# CHAPTER III

RESEARCH METHODOLOGY

This chapter presents four main matters such as research design, data collection method, research procedures, and data analysis.

3.1 Research Design

In attempt to answer the research questions, this study used quasi-experimental design with nonequivalent (pre-test and post-test) control group. This design provides reasonable control over most sources of invalidity (McMillan & Schumacher, 1989:323). Moreover, in this design, the experimental and control group were selected without random assignment. It is because established classes or groups are selected, possible effects from reactive arrangements are minimized (Gay *et al*, 2009:259). The design is represented below:

Group	Pretest	Treatment	Posttest
A →	O →	X →	O
B →	O →		O
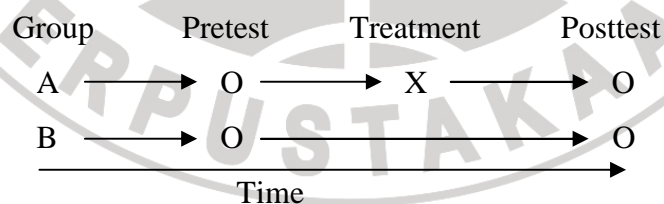
Time

(McMillan & Schumacher, 1989:323)

Note: A and B represent groups of subjects, O represents observation, and X represents treatment using interactive multimedia in teaching vocabulary in the seventh grade of junior high school.

3.1.1 Hypothesis

According to Gay *et al* (2009:71), "a hypothesis is a researcher's prediction of the research findings, a statement of the researcher's expectations about the relations among the variables in the research topic". This study used null hypothesis (H_o) which states that there is no difference between the population means of the two different groups (McMillan & Schumacher, 1989:349). Thus, the hypothesis of this study is as follow:

$$Ho: \mu1 = \mu2$$

Note: $\mu1$ represents the mean of the first group and $\mu2$ represent the mean of the second group.

It indicates that there is no significant difference between the students who receive experimental treatments using interactive multimedia and the students who do not. Therefore, if the null hypothesis is rejected, it means that the use of interactive multimedia is effective in improving students' vocabulary.

3.1.2 Variable

In this study, there are two variables namely independent variable and dependent variable. The independent variable is the variable which is selected, manipulated, and measured by the researcher. The dependent variable, on the

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other hand, is the variable which a researcher observes and measures to determine the effect of independent variable (Hatch & Farhady, 1982:15). Therefore, the independent variable of this study is interactive multimedia, while the dependent variable is students' vocabulary improvement.

3.2 Population and Sample

Population is the group of interest to the researcher, the group to whom the researcher would like to generalize the results of the study (Fraenkel and Wallen, 1990:93).

The population in this study was the seventh grade of junior high school in Bandung. The population was selected because the school provided the class with LCD Projector, which supported the research. In addition, the characteristics are: they are native Indonesian, their age is around 13, most of the students learn English just at school, and they have a high anxiety in learning English.

After selecting the population, the researcher selected the samples. The sample is "the group on which information is obtained" (Fraenkel and Wallen, 1990:92). The samples were selected without random assignment because in a school situation, schedules cannot be disrupted and classes cannot be reorganized in order to accommodate the researcher's study (Sax, 1979:260). Therefore, the samples were class 7A and 7B. Class 7A was the experimental group and class 7B was the control group. Each class consists of 20 students, so that the total numbers of the sample were 40 students.

3.3 Research Instrument

3.3.1 Try Out Test

Try out test was held to elicit the validity and the reliability of the instrument. It was conducted to 41 students in one of junior high school in Bandung. The test was in form of multiple-choice test which consist of fifty items related to the materials which will be taught later.

3.3.2 Pre-test and Post-test

Pre-test is a measure on some attributes or characteristics of participant in an experiment which is conducted before they receive a treatment. Whereas, a post-test is a measure on some attributes or characteristics of the participant in an experiment which is conducted after a treatment (Creswell, 2008:301).

The pre-test was conducted to both experimental and control groups to find out whether the two classes have equal vocabulary initial ability. Whereas, the post-test was conducted to both groups after the treatment to see whether there is a change on students' vocabulary.

3.3.3 Interview

Interview represents a direct attempt by the researcher to acquire reliable and valid measures in the form of verbal responses from one or more respondents (Sax, 1979:232). According to Fraenkel and Wallen (2006:455), the purpose of interviewing people is to find out what is on their mind-what they think or how they feel about something.

