

CHAPTER III

RESEARCH METHODOLOGY

Introduction

This chapter provides a discussion of the methodology employed in conducting the research. The description and account below involve: research design, research variables, research hypothesis, data collection, research procedure and data analysis.

3.1 Research Design

The research conducted quasi-experimental as the research design. The quasi-experimental design was used because this method does not require random sampling (Jackson, 2008:318). This research method provide the students with pre-test, treatment, and post test to find out the effect of Jigsaw technique on the student's reading comprehension. Since there was no random sampling, the sample in this research is considered as nonequivalent sample which consisted of Experimental and Control group (Jackson, 2008: 323).

In this research, two classes were taken as the sample classes; those were labeled as the experimental group and control group. The first group (e1) as the experimental group was given a pre-test (X1), treated by using Jigsaw technique (T), and then provided a post-test (X2). The second group (c1) as the control group was given a pre-test (X1), treated by using conventional teaching (O) and a

post-test (X2) (Hatch and Farhady 1982:21),. Here is the representation of the design:

Table 3.1

The Quasi-Experimental Design

Group	Pre-test	Treatment	Post-test
Experimental	Xe 1	T	Xe 2
Control	Xc 1	O	Xc 2

Xe 1 : Students' reading scores of experimental group on pre-test
 Xc 1 : Students' reading scores of control group on pre-test
 T : Jigsaw treatment
 O : Non- Jigsaw treatment
 Xe 2 : Students' reading scores of experimental group on post-test
 Xc 2 : Students' reading scores of control group on post-test
 (Hatch and Farhady, 1982:21)

The table shows that both classes are given a pre-test and a post-test, but the difference is in giving the treatments. In the experimental group, Jigsaw technique was given as a treatment to the students in the learning process. In contrast, for the control group, conventional teaching was implemented as the treatment in learning to read. After both treatments were applied to both groups, a post-test was administered in order to investigate the result of the treatment.

3.1.1 Research Variables

According to Khan (1990:18), variable is a concept which serves a particular purpose and can be expressed in quantitative or qualitative value. There were three variables in this research. Those variables were independent variable, dependent variable and extraneous variable.

The independent variable is the prominent method which is manipulated and measured by a researcher. The dependent variable is students' scores that are observed and measured to determine the effect of independent variable (Sukardi, 2008:179). There is also another type of variable called extraneous variable. Extraneous variable is other conditions outside independent variable that is responsible for the effect on dependent variable.

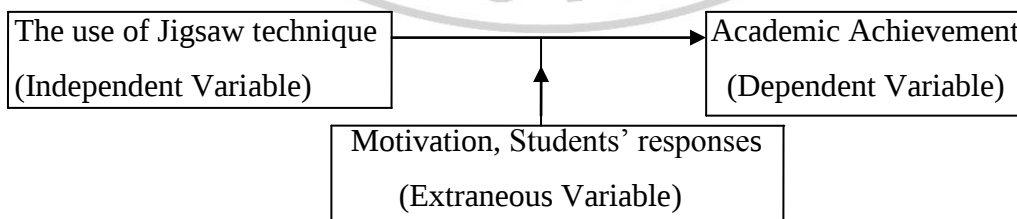
In this study, the students' reading skill was measured with the test to determine the effect of using Jigsaw technique to the students' scores, and also to figure out if there is any other condition that effects students' achievement. Therefore, in accordance with Khan's and Sukardi's statements, the three variables are categorized as follow:

1. Dependent variable: students' reading scores or achievement in the test
2. Independent variable: the effect of using Jigsaw technique in improving students' reading comprehension
3. Extraneous variable: students' responses toward the use of Jigsaw technique

The situation is further explained in the diagram below.

Figure 3.1

Variables



(Khan, 1990:19)

3.2 Research Hypothesis

Basically this research began with null hypothesis (H_0). The hypothesis is stated as follow:

$H_0: \mu_{\text{experimental}} = \mu_{\text{control}}$

The null hypothesis (H_0) means that there is no difference between the experimental group and the control group in the mean of adjustment level (Kranzler and Moursund, 1999).

