

CHAPTER III

METHODOLOGY OF THE RESEARCH

This chapter presents the research methodology which has been briefly introduced in chapter one. This chapter covers research methods, population and sample, research procedures, research instruments, data collections, teaching and learning procedures, and techniques for analyzing the data.

3.1 Research Method

The research used an experimental research as the research method, in which the writer gave certain treatment to the experimental class to find whether or not there were significant changes of students' reading achievement after being treated by jigsaw technique.

3.1.1 Research Design

The research design for this experimental research is the quasi-experimental design. Quasi experimental design is used as one of the best research approaches in the research since it aims practically to compare true experimentation and the nature of human language behaviour which the researcher wish to investigate (Hatch and Farhady, 1982:24). The pretest-posttest design is used as the subset of quasi experimental design with the following formula:

Table 3.1

Experimental Design

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

(Hatch, E and Farhady, H, 1982:21)

Notes:

X1e : students' reading achievement of experimental group pre-test.

X1c : students' reading achievement of control group pre-test.

X2e : students' reading achievement of experimental group post-test.

X2c : students' reading achievement of control group post-test.

T : treatment using Jigsaw technique.

Two classes were taken as the investigated classes. One class was for an experimental group that was treated by using Jigsaw technique, while the other class was for a control group that was treated by using a conventional method.

3.1.2 Variables

Variable is any entity that can take on different values (Hadi, 1994). There were two variables in the present study: independent and dependent variable. 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 achievement scores.

3.2 Research Hypothesis

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 was no significant difference in mean adjustment level between those who use Jigsaw technique and those who did not. Whereas, the alternative hypothesis (H_a) is that there was 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 :

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

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

3.3 Data Collection

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

3.3.1 Population and Sample

Population is an entire group of people, objects or events which all have at least one characteristic in common, and must be defined in a special and unambiguously (Sudjana, 1983). The population of this research was the second grade students of one public senior high school in Cimahi since Exposition text was taught in this grade.

Sample is a part of the population which will be investigated (Arikunto, 2006). From nine classes, two classes had been chosen as the sample. The classes were labeled into experimental group (XI-IPA1) consisting of 30 students and control group (XI-IPA2) consisting 30 students. Therefore, the total number of students is 60 students. XI-IPA1 and XI-IPA2 were involved in this study because these two classes were available to be served as research subject.

The experimental and control groups were given the pre-test and post-test. However, the treatment was only given to experimental group.

3.3.2 Research Instruments

This study employed some particular instruments to gain data to be analyzed. The instruments used in this research were: teaching materials, pre-test and post-test questions and questionnaire. The instruments used are presented below.

3.3.2.1 Teaching Materials

The teaching materials given to the students were taken from a couple of English textbooks, they were *Interlanguage: English for Senior High School Students XI* and *Developing English Competencies for Senior High School Grade XI*. Those books were published in 2008 by *Pusat Perbukuan Departemen Pendidikan Nasional*. The books were chosen because they were used in the school where this research was held, which is SMAN 3 Cimahi.

The materials included some exposition texts about raising issues in daily life, such as: environments, home schooling, and public transportation. The materials taken were in line with the Competence Standard number five released by the Nation Education Ministry of Grade XI Senior High School. It is stated that students are expected to comprehend short functional text and essay in report, narrative, and analytical exposition text in daily context and to access knowledges.

The materials taught in experimental and control groups were the same but they were taught with different techniques. The first topic was 'Home Schooling'. Then, the next topics were 'Drugs Addiction is not A Crime', 'Public Transportation Should be Free', 'Five Trees Should be Planted', and 'The Importance of Rainforests'. In the experimental group, the materials were taught by jigsaw technique, using the ten steps of jigsaw technique proposed by Elliot Aronson. In the control group, the materials were taught using conventional technique.

