluasi Pendidikan* (Jakarta: PT Raja Grafindo Persada, 2001), p. 43.

control class in same way. It was given before the experiment was run.

b. Post-Test

Post-test was given to the experimental class and the controlled class. It was given in order to know students' understanding and score on degrees of comparison after they were taught using cooperative learning type of *Two Stay Two Stray* technique (experimental class) and conventional method (control class).

The score of students' achievement can be calculated by using this following formula:¹¹

$$\text{Score} = \frac{\text{The number of right answer}}{\text{The number of questions}} \times 100\%$$

2. Documentation

Besides data from result of the test, the documentation is needed to help the researcher conducted research. According to Arikunto, the documentation method is used to look for the data concerning matters or the variable that took the form of the note, transcript, book, newspaper, magazine, inscription, notes of a meeting, agenda, etc.¹²

¹¹Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktek*, (Jakarta: PT Rineka Cipta, 2006), p.235.

¹²Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktek*, (Jakarta: PT Rineka Cipta, 2006), p.274

The researcher used the documents related to the object of research such as students' name list, the number of students, lesson plan, English subject schedule, etc.

F. Data Analysis Technique

The data analysis method which used in this research is quantitative analysis. Quantitative is concerned with the amount or number.

1. Try-Out Instrument

Try out test analysis is meant to get the validity, reliability, index difficulty and discriminating power. The try out test was given to VII A of the students of SMPN 23 Semarang. After finishing the test, the answer sheets were collected in order to be scored. From 30 items test of tryout, some items were chosen as the instrument of the test. The choosing of the instrument had been done by considering: validity, reliability, the degree of test difficulty and discriminating power as follows:

a. Validity

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".¹³

¹³Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktek*, (Jakarta: PT Rineka Cipta, 2006), p. 65.

The validity of an item can be known by doing item analysis. It is counted using product – moment correlation formula:

$$r_{xy} = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{\{N \sum x^2 - (\sum x)^2\} \{N \sum y^2 - (\sum y)^2\}}}$$

Where:

- r_{xy} = the correlation of the scores on two halves of the test
- N = the number of students in group
- X = the score of each component of test
- Y = the total score of correct answers
- $\sum X$ = the sum of total X score in each group
- $\sum Y$ = the sum of total score from each student in the group
- $\sum XY$ = the sum of multiple score from each student with the total score
- $\sum X^2$ = the sum of the square score in each component of test
- $\sum Y^2$ = the sum square of total score from each student in the group.

Calculation result of r_{xy} is compared with r_{table} of product moment by 5% degree of significance. If r_{xy} is higher than r_{table} , the item of question is valid.¹⁴

¹⁴ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 78.

b. Reliability

Reliability means “consistent”.¹⁵ It 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. 20.¹⁶

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

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
- q : The proportion of students who give the wrong answer
- S^2 : The standard deviation of the test

Calculation result of r_{11} is compared with r_{table} of product moment by 5% degree of significance. If r_{11} is higher than r_{table} , the item of question is reliable.¹⁷

¹⁵J.B Heaton, *Writing English Language Tests* (London: Longman, 1975), p. 155.

¹⁶Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, (Bandung: Alfa Beta, 2008), p. 132.

¹⁷ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 100.

c. Index Difficulty

According to Arikunto, good question is not very easy and is not very difficult. The easy question will not stimulate the students to heighten their power in solve problem. Conversely, the difficult question will make the students be giving easily up and have not spirit try to solve that problem on the question. Because they think that the question is beyond the reach of their brain.¹⁸

Item analysis is carried out to find out the effectiveness of the items. It means to check whether each item meet the requirement of good test item or not.

To know the item difficulty, the writer used the formula:

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

Where:

P = index of difficulty

B = the number of students who answer an item correctly

JS = the total number of students

¹⁸ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 208.

The index of difficulty level can be classified as follows:¹⁹

$0.00 < P \leq 0.30$ is difficult

$0.30 < P \leq 0.70$ is medium

$0.70 < P \leq 1.00$ is easy

d. Discrimination Power

Item of discrimination power tells how well the item performs in separating the better students from the poorer students. If the good students tend to do well on an item and the poor students do badly on the same item, then the item is a good one because it distinguishes the good students from the bad students. To calculate the index of discriminating power, the writer used the formula:²⁰

$$D = \frac{B_A}{J_A} - \frac{B_B}{J_B} = P_A - P_B$$

Where:

J_A = Number of all students in the upper group

J_B = Number of all students in the lower group

B_A = Number of students in the upper group who answered the item correctly

B_B = Number of students in the lower group who answered the item correctly

¹⁹ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 210.

²⁰ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 213.