3.3 Data Collection

The data collection in this study included population, sample, and research instruments.

3.3.1 Population

According to Borg and Gall (1979: 179), population is all members of a real or hypothetical set of people or object to which we wish to generalize the result of the research. It is supported by Arikunto (2002) who stated that population is the whole subject of the research. The population of the research was the second grade of a junior high school in Bandung.

3.3.2 Sample

A sample is a part or a representation of the whole population that is investigated in the research. A sample should reflect the characteristics of the

selected population (Kahn, 1990:27). The two chosen classes involved in the research have relatively the same characteristics.

In accordance with the research design, the two classes were divided into the experimental group and control group (VIII-8 as experimental class and VIII-9 as control class). Both classes consisted of 42 students.

3.3.3 Research Instruments

In this research, observations and a pre-test were used to gain the information about the prior reading proficiency of the students from both groups. Then a post-test and a set of questionnaire were distributed to obtain more information about the students' responses toward the use of Jigsaw technique in improving their reading comprehension. All research instruments were also meant to investigate the effectiveness of using Jigsaw technique in term of improving students' reading comprehension.

a. Pre-test

A pre-test was conducted to find out initial differences between the experimental and control groups' levels in reading skill before receiving the treatment. The pre-test was held in both control and experimental classes. The students had 50 minutes to finish the test consisting of 26 multiple-choice questions.

b. Post-test

A post-test was conducted to find out the students' progress in reading comprehension. The post-test procedure was similar to the pre-test procedure.

The post-test was held in both control and experimental classes. The students had 50 minutes to finish the test which consists of 26 multiple choice questions.

c. Observation

Observations were conducted to collect the data about the teacher and students' performances during the teaching and learning process. This study used the focused observation method. This method was chosen because it could refine the judgment about both the teacher and students' activity (Hopkins, 1993). The observations were conducted during the treatments applied to the experimental group.

d. Questionnaire

The questionnaire consisted of ten questions. The questionnaire was aimed to gather more information about the students' responses towards the use of Jigsaw technique based on the students' point of view. The questionnaire was only distributed to the experimental group. The students' answers were collected to find out the students' perception towards the use of Jigsaw technique. The questions were related to the topic and research questions. These questions illustrated the students' responses when they were using Jigsaw technique to improve their reading comprehension.

3.4 Research Procedure

3.4.1. Materials

The texts used for teaching and learning process during the experimental period were taken from English in Focus (2008) and English on Sky 2 (2007). The materials consisted of narrative texts and questions. The narrative texts were chosen as requirements from the school where the research was held.

3.4.2. Organizing teaching procedure

A teacher is responsible for the teaching and learning process, not only as a performer but also a facilitator. First, the appropriate materials should be chosen and prepared well. Second, teaching procedures were organized in the control and experimental groups. They were written differently in both lesson plans for experimental and control groups. Both lesson plans have different procedures. The lesson plans for control group used conventional procedure. The lesson plans for experimental group employed Jigsaw procedure which was adapted from Slavin (2005). The further detail of the procedure is presented in the following table.