All the texts have an exposition's generic structure, which are: thesis, argument, and reiteration. Moreover, all the texts have the language features of an exposition text. Thus, it is clear that the texts used are exposition texts. The analysis of one of the texts is presented below:

Table 3.2
Analysis of Exposition Text

Generic Structure	Sample of Text	Language Features
Thesis	<p>Home schoolings are education systems which provide child's main education programme at home. Home schoolings take the place of full-time school attendance and, in the United States and Canada, they <u>usually</u> meets state requirements for compulsory education. <i>Although home schoolings could</i> achieve the objectives of compulsory education, there are some points that <u>should</u> be noticed from the home schoolings.</p>	<ul style="list-style-type: none"> • General nouns (bold) • Emotive words/language (<i>italics</i>) • Simple present tense • Modal verbs (<u>underlined</u>) • Connectives (bold&italics) • Words that link cause and effect (bold&underline d) • Evaluative language (grey)
Argument	<p><i>First</i>, the idea of taking our children's education on home schoolings can be <i>a bit intimidating</i>. Since our country is so large and the people are from so many different kinds of backgrounds, students need some kind of social glue to make them stick together and to give them a sense of unity in spite of all the differences. They <u>will not</u> get such a unity when they are in home schooling. They <u>will</u> get the sense of unity when they are in the compulsory public schools since it is <i>the easiest and best</i> places to make this glue.</p>	
Argument	<p><i>Then</i>, the home schoolings <u>may not</u> be able to prepare children to fit into the mass society, which means, among other things, believing what most people believe and liking what most people like. Or it <u>may not</u> be able to help children to find a set of values with which they <u>could</u> resist and reject at least many of the values of the mass society.</p>	
Reiteration	<p>Home schoolings, <i>though</i> provide the need of compulsory education, <i>has lack of</i> children's socialization opportunity. Those children who take this option of education <u>may</u> reach the same objectives in formal education but otherwise, they will be less aware of social life because they have less opportunity to socialize with others. <i>However</i>, <i>this is a matter that need to be solve</i> since socialization is one major aspect in human's life.</p>	

The other exposition texts used in this research can be seen on the lesson plans in Appendix A.

3.3.2.2 Pre-test and Post-test

A pre-test is administered to capture the initial differences between the groups (Hatch & Farhady, 1982: 22) on the other hand, post-test also served as instrument to find out the improvement of their reading achievement (Hadi, 1994). The pre-test and post-test questions can be seen in the Appendix B.

Table 3.3
The Competences and Indicators of Items in the Pre-test & Post-test

Aspect	Competence Standard	Basic Competence	Indicator	Number of Items	
				Pre-test	Post-test
Reading	5. Understanding the meaning of short functional written text and essay in report, narrative, and analytical exposition in daily context and to access knowledges.	5.2. Responding the meaning and the rhetorical stages accurately, fluently and acceptably in the context of daily life and to access knowledges in report, narrative, and analytical exposition form.	Identifying the detail information in analytical exposition text.	1, 3, 4, 6, 7, 10, 12, 14, 15, 16, 18, 19, 22,	1, 3, 4, 5, 7, 9, 10, 12, 13, 16, 20, 21, 24
			Identifying the meaning of words or phrases in analytical exposition text.	5, 8, 11, 20, 24	11, 14, 18, 22, 25
			Identifying the function of analytical exposition text.	2, 9, 13, 17, 21, 23, 25	2, 6, 8, 15, 17, 19, 23

3.3.2.3 Questionnaire

Questionnaire is a series of questions which are logically related to the subject of the research, and every question is a meaningful answer to test the

hypothesis (Nazir, 1998). Questionnaire in this study involved 10 closed-questions. There was space for reasons existed. It was intended to obtain more information about students' opinion towards the use of Jigsaw technique.

Furthermore, the use of closed-questions was purposed to lead required answers, which are their opinions toward the use of jigsaw technique in reading, while the use of reasons' column was to attain deeper students' opinion. The questionnaire used in this research can be seen in Appendix C.