P_A = The proportion of the upper group who answered the item correctly

P_B = The proportion of the upper group who answered the item correctly

The criteria of determining the index of discriminating are below:²¹

D = 0.00 – 0.20	: Poor
D = 0.21 – 0.40	: Satisfactory
D = 0.41 – 0.70	: Good
D = 0.71 – 1.00	: Excellent

2. Pre-Requisite Test

Before the writer determined the statistical analysis technique used, he examined the normality and homogeneity test of the data. To get the normality and homogeneity, the researcher used *pre test* score.

Pre-test was given before the treatments. The researcher determined the statically analysis technique whether both groups have normal distribution. If the data have normal and homogeny distribution, the treatment and teaching can be conducted to both classes.

a. Normality test

It is used to know the normality of the data that is going to be analyzed whether both groups have normal distribution or not. The normality test with Chi-square is

²¹ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 218.

done to find out the distribution data. Step by step Chi-square test is as follows:

1) Determine the range (R); the largest data reduced the smallest.

2) Determine the many class interval (K) with formula:

$$K = 1 + (3, 3) \log n$$

3) Determine the length of the class, using the formula:

$$P = \frac{\text{range}}{\text{number of class}}$$

4) Make a frequency distribution table

5) Determines the class boundaries (bc) of each class interval

6) Calculating the average \bar{X} (\bar{X}), with the formula:

$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i}$$

7) Calculate variants, with the formula:

$$S = \sqrt{\frac{\sum f_i (x_i - \bar{x})^2}{n - 1}}$$

8) Calculate the value of Z, with the formula:

$$Z = \frac{x - \bar{x}}{s}$$

x = limit class

\bar{x} = Average

S = Standard deviation

- 9) Define the wide area of each interval
- 10) Calculate the frequency expository (E_i), with formula:
 $E_i = n \times \text{wide area}$ with the n number of sample
- 11) Make a list of the frequency of observation (O_i), with the frequency expository as follows:

Class	Bc	Z	P	L	Ei	Oi	$\frac{O_i - E_i}{E_i}$

- 12) Calculate the chi-square (X^2), with the formula:

$$X^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

- 13) Determine $dk = k-3$, where k is the number of class intervals and $\alpha = 5\%$
- 14) Determining the value of X^2 table
- 15) Determining the distribution normality with test criteria:

If $X^2_{count} > X^2_{table}$ so the data is not normal distribution and the other way if the $X^2_{count} < X^2_{table}$ so the data is normal distribution.²²

b. Homogeneity test

It was meant to get the assumption that sample of research came from a same condition or homogenous. It is

²² Sudjana., *Metode Statistika* (Bandung: Tarsito, 2001), 6thp. 272

used to know whether experimental class and control class, that are taken from population have same variant or not.

The steps as follows:

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

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

- 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.²³

²³ Sugiyono, *Statistika Untuk Penelitian*, (Bandung: Alfabeta, 2007), p. 140.

c. Test of the Average

It is used to examine average whether experimental group and control group have been decided having different average.²⁴

T-test is used to analyze the data of this research. A t-test would be measured you would use to compare the mean scores of the two groups.²⁵

If $\sigma_1^2 = \sigma_2^2$ (has same variant), the formula is:

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

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 : The mean score of the experimental group

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

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 both groups

If $\sigma_1^2 \neq \sigma_2^2$ (has no same variant) the formula is:

²⁴Anas Sudijono, *Pengantar Statistik Pendidikan* (Jakarta: PT. Raja Grafindo Persada, 1995) 6th Ed., p. 326-327.

²⁵H. Douglas Brown, *Language Assessment: Principles and Classroom Practices*, (San Fransisco: Longman, 2004), p. 205.

$$t^1 = \frac{\bar{X} - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

The hypotheses are:

$$H_0 = \mu_1 = \mu_2$$

$$H_a = \mu_1 \neq \mu_2$$

μ_1 : average data of experimental group

μ_2 : average data of control group

If $t_{count} > t_{table}$ so H_0 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_0 is accepted and there is significant difference of average value from both of groups.²⁶

3. Post-Test

Post-test was held after all treatments were conducted. This test was used to measure students' achievement after experimental and control classes were given treatments and explanations. The result of test was analyzed statistically. There are types of post-test, as follow:

a. Normality Test

Steps normality second step is the same as the normality test on the initial data.

²⁶Anas Sudijono, *Pengantar Statistik Pendidikan* (Jakarta: PT. Raja Grafindo Persada, 1995) 6th Ed., p.272-273.

b. Homogeneity Test

Steps homogeneity second step is the same as the homogeneity test on the initial data.

c. Test Average (Right-hand Test)

This test proposed that hypothesis test in average similarity with the right test as the steps right-hand test the initial data.

G. Statistical Hypothesis

This study has a hypothesis, those are :

Ho: There is no differentiation on average of students study result taught by *Two Stay Two Stray* technique as *Cooperative Learning*, with students study result taught by *Direct Method as Conventional Method*.

Ha: There is differentiation on average of students study result taught by *Two Stay Two Stray* technique *Cooperative Learning*, with students study result taught by *Direct Method Conventional Method*.