Table 3.2
Lesson Plan of Control and Experimental Groups

Description	Lesson Plan of Experimental Group	Lesson Plan of Control Group
Objectives	- Students are able to identify explicit information from the text - Students are able to identify implicit information from the text - Students are able to identify main idea from the text - Students are able to identify reference words from the text	- Students are able to identify explicit information from the text - Students are able to identify implicit information from the text - Students are able to identify main idea from the text - Students are able to identify reference words from the text
Materials	Some Sample of Narrative Text	Some Sample of Narrative Text
Procedure		
Pre activity	- Greetings and praying - Checking attendance list - Brainstorming and apperception	- Greetings and praying - Checking attendance list - Brainstorming and apperception
Main activity	- Teacher asks the students to form "home group" consist of 4-5 students - Teacher gives a text - Teacher gives explanation about narrative text - Teacher gives explanation about part of narrative text - Teacher asks questions to students about the text - Teacher gives explanation about Jigsaw technique - Teacher gives second text to the students - Teacher asks every member of "home group" to choose a paragraph from the text. - Teacher asks students who choose the same paragraph to gather and form "expert group" consist of 4-5 students. - Students of "expert group" make a discussion in order to find out some information from the paragraph - Students return to the "home group" - Students discuss about what they get	- Teacher gives a text - Teacher gives explanation about narrative text - Teacher gives explanation about part of narrative text - Teacher ask questions to students about the text - Teacher gives explanation about how to find information - Teacher gives second text to the students - Students read the second text - Students answer questions from the text - Teacher gives explanation about the text

	from the discussion in each “expert group” - Teacher asks every group to present the result of their discussion in the “home group” - Students answer questions based on the text	
Post activity	- Teacher and students conclude what they have learnt today - Students are given opportunity to ask questions - Teacher gives homework to students - Closing and Praying	- Teacher and students conclude what they have learnt today - Students are given opportunity to ask questions - Teacher gives homework to students - Closing and Praying

3.4.3. Instrument try out

Instrument try out was held before the pre-test and post-test were administered to the two chosen classes. The purpose is to measure the validity and reliability of the instrument. The try out was administered in another class which was not involved during the research process.

3.4.4. Pre-test

The pre-test instrument consisted of 26 questions. The test was administered to both the experimental and control groups during the school hours.

3.4.5. Treatments

The control and the experimental groups got different treatments. The control group was treated using conventional teaching while Jigsaw technique was implemented in the experimental group. Two types of lesson plans were used in this research; the first was used for the experimental group and second one was for the control group.

Four meetings were conducted for both groups. The duration for each meeting was 80 minutes; each meeting consisted of pre-activity, main activity and post-activity (see Table 3.2). The details are explained below.

The first meeting was conducted on May 16th, 2011. Before the giving the explanation about the material, the students were given two passages in this meeting. The first passage was entitled *Takatuliang the Woodcarver* and the second was *The Story of Sangkuriang and Tangkuban Perahu*.

The second meeting was carried out on May 19th, 2011 for the control group and May 20th 2011 for the experimental group. The students were given two passages in this meeting. The first one was entitled *The Cowardly Lion* and the second was *Red Feather the Hen*.

The third meeting was carried out on May 23rd, 2011 for both groups. As the first meetings, the students were given two passages. the first was entitled *Little brother, little sister* and the second was *Beauty and the Beast*.

The fourth meeting was conducted on May 26th, 2011 for the control group and May 27th, 2011 for the experimental group, these were the last meeting. Unlike the other meetings, in this meeting the students were only given one passage. The title of the passage was *The deathly Poppy Fields*. After finishing the activity, the teacher reviewed the whole materials. In this activity, teacher asked the students about what was not clear yet about the materials.

3.4.6. Post-test

At the end of the treatments, the post test was conducted. This test was given to both groups (control and experimental groups) to find out the improvements of their reading skill after the experimental group received the treatments. The test was administered to both groups on May30th, 2011.

3.5 Data Analysis

Data analysis in the research includes scoring technique, data analysis on the instrument try out, data analysis on the pre-test and post-test, data analysis on the questioners, and data analysis on the observation.