In regard to that, the interview used in this study was to find out the students'

responses toward the use of interactive multimedia in teaching vocabulary. The

interview consists of a set of questions exploring students' opinion, feeling, and

perspectives about the advantages and disadvantages of teaching vocabulary using

interactive multimedia. It was conducted only to the experimental group after

conducting the post-test. While during the interview, the researcher recorded the

interview by using a tape recorder.

The interview was conducted individually in the forms of open-ended

questions which consist of five questions. The open-ended questions are used to

allow for more freedom of response, to permit follow-up by the interviewer, to

elicit more information from the interviewees, and to check the accuracy of the

answers to the closed-ended question (Al-Seghayer, 2001:16).

3.4 Research Procedure

3.4.1 Organizing Teaching Procedure

Before teaching, teacher prepared lesson plan. The lesson plan notes the

contents of teaching learning process including standard competence, basic

competence, indicators, aims of learning, teaching learning methods, materials,

learning steps, and media.

Interactive multimedia is applied in the whilst-activity to provide a brief

explanation of the materials. The materials consist of four main topics such as

Parts & Things in the House, Daily Activities, Occupation, and Foodstuffs and

Units of Measurement. These topics which were included in the pre-test and post-

test were delivered in four meetings. After conducted the series of teaching learning process, the teacher needed to make evaluation of the materials given. It was aimed at picturing students' readiness to take the next step of this study, which was posttest.

3.4.2 Organizing Research Instrument

The next step was organizing research instrument. There were two kinds of instrument used in this study: tests and interview. Here, the researcher prepared the research instruments such as making some questions to be applied in the tests and interview.

3.4.3 Conducting Try Out Test

The try out test was held to elicit the validity and reliability of the instrument. The try out test was conducted before the pre-test. It was administered to 41 students in one junior high school in Bandung. The test was in form of multiple-choice test which consists of fifty items related to the materials which will be taught later that is included in syllabus. The topics were Parts and Things in the House, Daily Activities, Occupation, and Foodstuffs and Units of Measurement.

3.4.4 Conducting Pre-test

The pre-test was administered to both groups to find out whether the two classes have equal vocabulary initial ability. Furthermore, it was conducted to both experimental and control groups.

3.4.5 Conducting Treatment

Interactive multimedia as the treatment in this study was applied in class 7A as the experimental group, whereas conventional method, where many vocabularies are taught in the form of lists of isolated words (Brown, 2001:19) was applied in class 7B as the control group.

3.4.6 Administering Post-test

The post-test was administered to both experimental and control groups. It was conducted to see the effectiveness of using interactive multimedia in teaching vocabulary. The test items were the same as those in the pretest.

3.4.7 Conducting Interview

Interview as the additional instrument was conducted to the experimental group. It was conducted to gain detail information about the students' responses toward the use of interactive multimedia in teaching vocabulary. The interview was conducted on the same day as the posttest was administered.

3.5 Data Analysis

3.5.1 Scoring Technique

As mentioned earlier, the test was in the form of multiple-choice questions. Compared with other formats, the multiple-choice format can be used to assess a greater variety of learning targets (Nitko & Brookhart, 2007:152). According to Arikunto (2007:168), there are two types of formula which can be used to score

the multiple-choice data, they are the formula with punishment and the formula without punishment. In order to avoid a negative score, this study used the formula without punishment. The formula is as follow:

$$S = R$$

Where

S= Obtained score (Raw Score)

R= The right answer

3.5.2 Data Analysis on Try Out Test

The try out test was administered to 41 students of junior high school in Bandung before the pre-test. There are some considerations needed in order to find out the quality of the instruments such as validity, reliability, difficulty index, and discriminating power of the test, as proposed by Arikunto (2009:170).

3.5.2.1 Validity Test

Validity refers to the appropriateness, meaningfulness, correctness, and usefulness of the inferences a researcher makes (Fraenkel and Wallen, 1990:150).

To examine the validity of the test, Pearson product moment correlation was used in this study. The criteria of the interpretation data are as follow:

Table 3.1

Index Number of "r" Correlation

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)

Note: "r" represents the Pearson product moment correlation coefficient

3.5.2.2 Reliability Test

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 (Fraenkel and Wallen 2006:150).

