CHAPTER III
RESEARCH METHODOLOGY

This chapter describes the procedures of the study in order to figure out the answer of the questions previously stated in chapter one. The discussion includes method and technique of the research, population and sample, instruments, data collection, and data analysis.

3.1 Research Method

According to Burns (1995: 2), a research is a systematic approach to finding answer to questions. As a process to find out the answers to research questions, a research definitely requires some steps to reach the goal.

In this research entitled *The Effectiveness of Cooperative Learning Method to Improve Students' Ability in Reading*, the researcher chooses an experimental study as it is appropriate with the research problem. By experiment method, the researcher carries out some treatments to gain the objective of the research. As Hatch and Farhady (1982:23), states,

Because of these limitations, constructing a true experimental design may be difficult if not possible. However, it does not mean that we should abandon research or that our studies need to be invalid. Our goal should be approximate as closely as possible the standard of true experimental design. The more care we take, the more confident we can be that we have valid result that we can share with others.

The aim of this research is to find out whether or not teaching using cooperative learning technique is effective in improving student's ability in reading. Thus, the study used experimental design with the pre-test and post-test control group design. Time constraint is the main reason why the researcher used this design.

This study investigates the use of cooperative learning technique in improving students reading ability. The technique was implemented to the students in the experimental group in order to find out the effectiveness of the technique as compared to the students' in control group who were treated in conventional technique. The experimental with pre-test and post-test design in this study is described as follows.

Table 3.1

Experimental with pre-test and post-test design

Sample	Pre-test	Treatment	Post-test
Experimental Group	X1e	T	X2e
Control Group	X1c	0	X2c

Notes

X1e   : Students' reading achievement of experimental group in pre-test

X1c   : Students' reading achievement of control group in pre-test

X2e   : Students' reading achievement of experimental group in post-test

X2c   : Students' reading achievement of control group in post-test

T   : Treatment using cooperative learning technique

From the table above, it can be seen that both of the classes were given pre-test in the beginning of the research. Afterwards, the experimental group was given the treatment for six times. After the treatment, post-test was given to both groups. This is to find out whether the students who were treated by using cooperative learning could achieve higher scores than those who were taught using the conventional method.

3.2   Variables

There are three variables in this study. The first is the independent variable, the second is the dependent variable, and the last is the intervening variable.

Hatch and Farhady (1982:15) stated that an independent variable is the major variable which is investigated; a dependent variable is the variable which is observed and measured to determine the effect of the independent variable; and an intervening variable is a number of variables which cannot be measured or manipulated.

In this research, the dependent variable is the improvement of students' reading ability. The independent variable is the effectiveness of cooperative learning technique in improving students' reading ability. The intervening variable is any

factor whose effects has not been measured but theoretically may or may not be part of that process.

3.3 Population and Sample

The population of this research is the second grade students of SMAN 15 Bandung. Two classes were chosen as the sample of the research; Class XI Science 4 was taken as the experimental group, and Class XI Science 3 was elected as the control group. They were chosen based on the good scores for the English placement test before they went to the second grade, thus they had equal achievement at that time. Based on the test, it was found that the means of the score was 7.0 to 8.0. Unfortunately, the researcher was not allowed to get the copy of the result of the placement test, due to the confidentiality status of the documents. The number of the sample was 80 students, 40 students for each class. The researcher only took 36 students from each class as the sample, so the fixed number of the sample was 72 students. The sample was chosen through simple random sampling with confidence level of 95%, because every member of the population has an equal and independent chance of being selected to represent the population.

3.4 Data Collection: Instruments and Procedures

The data of this study was taken from Class XI Science 3 and Class XI Science 4 of SMAN 15 Bandung. Each class consisted of 40 students. The data were collected by using three instruments: 1) pre-test and post-test, 2) questionnaire, and 3) interview.

3.4.1 Validity and Reliability Test

Before conducting pre-test and post-test, the test items should be tried out in terms of its validity and reliability (Brown, 1988). In order to make the validity of the test, the researcher used the assistance of SPSS Version 13, which was the latest version then.