3.5.1 Scoring

According to Arikunto (2003), there are two types of formula that can be used in the process of scoring and data. They are formula with punishment and formula with no punishment. The formula with no punishment was used in this study. It means that there are no minus score when the students choose the wrong answer.

$$S = R$$

In which:

S: Score

R: Right Answer

3.5.2 Data analysis on instrument try out

3.5.2.1 Validity

The try out item should be tested to measure its validity and reliability before conducting pre-test and post-test (Brown, 1988). This study used the Pearson's product moment formula to test the instrument. A software was employed in the process of calculation. The software's name is Anatest V 4. The criteria of validity were shown in Table 3.3:

Table 3.3
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)

The following formula is used to measure the validity of the instrument.

$$r_{xy} = \frac{n \sum (XY) - (\sum X)(\sum Y)}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}}$$

Where : r = correlation coefficient

X = item score

Y= total score

n= number of subject

(Arikunto, 2003)

Validity test was intended to find out whether or not the test instrument was appropriate to use in this study. The data gathered from the try-out test were

analyzed using corrected item total correlation in Anatest V.4 for windows. The result of the statistical computation on the try out test is presented in the following table.

Table 3.4
The Result of Validity Test

Item Number	Raw Score	Interpretation
3, 5, 11, 12, 17, 19, 21, 23, 25, 27, 37, 38, 39, 40	0.000 – 0.200	Very Low
1, 2, 6, 9, 14, 15, 16, 20, 22, 26, 30, 31	0.200 – 0.400	Low
7, 8, 10, 13, 18, 24, 28, 29, 32, 33, 34, 35, 36	0.400 – 0.600	Moderate
4	0.600 – 0.800	High
-	0.800 – 1.000	Very High

Based on Table 3.4 above, 26 items were valid and could be used as research instrument. While 14 items were not valid and could not be used as the research instrument. The detail validity score and analysis are presented in Appendix C.

3.5.2.2 Difficulty Level

The research adopted Heaton's Formula (1995: 178), Heaton states that the index of difficulty or facility value of an item illustrates how easy or difficult the certain item established in the test. In addition, the following formula was used to calculate the index of difficulty of an item.

$$FV = \frac{R}{N}$$

FV = Facility/ Index of difficulty
R = The number of correct answers

N = The number of students taking the test

Table 3.5
Criteria of difficulty Index

Index of Difficulty	Difficulty Degree
0.00 – 0.30	Difficult item
0.30 -0.70	Moderate item
0.70 – 1.00	Easy item

(Heaton, 1955: 178)

According to the category above, the items in the try out instruments are categorized as follow.

Table 3.6
The Result of Difficulty Test

Item Number	Interpretation
25, 37, 39, 40	Difficult Item
3, 6, 8, 9, 12, 14, 16, 17, 21, 23, 26, 27, 28, 29, 33, 34, 38	Moderate Item
1, 2, 4, 5, 7, 10, 11, 13, 15, 18, 19, 20, 22, 24, 30, 31, 32, 35, 36	Easy Item

Table 3.6 shows that four items were considered as difficult. Meanwhile 17 items were considered as moderate. The rest of the 19 items were categorized easy. Because the items taken as the instrument was only 26, the instrument consists of 9 moderate items, and 17 easy items. The category of the instruments is presented as follows

3.5.2.3 Discrimination

The discrimination index of an item indicates the extent to which the item distinguishes between the tests, separating the more able tests from the less able (Heaton, 1995:179).

The present study are able to find the discrimination index by following the procedures.

1. Arranging the students' total scores and dividing the scores into two groups of equal size (the top half and the bottom half);
2. Counting the number of the students in the upper group who answer each item correctly, then counting the number of lower group students who answer the item correctly;
3. Subtracting the number of correct answer in the upper group to find the difference in the proportion passing in the upper group and the proportion passing the lower group; and
4. Dividing the difference by the total number of the students in one group

The following formula is used to calculate the discrimination index of an item:

$$D = \frac{\text{Correct U} - \text{Correct L}}{n}$$

Where:

D = Discrimination Index

U = Upper half

L = Lower half

n = Number of students in one group; $n = \frac{1}{2} N$

The criteria of discrimination index were shown in Table 3.7

Table 3.7
Criteria of Discrimination Index

Discrimination Index	Interpretation
00.00 – 0.20	Poor
0.20 – 0.40	Moderate
0.40 – 0.70	Good
0.70 – 1.00	Excellent

(Heaton, 1995: 179)

The result of the statistical computation on the try out test is presented in the following table.