To obtain the reliability of the instrument, this study used Cronbach's alpha formula in SPSS 16 for windows. The interpretation of the coefficient of reliability is as follows:

Table 3.2

The Criteria of Reliability Test

Coefficient Correlation	Interpretation
0.00 – 0.20	Low
0.21 – 0.40	Moderate
0.41 – 0.70	High
Above 0.70	Very High

3.5.2.3 Difficulty Index

Difficulty index is the capability of the test to embrace the number of students who could answer the item correctly (Arikunto, 2009:176). The difficulty index was computed using Anates for multiple choices. The criteria of difficulty index are as follow:

Table 3.3

The Criteria of Difficulty

Facility Value	Interpretation
0.00 – 0.30	Difficult
0.30 – 0.70	Moderate
0.70 – 1.00	Easy

(Arikunto, 2007: 210)

3.5.2.4 Discriminating Power

Discrimination power is the capability of the test to discriminate between the good and poor students (Arikunto, 2009:177). There are some stages in obtaining discrimination power of each item such as arranging the obtained scores from the highest to the lowest, dividing the subjects into two groups based on their scores, calculating the discrimination power of each item, and interpreting the quality of each item based on criteria of discrimination power, proposed by Arikunto (2003). The formula can be seen below:

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

Where:

D   = Discriminating power

B_A = Number of right answer from upper group

J_A = Number of upper group

B_B = Number of right answer from lower group

J_B = Number of lower group

The criteria of discriminating power are as follow:

Table 3.4

The Criteria of Discriminating Power

Discrimination Index	Interpretation
0.00 – 0.20	Poor
0.20 – 0.40	Satisfactory
0.40 – 0.70	Good
0.70 – 1.00	Excellent

(Arikunto, 2007:218)

3.5.3 Data Analysis on the Pre-test and Post-test

3.5.3.1 Normal Distribution Test

The distribution of score was analyzed by Kolmogrov-Smirnov formula which consists of the following three steps:

1. Setting the hypothesis and alpha level at 0.05 (two-tailed test).

   H_0 = the score of the experimental and the control group are normally distributed.

2. Analyzing the normal distribution using Kolmogrov-Smirnov formula

3. Comparing the asymp.sig with the level of significance (p) to test the hypothesis. If the asymp.sig $>$ 0.05, the null hypothesis is accepted and the distribution of data is normal. Hence, if the asymp.sig $<$ 0.05, the null hypothesis is rejected, it means the data is not normally distributed.

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3.5.3.2 The Homogeneity of Variance Test

The Homogeneity of variance test was analyzed by using Levene's test formula, as one of the SPSS program. The statistical steps in using Levene's test formula are clarified below:

1. Setting the hypothesis and alpha level at 0.05 (two-tailed test).

   H_0: the variances of the experimental and the control group are homogenous.

2. Analyzing the homogeneity of variance by using Levene test.

3. Comparing the asymp.sig with the level of significance (*p*) to test the hypothesis. If the asymp.sig > 0.05, the null hypothesis is accepted and the variances of data are homogenous. Hence, if the asymp.sig ≤ 0.05, the null hypothesis is rejected and the variances are significantly difference.

3.5.3.3 The Calculation of t-test

The t-test is an excellent statistical procedure to use in comparing two means (Hatch and Farhady, 1982). The steps of the t-test calculation are:

1. Setting the hypothesis and alpha level at 0.05 (two-tailed test).

   H_0: There is no significant difference between the two sample means

2. Analyzing the independent t-test by using SPSS 16.0.

3. Comparing t_{obt} with the level of significance. If the t_{obt} is equal to or greater than the level of significance, the null hypothesis is accepted. It indicates that there is no significant difference between the two sample means.

3.5.3.4 The Calculation of Effect Size

According to Coolidge (2001: 151), effect size is the effect of the influence of independent variable upon the dependent variable. The effect size reveals how well the treatment works. If the difference between the two samples of means is large, then it is said that there is a large effect size. Hence, if the difference between the two sample means is small, then it is said that there is a small effect size. The formula of the effect size is as follows:

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

where:

r = effect size

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

df = degree of freedom

To interpret the magnitude of the effect size, this study used the following scale:

Table 3.5

The Effect Size Scale

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

(Coolidge, 2000:151)

3.5.4 Data Analysis on the Interview

According to Seidman (2006:128), there are several steps to analyze the interview data such as doing the interview, transcribing the interview, marking passages that are of interest, labeling and grouping the transcript, and interpreting the material.