3.4. Research Procedures

The research is conducted in October 2011. The research that the writer has carried out followed these steps:

1. Readability measurement

A readability test had been conducted for assessing text readability. The formula used was Fry Readability Graph. According to Rubin (1982: 409) there are two variables which are used to estimate the reading-grade level of texts materials. The first is the average number of sentence length and the second is words length per 100 words of selection. A sentence length is determined by the total number of syllables in the text. The reading-grade levels of the text are determined by the indexes, we can predict the reading-grade level of the text by plotting them into the graph. The result of the measurement showed that the reading material used as instruments was appropriate for second graders of senior high school.

2. Administering try out test

Try out test was conducted on 30 September 2011. It was administered to the second graders of one public senior high school in Cimahi. The test consists of 40 multiple choice items with five options a, b, c, d and e. Each multiple choice item is scored 1. Thus, the total score is 40. Then, the items were analyzed to check their validity, difficulty level, index of discrimination, reliability and practically to ensure that they can be used for pre-test and post-test. The result showed that the instruments had fulfilled those requirements.

The try out test was given to second graders who were not the sample. It was given to the students from other class in the same school.

3. Administering pre-test

The pre-test was conducted on 4 October 2011. It was administered to the experimental group and control group with 30 students each. The aim of pre-test is to measure students' prior reading comprehension.

4. Conducting the jigsaw technique treatment to the experimental group

Jigsaw technique was implemented from 5 October to 19 October 2011. There were five jigsaw technique treatments in this research. The steps of jigsaw technique can be seen in the Chapter II. The materials used were adapted from some books for second grade students. To be clear, jigsaw technique in three-phase framework in the classroom is presented below.

Table 3.4

Jigsaw Technique Treatment

No	Jigsaw Technique Treatment
1.	<p>Pre- Activity:</p> <ol style="list-style-type: none">a. Teacher (T) opens the lessonb. T checks Students (Ss) attendancec. T asks Ss about what do they know about exposition text that will be given.
2.	<p>Whilst-(Main) Activity</p> <ol style="list-style-type: none">a. Ss are given explanation about the purpose, generic structure, and language features of a text.b. T applies jigsaw technique:<ul style="list-style-type: none">• Ss are divided into groups of 4.• A student from each group is chosen to be a leader.• T divides the material into 4 segments.• Every student in a group is given a different segment of material so a group makes a complete text.• Ss are given time to read and make meaning of their own segment.• Ss are regrouped into “expert groups” by assembling students with the same segment. These groups are assigned to share understanding and identify whether their segment is thesis, argument, or reiteration.• Ss break the groups and go back to their first group.• Ss do presentation on their segment of text to their group’s members.• T observes the process and gives interventions if needed.• Ss are given worksheet to be done individually.
c.	<p>Post- Activity</p> <ol style="list-style-type: none">a. Ss and T conclude the material which has been learntb. Ss are given opportunities to ask about their difficulties during learning process.

The lesson plans using jigsaw technique can be seen in Appendix A.

5. Conducting the conventional treatments to the control group

The conventional or non-Jigsaw technique was implemented from 5 October 2011 to 19 October 2011. There were five conventional technique treatments in this research. The materials used were adapted from some books for second grade students. The conventional technique in three phases framework is presented below.

Table 3.5

Conventional Technique Treatment

No	Conventional Technique Treatment
1.	Pre- Activity: a. Teacher (T) opens the lesson b. T checks Students (Ss) attendance c. T asks Ss about what do they know about exposition text that will be given.
2.	Whilst-(Main) Activity a. Ss are given explanation about the purpose, generic structure, and language features of a text. b. T distributes reading text c. Ss are asked to make a list of difficult words from the text. d. Ss are given worksheet about the text.
c.	Post- Activity c. Ss and T conclude the material which has been learnt d. Ss are given opportunities to ask about their difficulties during learning process.

The lesson plans using conventional technique can be seen in Appendix A.

6. Administering post-test to both of the group

It was conducted on 25 October 2011 for experimental group and control group. The items in post-test were the same as the pre-test, but to avoid the memorization of the test items, the items were rearranged.