Table 3.8
Discrimination Index

Item Number	Interpretation	Discrimination Index
28, 29	Excellent	Acceptable
2, 6, 10, 33, 34	Good	Acceptable
1, 4, 5, 7, 8, 9, 12, 13, 14, 15, 16, 18, 20, 22, 23, 24, 26, 35, 36, 38	Moderate	Acceptable
3, 11, 17, 19, 21, 25, 27, 30, 31, 32, 37, 39, 40	Poor	Non Acceptable

From the result of Table 3.8, It shows that 27 items were accepted and could be used as the research instrument, and 13 items were not accepted to be used as research instrument because the value were not ideal.

3.5.2.4 Reliability

Hatch and Farhady (1982) stated that reliability is the extent which a test is produced in constant result when administered under similar condition. Another statement comes from Arikunto (2002), an instrument is regarded as reliable if it is reliable to collect the data required. To find out the reliability of the test items, the present study used internal consistency method which is facilitated by Cronbach's Alpha formula.

The result of the calculation was interpreted by the following criteria in Table 3.9 below.

Table 3.9
r Coefficient Correlation

Alpha	Reliability degree
0.00 – 0.199	Very low
0.20 – 0.399	Low
0.40 – 0.599	Fair
0.60 – 0.799	High
0.80 – 1.00	Very high

(Sugiono, 2001:149)

The following formula was used to measure the reliability of the instrument.

$$r_{11} = \left[\frac{k}{k-1} \right] \left[1 - \frac{\sum \sigma_b^2}{\sigma_1^2} \right]$$

Where:

r_{11} =Instrument Reliability

k = number of item

$\sum \sigma_b^2$ = number of item's variance

σ_1^2 =total of variance

The result of computation of reliability test shows that the reliability of the items from Cronbach's Alpha calculation is 0.820 with the total items 40 (see Appendix C). According to Triton (2006:248) if the level of Alpha is in between 0.800 – 1.000, it can be assumed that the reliability of test items was very high and could be used as the research instrument.

3.5.3 Data analysis on pre-test and post-test.

Pre-test was administered at the beginning of the experiment in order to obtain the initial equivalence between the groups. To determine the equivalence of the experimental and control groups, this study used t-test.

Post-test was given at the end of the experiment, and t-test was also used to find out whether the hypothesis (null hypothesis) was rejected or accepted. If the null hypothesis was accepted, it means that there was no difference between the experimental and control groups after implementing Jigsaw technique.

3.5.3.1. Testing the normal distribution

In the research, the present study used Kolmogorov-Smirnov's formula to analyze the normal distribution. The table data output from SPSS 17.00 for windows. The following formula was used to calculate the Normal distribution of the data:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{\frac{-(x-\mu)^2}{2\sigma^2}}$$

Where:

μ = mean of x

σ = Standard deviation of x

π = 3.14159

e = 2.71828

These steps were taken to test the normal distribution:

1. Looking at the hypothesis

Ho= The distribution of the scores are normally distributed

H1= The distribution of the scores are not normally distributed

2. Analyzing the normal distribution by using Kolmogorov-smirnov formula in SPSS 17.0 for windows

3. Comparing the level of significance to test hypothesis. If the result is more than the level of significance (0.05), the null hypothesis is accepted, the score are normally distributed.

3.5.3.2 The variance homogeneity

In analyzing the variance homogeneity, the present study used Levene's formula in SPSS 17.00. These are the steps taken to test variance homogeneity:

1. Stating the hypothesis

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

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

2. Analyzing the variance homogeneity using SPSS 17.0 for windows
3. Comparing the level of significance value to test hypothesis. If Levene's test is significant at $p \leq 0.05$, it means that the null hypothesis is incorrect and the variances are significantly difference. But, if Levene's is non significant at $p > 0.05$. it means that the variance is approximately equal (Field, 2002).

