CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology of the conducted study to answer the two questions previously stated in chapter one. It covers research design, data collection, research procedure, and data analysis.

3.2 Research design

The aim of the research was to find out whether or not teaching by using Jigsaw technique is effective in improving students' reading comprehension. Hence, the quantitative method was used because the study needed a statistical analysis in analyzing the acquired data. While experimental research design was used in the study to test the hypothesis served. The study used the framework of quasi-experimental design since it was not feasible to use true experimental design because of some limitations.

Hatch and Farhady (1982:23-24) state that because of some limitations, it is difficult to construct a true experimental design. However, it does not mean that the researcher can abandon the research and let it invalid. We have to reach the goal as closely as possible to meet the standards of true experimental design.

The study involved two classes; the first class was chosen as an experimental group which was given Jigsaw technique treatment while the second class was chosen as a control group which was given conventional or non-Jigsaw technique treatment

Table 3.1.

The Quasi-Experimental Design

Group	Pre-Test	Treatment	Post-Test
Experimental	Xe1	T	Xe1
Control	Xc1	O	Xc2

Xe1 : Students' reading scores of experimental group on pre-test.

Xc1 : Students' reading scores of control group on pre-test.

T : Jigsaw treatments.

O : Non-Jigsaw treatments.

Xe2 : Students' reading scores of experimental group on post-test.

Xc2 : Students' reading scores of control group on post-test.

The table above shows that both classes were given pre-test and post-test, but they receive different treatments. Jigsaw technique as a treatment was only administered in experimental group while the conventional or non-Jigsaw treatment was administered in control group. The purpose was to find out whether the students who were given treatment by Jigsaw technique could achieve a higher score than those of the students who were given conventional or non-Jigsaw technique.

Variables

Independent variable is the major variable which is investigated. It is the variable which is selected, manipulated and measured in this study. Therefore, the independent variable of this study is the use of Jigsaw technique. Meanwhile, dependent variable is the variable which determines to investigate the effect of independent variable, which in this study is students' reading comprehension scores.

The experimental design in the study can be illustrated as:

G1	T1	X	T2
G2	T1		T2

(Hatch and farhady, 1983: 22)

G1: Experimental group

G2: Control group

T1: Pretest

X: Jigsaw technique treatment

T2: posttest

3.3 Research Hypotheses

A hypothesis is formulated to show the effect of two variables' relationship (Arikunto, 2006). There are two hypotheses in this study, the null hypothesis (denoted by H_0) and alternative hypothesis (denoted by H_A). The null hypothesis (H_0) in this study is that there is no significant difference in mean adjustment level between those who used Jigsaw technique and those who did not. Whereas, the alternative hypothesis (H_A) is that there is significant difference in mean adjustment level between those who used Jigsaw technique and those who did not.

Hence, by rejecting the null hypothesis, the study was able to support the correctness of the alternative hypothesis, which means that the experiment worked.

The null hypothesis (H_0) and alternative hypothesis (H_A) are formulated as follows:

$H_0 = \bar{x}_1 = \bar{x}_2$

$H_a = \bar{x}_1 \neq \bar{x}_2$

3.4 Data Collection

The data collection in the study includes population and sample, and research instrument.

3.4.1. Population and Sample

The population of this study was the second grade students of SMP Negeri 1 Cianjur. The selected population then was narrowed into a sample. Sample is a part of the population which will be investigated (Arikunto, 2006). From nine classes, two classes had been chosen to be sample. The classes were labeled into experimental group (VIII-F) consist of 30 students and control group (VIII-A) consist of 30 students. Therefore, the total number of students was 60.

Experimental group and control group were given pretest and posttest. However, treatment was only given to experimental group.

3.4.2. Research Instrument

Reading Test

To gain the data, reading test was used in this research. It was divided into pre-test and post-test

3.4.2.1 Pre-test

A pre-test was implemented in experimental group and control group in order to find the students' reading comprehension before the treatment. Pre-test was also implemented to measure the normality and homogeneity between experimental and control groups. The pre-test items were in the form of multiple choice items which consist of 25 items which have been selected from the pilot test. The reason for using writing test in the form of multiple-choice is because "marking written test is easier then marking oral test – marking the written test take less time and easier to administer" (Harmer, 1987:57).

3.4.2.2 Post-test

The post-test was given to measure students' progress on reading after they received the treatment. The posttest item sheets were given to both groups (Experimental and Control group) at the end of program. The procedure and the items of post-test were similar to the pre-test. The reason is to find out whether or not the students make progress in their reading ability.

