# CHAPTER III
# RESEARCH METHOD

## A. Research Design

According to Arikunto (2013) research design can be interpreted as a plan structured work in terms of relations between variables in a manner comprehensive in such a way that the results of his research can provide answers for research questions. The plan includes the things to bethe research was carried out, starting from making hypotheses and their implications operational until the final analysis.

This research used quantitative research because the data in the form of numerical and statistical analysis. It includes on the experimental research.The types of experimental design used by the researcher is quasi experiment. Creswell (2012) says that quasi experiments include assignment, but not random assignment of participants to groups. Quasi experimental design is the development of true experimental design, which has a control group but can not fully function to control external variables that affect the execution of the experiment. In adition, quasi experimental design is a type of research design that has groups control and experimental groups were not chosen randomly. Researchers use quasi experimental design because in this study there are variables from outside that cannot be controlled by the researcher.

In this research design, there were two groups of classes involved . The researcher gave some steps, they are pre-test, treatment, and post-test. The researcher gave different treatment to both group, the first group was experimental group which used CAI technique , while the second group was control group which did not use CAI technique. The table of the research design as quoted by Sugiyono (2016) as follow:

**Table 3.1 Research Design**

| Class | Pre-test | Treatment | Post-test |
|---|---|---|---|
| C | O*1* | - | O*2* |
| E | O*1* | X | O*2* |

Note:

E : Experiment Class

C : Control Class

O1 : Pre-test

X : CAI

- : Conventional Technique

O2 : Post-test

*(Sugiyono, 2016)*

Based on the explanation above the researcher has given the pre-test to know the students' real competence in reading comprehension. The researcher conducted the pre-test before the treatment X (CAI). After implementing the treatment, the researcher gave a post-test to measure the students' improvement in reading comprehension.

## B. Research Variable

According to Sugiyono (2016) research variable is an attribute investigation, variable is everything that planed by the researcher to learn. Variable is a constructor character to studied there are two kind of variables in common, they are Indenpendent variable and dependent variable. Indenvendent variable is a variable that is affected or to influence another variable. Dependent variable is a variable that is affected or has become effect by Independent variable. In this study, there are two variables that is used by the researcher, they are Indenpendent (X) and Dependent (Y) variable.

The researcher conducted computer Assisted Instruction (CAI) as an independent variable to indicate the students' reading score, and in a dependent variable the researcher chose students' reading comprehension. The description as follows:

**Table 3.2 Research Variables**

| Group | Independent Variable | Dependent Variable |
|---|---|---|
| Experimental Group | CAI technique | Students' Reading Comprehension |
| Control Group | - | Student' Reading Comprehension |

*Source: Sugiyono (2016)*

Based on the explanation above, the researcher concluded that there are two variable in this study, they are X as a (CAI) and Y as (students' reading comprehension).

## C. Research Population, Technique Sampling and Sample

### 1. Research Population

Sugiyono (2016) states that population is composed of the generalization: object or subject that has quality and certain characteristics set by the researcher to learn and then take a conclusion. Therefore, the population of this research was the students on the fourth semester of English department at Muhammadiyah University of Metro in academic year 2020/2021. It consists of 45 undergraduate students of English Departement at Muhammadiyah University of Metro.

**Table 3.2 Reserch Population**

| No. | Class | Number of Students |
|---|---|---|
| 1. | A | 20 |
| 2. | B | 20 |
| Total Number of Students' | | 40 |

*Source: English Department Lecturer of Third Semester at Muhammadiyah University of Metro*

Based on the table, the population of this research is fourth semester at Muhammadiyah University of Metro in the academic year 2020/2021. There are two classes of this semester. The number of students in class A is 20 students and 20 students in class B. Therefore, the total of the population in this research is 40 students.

### 2. Sampling Technique

Setiadi (2013) argues that the sampling technique is one of technique to take a sample. Sampling technique is the way for the researcher to take the sample of the population. In conducting the research to get the sample from the population, the researcher used cluster random sampling as the technique. It is the sample selection in which all members of the population are naturally grouped in units, it states by Wiersma and Jurs (2010). The researcher used random selection to determine the class of the experimental group and the control group.

There are two classes which labeled with A and B class. From these classes, and the researcher took two classes that became the sample of this research. Below the steps done by the researcher:

a. The researcher wrote a number in a piece of paper.
b. The papers were rolled and then put into the glass.
c. The glass has shaken until getting the rolling of paper out.

d. The first roll of paper was B class became the subject of the experimental class.
e. The second roll of paper was A class became the subject of the research as control class.

**3. Research Sample**

According to Arikunto (2013) sample of the research is a part of the population that has all the main characters from the population. Sugiyono (2013) explains that the sample is a part of the total and characteristics of the population. In this research, the researcher used two classes that A class as the experimental which consist of 20 students, while class B as the control class which consists of 20 students.

Based on the explanation above, it can be concluded that the sample is part of the population. After all the class labeled with A and B, It has become a sample of this research where the researcher conduct this study at those classes. Finally, the researcher took two classes in fourth semester of English Education study program at Muhammadiyah University of Metro in academic year 2020/2021. There are class A as control class and class B as an experimental class.

**D. Research Instrument**

**1. Kinds of Research Instrument**

Instrument of the research is a part of activities to detect the accurate data. Ali (2014) argues that research instrument is equipment that can be used in the research conducted to get the final goal of the research. An instrument is a tool when the researcher administered the research through a certain technique. The researcher gave a test as an instrument in this research. The pre-test is given to the students to measure their reading skill before the treatment and the post-test given to measure their reading ability after giving the treatment.