3.5.3.3 The independent t-test

The primary purpose of t-test is to determine whether the means of the two groups' scores are different from a statistically significant degree as stated by Kranzel and Moursound (1999:89). There are some requirements of the data which must be considered before conducting t-test. First, the data should be measured in form of interval or ratio. Second, the data should be homogeneous or

formed in the same type. Third, the data should have a normal distribution (Coolidge, 2000: 143).

The procedures of t-test computation were as follow:

1. Stating the hypothesis

Ho= there is no difference between the pre-test and post-test means for the experimental group and control group.

H1= there is significance difference between the pre-test and post-test mean for the experimental group and for the control group.

2. Finding the t value with independent sample test computation in SPSS 17.00 for windows

3. Comparing the significance value with the level of significance for testing hypothesis. If the significance value is less than the level of significance (0.05), the null hypothesis is accepted. It means that the two groups are equivalent.

3.5.3.4 The dependent t-test

The pre-test and post-test scores were analyzed by using dependent t-test to investigate whether or not the pre-test and post-test scores of the experimental group was significantly different (Hatch & Farhady, 1982: 114). These are the procedures taken in dependent t-test:

1. Stating the hypothesis

Ho= there is no significant difference between the pre-test and post-test score

H1= there is significance difference between the pre-test and post-test score.

2. Finding the value with dependent sample test computation in SPSS 17.00 for windows.
3. Comparing the level of significance from the calculation of dependent t-test with the level of significance for testing the hypothesis. If the probability is more than or equal than the level of significance, the null hypothesis is accepted. But if the probability is less the level of significance, the null hypothesis is rejected.

3.5.3.5 The calculation of effect size

In the research, to verify the influence of independent variable to the dependent variable and to know how well the treatment works, the calculation of size effect was employed. In order to determine the effect size in the independent t-test, a correlation coefficient of effect size can be derived as presented below:

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

Where:

r= Effect size

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

df= $N_1 + N_2 - 2$

(Rosenthal, 1991:19)

After obtaining the value of r, the score was matched with the following scale to interpret the effect size.

Table 3.10
Effect Size Value

Effect Size	r value
Small	0.100
Medium	0. 243

Large	0.371
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(Coolidge, 2000: 151)

3.5.4 Data analysis of questionnaires

Data from the questionnaire were calculated with the frequency of the students who answered the questions given. These data revealed the use of Jigsaw technique in improving students' reading comprehension. The results of questionnaires were calculated using the formula below:

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

In which:

P = percentage

f_o = frequency of observed

n = number of samples

In analyzing the questionnaire, the number of sample or respondents answering "yes" and "no" were counted. The "yes" was counted as one and the "no" was counted as zero. After that, the result was shown in order to find out the students' responses toward the use of Jigsaw technique in improving students' reading comprehension by using the percentages as follows.

Table 3.11
Criterion on Students' Response

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

(Sudjana, 1984)

3.5.5 Data analysis of observation

Data from the observation were collected using checklist tables and each category from the table was described briefly. There are two tables which were used to collect the data. The first table was to record the teacher's activities during the treatments. The second table was to record the students' activities during the treatments. The format of the tables which were used to present the findings of the data are as follow.