Table 3.2

Test item distribution (based on topics)

No	Topics	Item Number
1	Tourism	1-6, 29-32
2	Healthy	7-12, 13-17
3	Friendship	33-40

4	Social problems	18-22
5	Celebration	23-28

3.4.2.3 Questionnaires

Questionnaires consisted of 10 questions list which distributed to experimental class in the end of treatment. It was used to find out students responses about the use of Jigsaw technique. The questionnaires were made to support the result of reading test in pre-test and post-test.

3.5 Research Procedure

Research procedure includes organizing teaching procedure, administering pilot-test, conducting treatment, administering pre-test post-test and interview.

3.5.1 Organizing Teaching Procedure

In conducting the study, the researcher acted as a teacher and a facilitator. The preparation of the study was implemented into two steps. The first step was preparing appropriate materials for teaching and learning process during the treatment, and the second step was organizing teaching procedures in control and experimental group.

Jigsaw technique treatment was given to the experimental group related to the teaching materials and procedures, while control group was given conventional teaching technique and procedures.

3.5.2 Administering Pilot-test

Pilot test is to select good items for the instruments. The test consists of 40 multiple choice items with four options A, B, C, and D. The students are to choose one correct answer from the four options. Each multiple choice item is scored 1. Thus, the total score is 40. Then, the items will be analyzed to check their difficulty level, discrimination index, validity, reliability and practically to ensure that they can be used for pre-test and post-test.

The pilot-test was given to the second grade students who were not the sample. It was given to the students from other class in the same school.

3.5.3 Conducting Treatment

In the process of treatment, two classes of the second grader were chosen and categorized as experimental and control group. The Jigsaw technique treatment was implemented in the experimental group, while conventional teaching strategy was given to control group.

The treatment schedule was set to make the experiment run well. The materials and themes were also set to follow the material schedule of the school. The lesson plans used in the study were divided into two different categories, which were one for experimental class and one for control class.

a. Teaching and learning Process in Experimental Group

   In the experimental group, the writer will implement Jigsaw technique in teaching reading comprehension. The following are the procedures:

   First, teacher divides the students into small groups. Each group consists of three to five students. These groups are called “Home Groups”. Teacher gives a passage consists of some paragraphs to all students in home groups. Then, every student in home group is assigned to choose one paragraph to read and to analyze the main idea

of the paragraph or what the paragraph tells about. After that, students who choose the same paragraph gather and make a new group called “Expert Groups”. In the expert groups, students discuss together the main idea of the paragraph they have chosen. After they discover the main idea of the paragraph, their return to their home groups and explain the main idea of their own paragraph to each other. Teacher has to make sure that all the students in home groups comprehend not only the main idea of their own paragraph but also all the paragraphs given in the passage. When students finish discussion, teacher asks a student in home groups to explain the main idea of any paragraphs given in the passage. To measure students’ comprehension toward the passage, at the end of the session, teacher gives a quiz on material so the students quickly came to realize that these sessions are not just fun and game but really count.

b. Teaching and Learning Process in Control Group

In the control group, the writer will implement conventional or non-Jigsaw technique in teaching reading comprehension. The following are the procedures:

First, every student is given a passage consists of some paragraphs. Then teacher assigns the students to read and summarize the passage individually. After that, teacher asks any of students to present and explain the summary of the passage they have made. To measure students’ comprehension toward the passage, at the end of the session, teacher gives a quiz on material given.

The treatment schedule was set to make the experiment run well. The materials and themes were also set to follow the material schedule of the school. The lesson plans used in the study were divided into two different categories, which were one for experimental class and one for control class.

Table 3.3

Schedule of the treatments

No.	Experimental group (VIII-F)		Control group (VIII-A)	
	Date	Material/theme	Date	Material/theme
1.	May 11, 2010	Pre-test	May 11, 2010	Pre-test
2.	May 11, 2010	Descriptive Text: Bandung Zoo	May 11, 2010	Descriptive Text: Bandung Zoo
3.	May 14, 2010	Descriptive text: My Best friend	May 14, 2010	Descriptive text: My Best friend
4.	May 18, 2010	Recount Text: Visiting The Doctor	May 18, 2010	Recount Text: Visiting The Doctor
5.	May 19, 2010	Report text: Water Pollution	May 19, 2010	Report text: Water Pollution
6.	May 25, 2010	Descriptive Text: My Pen Friends	May 25, 2010	Descriptive Text: My Pen Friends
7.	May 26, 2010	Post-test Questionnaires	May 26, 2010	Post-test

3.5.4 Administering Pre-test and Post-test

Pre-test was administered to measure students' prior reading comprehension. It was given to both experimental and control group. After pre-test was given, several Jigsaw technique treatments were given to only the experimental group, while conventional treatments were given to the control group. In the end, post-test was held to investigate the effectiveness of the Jigsaw technique treatment in teaching reading.