The instrument validity was examined by item analysis; therefore the process of the calculation was named as validity index. The index validity of each item was interpreted, to determine whether the test was good or not. The researcher used SPSS Version 13 with correlation product moment formula. The formula used in testing the validity is:

$$r_{xy} = \frac{N.\sum_{XY} - (\sum x)(\sum y)}{\sqrt{\left[N \times \sum X^2 - \left(\sum x\right)^2\right]\left[N \times \sum y^2 - \left(\sum y\right)^2\right]}}$$

(Arikunto, 2002:72)

Note

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

X = the item tested

Y   = total scores of the sample

N   = the number of testee

Afterward, the index validity of each item was interpreted with the following criteria:

0.0 - 0.21	bad
0.20 - 0.40	satisfactory
0.40 - 0.70	good
0.70 <	very good

<div align="right">(Karnoto, 2005: 43 - 44)</div>

The validity of the data was analyzed by using SPSS Version 13 with correlation product moment formula. The result of calculation (r_{xy}) was compared with the $r_{table} = 0.32$. The criteria in determining the item validity of instrument is if (r_{xy}) > r_{table} then the item is valid, whereas the item is not valid if r_{xy} < r_{table}.

The result of validity test of item number 1 is 0.158, which makes it categorized as a bad validity and was not eligible to be included into the test instrument because it shows r_{xy} (0.1580) lower than r_{table} (0.312). On the other hand, the result of validity test of the item number 5 is 0.594. This number was categorized as a good validity and makes it qualified to be part of the instrument. The rest of items were calculated using similar formula, and the result of validity test of all items is presented in Table 3.2.

Table 3.2

Result of Validity Test

Item Number	Interpretation

1,7,11,23,25	Bad
20,22,27,28	Satisfactory
2,3,4,5,6,8,9,10,12,13,14,15,16,17, 18,19,21,24,26,29,30	Good
0	Very good

Based on Table 3.2, it can be seen that there are four categories of validity items. From the calculation, it was found five items were bad, four items were categorized as enough items, and twenty-one items were good items. But, there is not any items categorized as very good item. To conclude, only 25 of 30 items that can be used as the instrument in collecting the data for the present study. Details on this is presented in Appendix 1.

Reliability is the extent to which a test produces consistent result when administered under similar condition (Hatch & Farhady, 1982). To check the test reliability, the researcher used SPSS Version 13 with Spearman-Brown split-half method and the formula is as follow.

$$r_{11} = \frac{2r_b}{1+r_b}$$

Note:

r_{11} = instrument reliability coefficient

r_b = correlation index of the first half and second half obtained by Pearson product moment

From the calculation, the coefficient result of Guttman Split-Half was 0.533. The result showed that it was significant, therefore, the test was claimed to have a good reliability. For further detail about the measurement of the instrument's validity and reliability see in the Appendix 1.

After the data was collected, the validity and reliability of the test, try-out was implemented to 40 students from XI science 2 of SMAN 15 Bandung. The result of the tried out test is presented in Appendix 1.

3.4.2 Pre-Test

The pre-test was given to the experimental and control classes after its validity and reliability has been measured. Pre-test was conducted before the treatment, precisely on the 1st of April for experimental group, and the 3rd of April for control class.

3.4.3 Teaching and Learning Procedures

After the pre-test, the teaching and learning process was conducted to both groups. This was handled by the researcher herself. Due to the limited time, the treatment was conducted based on the schedule presented in the Table 3.3.

Table 3.3

Topic List of Each Meeting

	Date	Sub Topic	Note
	April 1st, 3rd	**Pre-Test**	Given to Experimental and control groups
1st meeting	April 2nd, 4th	Occupation	Given to Experimental and control groups
2nd meeting	April 8th,10th	Technology	Given to Experimental and control groups
3rd meeting	April 22nd, 23rd	Fashion	Given to Experimental and control groups
4th meeting	April 15th, 17th	Weather	Given to Experimental and control groups
5th meeting	April 22nd, 24th	Food	Given to Experimental and control groups
6th meeting	April 23rd, 25th	Culture	Given to Experimental and control groups
	May 1st, 7th	**Post-Test**	Given to Experimental and control groups
	May 9th	Questionnaire Interview	Given to Experimental groups

The cooperative learning technique was used to teach Class XI Science 4 as the experimental group. The experimental group adapted one of the techniques in cooperative learning method, i.e. the Student Team Achievement Division (STAD).