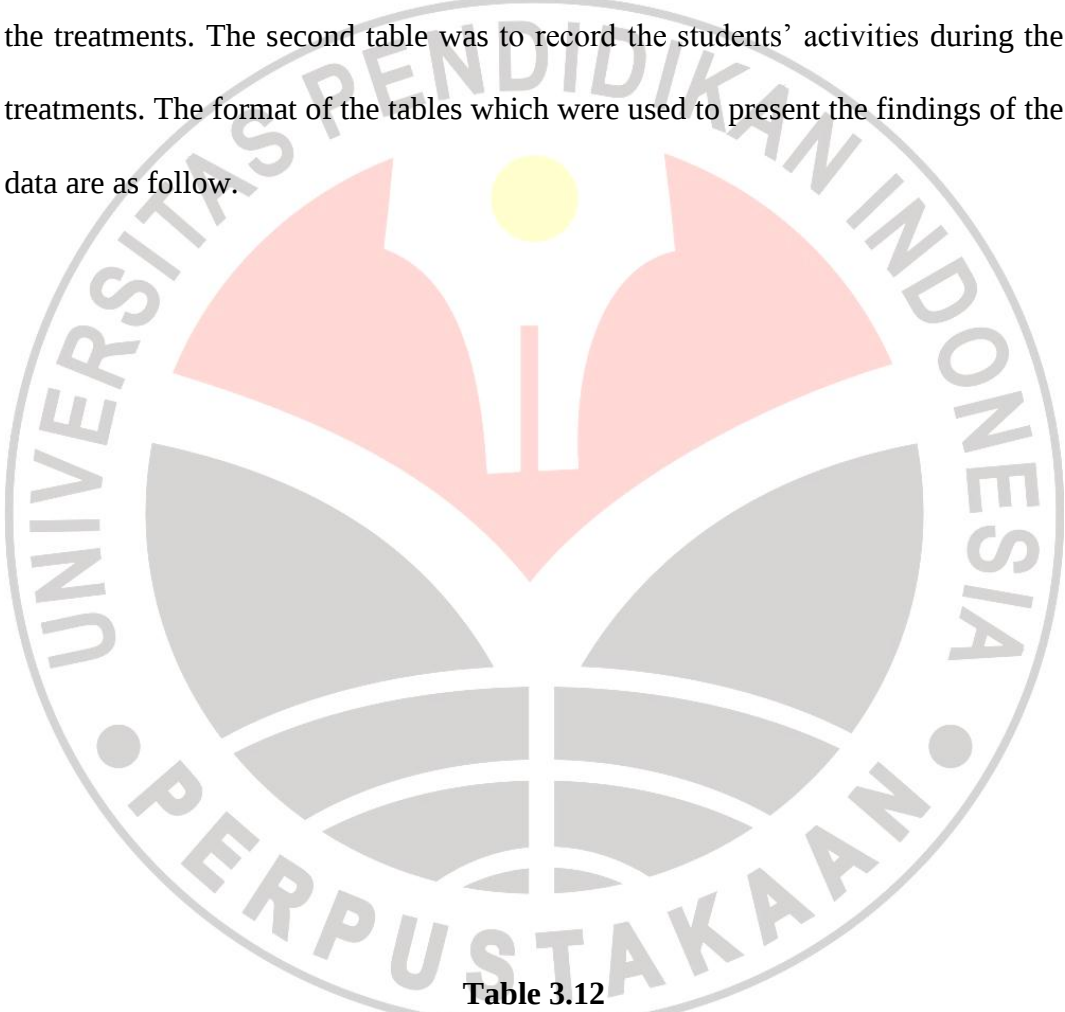


Table 3.12
Checklist Table for the Teacher's Activity

	1 st Meeting	2 nd Meeting	3 rd Meeting	4 th Meeting
Explain the material				
Explain the Jigsaw procedure				
Devide students into "home group				
Assign each students to pick one paragraph				

Ask student to form expert group					
Respond to students' question					
Bring the students back to the home group					
Maintaining class control	Observe the process				
	Found disruptive students				
	Reprimand the students				
	Attempt to find dominative students				
Give question about the text					

Adapted from Hopkins (1993:40)

Table 3.13

Checklist Table for the Students' Activity

	1 st Meeting	2 nd Meeting	3 rd Meeting	4 th Meeting
Get explanation about Jigsaw procedure				
Form the "home group"				
Form the "expert group"				
Make a discussion in expert group				
Return to the "home group"				
Make a discussion in "home group"				
Answer the questions about the text				

Adapted from Hopkins (1993:40)