3.6 Data Analysis

Data analysis includes scoring technique, data analysis on pilot-test, data analysis on pre-test post-test, and data analysis on the interview.

3.6.1 Scoring Technique

The test used in this study was multiple choice tests. According to Arikunto (2007), two types of formulas can be used to process the multiple-choice item data; the formula with or without punishment. This study used the formula with punishment. The formula is stated as follows:

$$S=R$$

In which, S is score; and R is right answer.

3.6.2 Data Analysis on Pilot-test

The instrument used in the study was pre test and post test which was aimed to measure the students' ability in reading comprehension. Before applying the instrument to experimental and control group, the value of its validity and reliability was sought. Therefore, pilot test was administered. 40 items of multiple choices were tested to the students who were not the sample of the study.

Moreover, difficulty (item facility) and discrimination test of the instrument were also analyzed to discriminate between the higher ability test takers and the lower ability test takers. This test must be done to see the relevance of the test item with the population. Below is the analysis of the instrument.

3.6.2.1 Validity Test

Validity refers to the appropriateness, meaningfulness, and usefulness of the inferences a researcher makes (Fraenkel & Wallen, 1990). It is stated as the best available approximation to the truth or falsity of a given inference, proposition, or conclusion. In short, it is the accuracy of a measurement. Therefore, validity test was measured to support any inferences that the writer made based on the data gained using particular instrument.

Pearson product moment correlation was used to analyze the validity of each item. The result of the pre-test was calculated using SPSS 17 for windows. The criteria that determine the degree of the item validity are shown below:

Table 3.4

r Coefficient Correlation (Validity)

Raw Score	Interpretation
0.8 – 1.0	Very High
0.6 – 0.8	High
0.4 – 0.6	Moderate
0.2 – 0.4	Low
0.0 – 0.2	Very Low

(Arikunto, 2002)

3.6.2.2 Difficulty Level

Difficulty level (item facility) was defined as the proportion of the test takers who answer the correct item (Fulcher, 2007; cf. Aprian, 2009). Difficulty level test was used to measure whether the item is relevant with the students' (in this case, the test takers) ability level or not.

In addition, the difficulty level should not be too easy or too difficult either. Therefore, items with facility value around 0.500 were considered to be ideal, with an acceptable range being from around 0.250 to 0.750 (Fulcher, 2007).

3.6.2.3Discrimination

The ability to discriminate is important in an approach to scoring because getting correct answer is directly related to more ability in question and getting wrong answer is directly related to less ability in question (Fulcher, 2007).

We are able to discriminate between higher ability and lower ability test takers from responses to individual. Point biserial correlation is commonly used in calculating the discrimination item. The test item can be manually calculated by using the following formula:

$$r_{pbi} = \frac{x_p - x_q}{s_x}\sqrt{pq}$$

(Fulcher, 2007)

Where:

r_{pbi} = point biserial correlation

X_p = mean score on the test for those who answer the correct item

X_q = mean score on the test for those who answer incorrect item

S_x = Standard deviation of test scores

3.6.2.4 Reliability Test

In a research study, reliability test also plays an important part in gathering the data. According to Fraenkel and Wallen (1990), reliability refers to the consistency of scores or answers from one administration of an instrument to another, and from one set of items to another. A measure was considered reliable if the students' scores on the same test given twice were similar.

Therefore, to measure the reliability of the item, internal consistency method was used in the study. To facilitate internal consistency method, Cronbach's Alpha formula was used in this study.

3.6.3 Data Analysis on Pre-test and Post-test

After the pre-test on control and experimental group were held, the next step was analyzing the output data. The output data were analyzed using independent t-test to determine whether there is a significant difference between the means of two independent samples (Fraenkel and Wallen, 1990). Before performing the independent t-test, the output data of the pre-test should fulfill the criteria underlying t-test as stated in Coolidge (2000) as follows:

1. The participant must be different in each group
2. The data should have a normal distribution
3. The variance of the two groups must be homogenous

For that reason, homogeneity of variances test and normal distribution test were performed before calculating the data using t-test formula.

3.6.3.1 Homogeneity of variance test

In analyzing the homogeneity of variances of the scores, Levene's test formula was used in this study. Levene's test tested the hypothesis that the variances in the groups are equal; or the difference between variances is zero. The test was performed using statistic software SPSS 17 for windows.