The treatment had been conducted for four weeks in which the teacher presented some reading comprehension assignments. The topics were chosen based on the curriculum. Due to the limited time, there were two meetings in a week. Every meeting took 45 minutes. Overall, the treatment was only conducted in six meetings.

There are four steps in this technique. The first is *Teacher Presentation*. In every meeting, the teacher presented and explained the material, assessed students'

understanding by giving them some questions and preparing answers and explanations to students' problems, then distributing assignment for each group.

The second step is *Team Study*. After explaining the material, the teacher explained the rules of discussion and allowed the students to work with their teams cooperatively about the material that was previously taught by the teacher. Most often, this involved students discussing problems together, comparing answers, and correcting any misconception if teammates made mistakes. During the process, the teacher observed groups, started discussion or checked students' comprehension by asking them random question.

The third step is *Individual Quiz*. After finishing the group discussion, teacher gave a task for each student. Students were not permitted to help one another during the quiz. This individual quiz was given soon after teacher presentation and team study.

The final step is *Team Recognition*. Each group got a team score. Any group which gained the highest team score was awarded a kind of reward. This was done on the following meeting.

The teaching and learning procedure for the control group was carried out by using a conventional way. Teacher explained the materials to the students, assessed their understanding by giving and answering questions. Afterwards, teacher gave a task for each student. Finally, the teacher asked students to study the task, and then they were asked to do the quiz individually which was assigned soon after the teacher's presentation.

3.4.4 Post-Test

Post-test was given to both groups at the end of the treatment in order to find out the result of the whole treatments, to see (if any) the differences between the two groups after the treatment. The test was conducted on May 1st and 7th 2008.
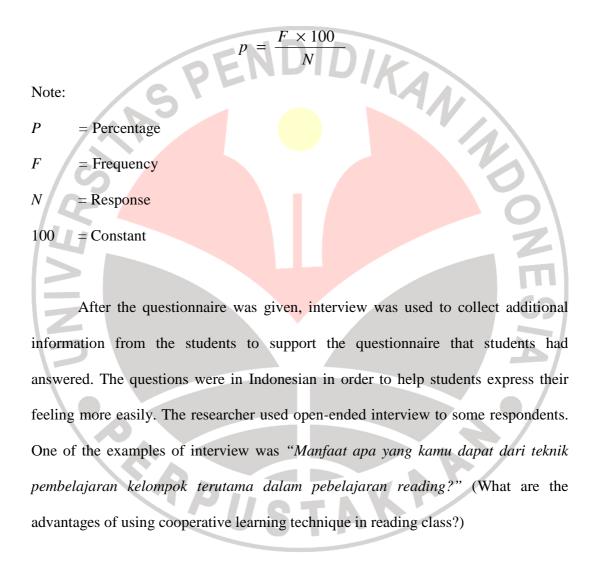
3.4.5 Questionnaires and Interview

Questionnaires were distributed to the experimental class in the end of the treatment to find out students responses about the use of cooperative learning method which in turn will show the technique's strengths and weaknesses. Afterwards, an interview was given to experimental group as well in order to get additional information and to clarify information contained in questionnaires.

The questionnaire consisted of 10 statements. Each statement had five various alternatives options that should be chosen by the students. The researcher used *Likert scale* with typical five-level Likert item format as follows:

a. Strongly disagree (STS: *Sangat Tidak Setuju*)

b. Disagree (TS: *Tidak Setuju*)

c. Undecided/Neither agree nor dissagree (TT: *Tidak Tahu*)

d. Agree (S: *Setuju*)

e. Strongly agree (SS: *Sangat Setuju*)

One of the statements in the questionnaire was "*Saya lebih bersemangat dan termotivasi untuk belajar reading dengan menggunakan pembelajaran kooperatif.*"

(Students find that the use of cooperative learning encourages and motivates them to learn reading comprehension)

The result of questionnaires was put in percentage below.

$$p = \frac{F \times 100}{N}$$

Note:

P   = Percentage

F   = Frequency

N   = Response

100   = Constant

After the questionnaire was given, interview was used to collect additional information from the students to support the questionnaire that students had answered. The questions were in Indonesian in order to help students express their feeling more easily. The researcher used open-ended interview to some respondents. One of the examples of interview was *"Manfaat apa yang kamu dapat dari teknik pembelajaran kelompok terutama dalam pebelajaran reading?"* (What are the advantages of using cooperative learning technique in reading class?)