7. Administering questionnaire to the experimental group

Questionnaire was conducted on 25 October 2011 for the experimental group. The questionnaire consists of 10 closed-questions.

The research schedule shown in Table 3.4 was set to make the research run well.

Table 3.6
Schedule of Research

No	Experimental Group (XI-IPA1)		Control Group (XI-IPA2)	
	Date	Material	Date	Material
1	October 4, 2011	Pre-test	October 4, 2011	Pre-test
2	October 5, 2011	Analytical Exposition text: Home Schooling	October 5, 2011	Analytical Exposition text: Home Schooling
3	October 11, 2011	Analytical Exposition text: Drugs Addiction is not A Crime	October 11, 2011	Analytical Exposition text: Drugs Addiction is not A Crime
4	October 12, 2011	Analytical Exposition text: Public Transportation Should be Free	October 12, 2011	Analytical Exposition text: Public Transportation Should be Free
5	October 18, 2011	Analytical Exposition text: Five Trees Should be Planted for Every Vehicle	October 18, 2011	Analytical Exposition text: Five Trees Should be Planted for Every Vehicle
6	October 19, 2011	Analytical Exposition text:	October 19, 2011	Analytical Exposition text:

		The Importance of Rainforests		The Importance of Rainforest
7	October 25, 2011	Post-test Questionnaires	October 25, 2011	Post-test Questionnaires

3.5. Data Analysis

The data collected by means of the test instruments, was analyzed differently according to specific purposes (Hatch & Farhady, 1982). In this case, three kinds of analyses were carried out: (1) test instrument analysis, (2) pre-test post-test data analysis, and (3) questionnaire data analysis. The description of data analyses procedures:

3.5.1 Test Instrument Analysis

A good instrument is very useful in research. Arikunto (2003) states that there are four analysis needed to measure if an instrument is good or not. The analyses of the test instruments are:

3.5.1.1 Validity

Validity is a matter of degree to extend the result of study as one way to measure the validity through carrying out item of instrument analysis (Hatch and Farhady, 1982: 251).

Commonly assessing validity employs Pearson Product Moment correlation. The formula as follows:

$$r_{xy} = \frac{n(\sum XY) - (\sum X) \cdot (\sum Y)}{\sqrt{\{n \cdot \sum x^2 - (\sum X)^2\} \cdot \{n \cdot \sum y^2 - (\sum Y)^2\}}}$$

Note:

r_{XY} = coefficient correlation between variable X and Y

X = item which its validity is assessed

Y = total score gained by the sample

(Arikunto, 2003)

In this study SPSS 17.0 was applied to measure validity with Pearson Product Moment correlation type. Here is the analysis.

Table 3.7
r Coefficient Correlation (Validity)

Raw Score	Interpretation
0.000 - 0.200	Very Low
0.200 - 0.400	Low
0.400 - 0.600	Moderate
0.600 - 0.800	High
0.800 - 1.000	Very High

(Arikunto, 2007: 147)

Based on the result, there were 25 items valid. Then, those appropriately became the instrument to apply in this study. The rest of 15 items were invalid (1, 2, 3, 4, 5, 6, 8, 9, 23, 27, 36, 37, 38, 39, 40), so those were not appropriate to use as the instrument. To sum up, 25 valid items attained were used in the instrument.

3.5.1.2 Difficulty

Another requirement that needs to be considered as excellent instrument is difficulty test. Arikunto (1993: 209) argued that difficulty test aims to get the level of difficulty for each item of the instrument. The formula employed to measure difficulty as follows:

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

Note:

P = index of difficulty

B = the number of students who can answer the item correctly

JB = the number of students

The following criteria are used to interpret the index of difficulty:

Table 3.8

The Criteria of Difficulty

Facility Value	Interpretation
0.000 - 0.300	Difficult
0.300 - 0.700	Moderate
0.700 - 1.000	Easy

(Arikunto, 1993: 210)

From the result, 4 items were categorized difficult. Meanwhile, 29 items were considered moderate. The rest of 7 items were categorized easy. Because the items taken as the instrument were only 25 items, the instrument consist of 22 moderate items, and 3 easy items.