From the SPSS data output we can see that if the significance value is more than the level of significance (0.05), the null hypothesis is accepted, the variance of control group and experimental group are homogenous. On the other hand, if the significance value is less than the level of significance (0.05), the null hypothesis is rejected, the variance of control and experimental group are not homogenous.

3.6.3.2 Normal distribution test

To analyze the distribution of the score, Kolmogrov-Smirnov formula was used in this study. Kolmogrov-Smirnov compared the scores in the sample to a normally distributed set of scores with the same mean and standard deviation (Field, 2005). The Kolmogrov-Smirnov test was performed by using SPSS 17 for windows.

The table of the data output from the SPSS 17 computation was simply concluded as: if the test is non-significant (column labeled sig. > .05) it tells us that the distribution of the sample is not significantly different from normal distribution (probably normal). If, however, the test is significant (column labeled sig. < .05) then the distribution is significantly different from normal distribution (Field, 2005).

3.6.3.3 The independent t-test

Independent group t-test is used to analyze a causative relationship between the independent variable (treatment) and the dependent variable that is measured on both groups (Coolidge, 2000).

Therefore, after the data had been proven as a normal distribution, the data were calculated using independent t-test. The independent t-test was analyzed using SPSS 17 for windows by comparing the significance value with the level of significance to test the hypothesis. If the significance value is more than or equal to the level of significance (0.05), the null hypothesis is retained, and it will be concluded that there is no significance difference between the two means. On the other hand, if the significance value is less than the level of significance (0.05), the null hypothesis is rejected, and it will be concluded that the mean is significantly different from the other mean.

3.6.3.4 The dependent t-test

Dependent t-test was used to analyze the difference between two groups' means in experimental design where the participants in both groups are related each other in some way (Coolidge, 2000). In line with this, Hatch and Farhady (1982: 114) state that dependent t-test or matched t-test is used to analyze the pretest and posttest score and to investigate whether or not the difference of pretest and posttest means of each group are significant.

In the study, the dependent sample test was analyzed using SPSS 17 by comparing the significance value with the level of significance to test the hypothesis. If the significance value is more than the level of significance (0.05), the null hypothesis is retained, and it will be concluded that there is no significance difference between two means. On the other hand, if the

significance value is less than the level of significance (0.05), the null hypothesis is rejected, and it will be concluded that the mean is significantly different from the other mean.

3.6.3.5 The calculation of effect size

The effect size refers to the effect of the influence of independent variable upon the dependent variable (Coolidge, 2000: 151). The calculation of effect size was conducted to measure how well the treatment works. For instance, if the difference between the two groups' means is large, then there is said to be a large effect size; if the difference between the two groups' means is small, then there is said to be a small effect size.

In order to determine the effect size in the independent t-test, a correlation coefficient of effect size can be derived as follows:

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

Where:

r = effect size

t = t_{obt} or t-value from the calculation of independent t-test

df = $N_1 + N_2 - 2$

To interpret the computational result, the following scale was used as guidance in determining the effect size on the dependent variable.

Table 3.5

The effect size scale

Effect size	*r* value
Small	0.100
Medium	0.243
Large	0.371

(*adapted from Coolidge, 2000)*

3.6.4 Data Analysis on Questionnaires

In analyzing the data of the questionnaires, the answers of the students on the questionnaires were categorized into three major findings which were related to the students' responses of using Jigsaw technique, the advantages of Jigsaw technique, and the disadvantages of Jigsaw technique. Then, the three major points were also elaborated based on students' answers of the questionnaires.

In the end, interpreting the data to reveal the points which have been categorized. The findings of students' answers on the questionnaires were calculated and depicted in the charts.

The data gained from questionnaires are calculated using percentage scale formula. The formula is as follows:

$$P = \frac{fo}{n} \times 100\%$$

P = Percentage

Fo = Frequency of observed

N = number of samples

In analyzing the data from questionnaires, the number of samples or respondents choosing the option ‘yes’ and ‘no’ are counted. The option ‘yes’ counted 1 and the option ‘no’ counted 0. After calculating the percentage of respondents, the result is determined in order to find out the students’ response towards the use of Jigsaw technique by using the percentage criterion as follows:

Table 3.6

Criterion of Students’ Response

No	Percentage (%)	Criterion
1	0	None
2	1 – 25	Small number of
3	26 – 49	Nearly half of
4	50	Half of
5	51 – 75	More than half of
6	76 – 99	Almost all of
7	100	All of

(Kuntjaraningrat in Yuliani, 2003)