3.5   Data Analysis

In this stage, the researcher analyzed and interpreted the research findings in order to explain the results of the study. Firstly, data collected from each instrument were identified and classified based on the characteristics of the data.

Data from the pre-test and post-test were measured using t-test in order to determine whether the means of two groups in the pre-test and post-test are significant or not. Data from the post-test were also used to determine how effective cooperative learning technique is in teaching reading by comparing the achievement of the experimental group and control group.

The aim of analysis data was to compare the observed value of the statistic to the critical value. The test included calculating normal distribution, homogeneity of variances and the differences between mean of experimental group and control group.

3.5.1 Normality of Distribution Test

Scores can be examined by t-test only if they are normally distributed. Hi-square formula was used to calculate normal distribution. The following steps are taken as follows:

a. Setting the hypothesis

   Null hypothesis Ho: the scores in both groups are normally distributed

b. Finding the mean X:

$$\overline{X} = \frac{\sum X}{n}$$

c. Finding the standard deviation (SD)

Note:

$$SD = \sqrt{\frac{\sum (X - \overline{X})^2}{n}}$$

SD   : standard deviation

(X-X) : differences between score and mean

N   : the total number of students

d. Finding the range

Range = X highest – X lowest

e. Finding the class interval

K = 1+ 3.3 log n

f. Estimating the length of class interval:

$$P = \frac{R}{K}$$

g. Making a table of observed and expected frequency

- Finding the observed frequency (Oi)

- Finding Z for class limit

Note:

$$Z = \frac{X - X}{SD}.$$

(X-X) : differences between score and mean

SD   : standard deviation

Z   : standard score

- Finding the width of each class interval (l)

- Finding the expected frequency (Ei):

  Ei = 1x n

h. Calculating the chi-square

$$\chi^2 = \sum_{i=1}^{k} \frac{(Oi - Ei)^2}{Ei}$$

i. Testing the hypothesis of normal distribution with the following steps:

  - Looking the hypothesis

    Ho: the distribution of the score is normally distributed

  - Looking at the alpha level p. 0.05

  - Calculating degree of freedom with the formula:

    Df = (K-3), in which K = class interval

  - Comparing the observed and critical statistic at the calculated degrees of freedom (df), if the X^2 observed is less than X^2 table it indicates that null hypothesis is rejected.

3.5.2 The Homogeneity of Variance Test

In analyzing the variance homogeneity of the scores, the researcher used the Levene Test formula in SPSS 13 for window. The analyzing of variance homogeneity follows the steps below:

1. Stating the hypothesis and setting the alpha level at 0.05

   H_0 = the variance of the experimental and control group are homogenous

H_1 = the variance of the experimental and control group are not homogenous

2. Analyzing the variance homogeneity using *Levene* Test formula in SPSS for windows.

3. Comparing the probability with the level significance for testing the hypothesis. If the probability > the level of significance (0.05) the null hypothesis is accepted; variance of the experimental and control group are homogenous.

3.5.3 The Calculation of *t*-test

The steps of the *t*-test calculation are as follows:

1. stating the hypothesis and setting the alpha level at 0.05 (two tailed test)

   H_0 = the two samples are from the same population; there is no significant difference between the two sample ($Xe = Xc$)

   H_1 = the two samples are from the same population; there is a significant difference between the two sample ($Xe \neq Xc$)

2. finding the t value

3. Comparing the probability with the level of significance for testing the hypothesis. If the probability is more than or equal to the level of significance, the null hypothesis is accepted; the two groups are equivalent

   (The calculations were performed in SPPS 13 for window).

Data from questionnaires were calculated in terms of the frequency of students who choose the given items. Combined with the result of the interview, these data revealed the students' responses towards the use of the cooperative learning technique, including its strengths and weaknesses.

In short, the primary data was collected by means of pre-test and post-test, while the secondary data was obtained by way of questionnaires and interviews which served as additional input to find out the strengths and weaknesses of cooperative learning technique. The findings and discussions of the present study are elaborated in the following chapter.