3.5.1.3 Discrimination index

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).

The *Discrimination Index* refers to how well an assessment differentiates between high and low scores. In other words, we should be able to expect that the high-performing students would select the correct answer for each question more often than the low-performing students. If this is true, then the assessment is said to have a *positive discrimination index* (between 0 and 1) – indicating that students who received a high total score chose the correct answer for a specific item more often than the students who had a lower overall score. If, however, you find that more of the low-performing students got a specific item correct, then the item has a *negative discrimination index* (between -1 and 0).

Dante's formula was used to calculate the Discrimination Index. Here is the formula:

$$D = \frac{R_U - R_L}{f}$$

(Dante, 2001: 8)

Where:

D = Discrimination Index

R_U = Number of students in the upper group who got the item correct

R_L = Number of students in the lower group who got the item correct

F = Number of students in each group

The result presented that 33 from 40 items were positive discrimination (index 0 and 1). It indicated that students who received a high total score chose the correct answer for a specific item more often than the students who had a lower overall score. In other words, those items are good for research instrument.

Besides, 7 items were classified as negative discrimination (index between -1 and 0). It indicated more of the low-performing students got a specific item correct. Therefore they should be deleted or changed.

3.5.1.4 Reliability

Reliability is the extent to which the result can be regarded consistent or stable (Brown, 1990: 98).

In this study, Cronbach's Alpha formula in SPSS 17.0 was applied to reveal the reliability of instrument. To interpret the coefficient of reliability, the following criteria are employed:

Table 3.9
Coefficient Reliability

Coefficient Reliability	Interpretation
0.00 – 0.19	Very Poor
0.20 – 0.39	Poor
0.40 – 0.59	Moderate
0.60 – 0.79	Good
0.80 – 1.0	Excellent

(Sugiyono, 2001: 149)

Based on the result, the reliability of the instrument measure was 0.827. In keeping with Sugiono (2001: 149), the value of alpha is considered excellent for the items. Thus, the items were appropriate to be the instrument given to learners in the study.

3.5.2 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 was 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 fulfilled the criteria underlying t-test as stated in Coolidge (2000) as follows:

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

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

3.5.2.1 Normality of Distribution Test

To analyze the distribution of the score, Kolmogorov-Smirnov formula was used in this study. Kolmogorov-Smirnov compared the scores in the sample to a normally distributed set of scores with the same mean and standard deviation

(Field, 2005). The Kolmogorov-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. > 0.05) 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. < 0.05) then the distribution is significantly different from normal distribution (Field, 2005).

3.5.2.2 Homogeneity of Variance Test

In an experimental research, one of requirements that should be fulfilled is experimental group and control group must be homogenous or having same characteristic (Sugiyono, 2001). To analyze that, SPSS 17 for Windows was performed and Levene's test was used.

According to Coolidge (2000), the decision of variance homogeneity is as the probability (Based on Mean Sig.) is greater than the level of significance ($\alpha = 0.05$), H_0 is accepted. On the contrary, as the probability (Based on Mean Sig.) is less than the level of significance ($\alpha = 0.05$), H_0 is rejected.

The hypotheses were as follows:

H_0 : no difference between both experimental and control groups in pre-test. (Both experimental and control groups are homogenous).

H_a : there is difference between experimental and control groups in pre-test. (Experimental and control groups are not homogenous).

3.5.2.3 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 normally distributed, the data were analyzed using independent t-test 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.

3.5.2.4 The Dependent t-test

Dependent t-test was used to analyze the difference between pre-test and post-test experimental group' means (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 data was analyzed using dependent t-test 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.

3.5.3 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.

51% - 75% = more than half of students

76% - 99% = almost all of students

100% = all of students