After all of the test is reliable then the researcher conducted pre-test before treatment and gave post-test after the treatment. In this study, the type of reading test in pre-test and post-test.The score of the test is based on criteria on the reading test rubric, those are main idea , context, reference, fact, conclusion .

## E. Validity and Reliability

### 1. Validity

Sugiyono (2016) validity is refers to the degree to which a study accurately reflect or assesses the specific concept that the researcher is attempting to measure. Validity is concerned with the study success at measuring what the researcher set out, In this case after the instrument is constructed about some aspects which are measured based on the particular theory, it can be consulted by the experts.

Arikunto (2013) claims that validity is a standard which shows the degree of validity or valid instruments. Therefore, validity is a tool that can be used to see the validity of an instrument that will be used by the researcher. In this study the researcher analyzed the test from content validity. Content validity examines whether the test is a good representation of the material that needs to be tested. It means that the item of the test will be represented by the material that is discussing. The validity instrument was corrected by the validator.

### 2. Reliability

Reliability refers to the extension to which the test is consistent in it is score and give an indication of how accurate the test score is. Arikunto (2013) says that the reliability of the test is an instrument can be believed to be used as an instrument for collecting data because it has been good. Based on the explanation above, the measurement of whether the test has good reliability or not.

Instrument reliability testing is measured by internal consistency reliability testing, with one-time instrument testing. This reliability test used the Spearman Brown formula, which is as follows:

$$r_{11} = \frac{2(r \cdot \frac{1}{2} \frac{1}{2})}{(1 + r \cdot \frac{1}{2} \frac{1}{2})}$$

Where :

r11 = Instrument reliability

r ½½ = rxy the correlation index between the two instruments

Before entering the formula above, first to find the correlation index between the two instruments. the formula used is formula as stated Sugiyono (2016) as follows :

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\left(N\sum X^2 - (\sum X)^2\right)\left(N\sum Y^2 - (\sum Y)^2\right)}}$$

Where:

rxy = cofesien correlation X and Y

N = number of samples

X = initial score

Y = final score

**F. Data Collecting Technique**

The most important thing in this research is collecting the data that can determine the result of the research. According to Dennis *et al.,* (2012) tests are a measurement technique used to measure behavior or help understand and predict behavior. Furthermore, an improvement of students' achievement can be tested by using a test as a method. The researcher used a test to measure students' reading comprehension. The detail explanation can be seen below:

**1. Pre-Test**

A pre-test is conducted as the preliminary research to identify the students' real competence and problems in reading learning. A pre-test is done before the treatment process. The researcher took the score to get the first information.The pretest was administrated on , 16th June 2020 at 08.00 - 10.00 a.m. The researcher used Computer Assisted Instruction (CAI) as a technique to test. The researcher have given the example of using CAI and after that the students have to do it themselves using a computer .

**2. Treatment**

After conducting a pre-test, the researcher gave the treatment to the students. The aim of treatment is to develop the students' reading comprehension .The treatment conducted by the researcher in reading class. The following is a description of the steps of using CAI technique .

a. Researcher prepares teaching materials from book or internet.
b. Researcher prepares teaching material using software.
c. Researcher delivering material using CAI technique.
d. Directing students' in learning using CAI
e. Directing students' to make conclusion in learning process

### 3. Post-Test

Post-test has been given after giving the treatment in an experimental study or after teaching advanced reading by using Computer Assisted Instruction (CAI) technique. The aim is to see how the students improvement in reading comprehension after giving treatment. The researcher gave a sequence steps is like pre-test. The score of the post-test is based on criteria on the reading test rubric, those are main idea, fact, context, reference , conclusion.

## G. Data Analysis Technique

After the researcher collected the data, the researcher analyzed the result of data from pre-test and post-test related both of them through the formulas of normality test, homogeneity test, and hypothesis test.

The procedures to treat the data as follow:

### 1. Normality Test

The object test for normality to determine the distribution of the data follows a normal distribution or not. One of the test assumptions of the statistic compilation is that the data must fulfill the qualification of the normal distribution. Therefore analyzing the normality of distribution the students' score is crucial. The detail explanation can be seen as follow:

Normality test using the formula Chi-quadrateas Ghazali (2010) follow:

**a) The hypothesis formula:**

Ho: sample comes from the population that has a normal distribution.

$H_1$: sample did not come from the population that has not a normal distribution.

**b) Statistic formula:**

$$x^2_{count} = \sum_{i=1}^{k} \frac{(O_i - E_i)}{E_i}$$

*Ghazali (2010)*

Notes:

$x^2$ = Chi-quadrate

Oi = frequency observes

Ei = frequency expectation

k = Interval class

The criterion, if $X^2_{count} \leq X^2_{table}$ with dk = k – 3, so, the data is normal.

**2. Homogeneity Test**

A homogeneity test was applied to analyze whether or not the scores of one group have homogenous variance compared with the score of other groups. In this study, the researcher used F-test. The formula can be seen as follow:

**a)The hypotesis formula:**

$H_0$ : $\sigma_{1^2} = \sigma_{2^2}$ both sample have the quality of variants.

$H1$ :$\sigma_{1^2} \neq \sigma_{2^2}$ both sample have different of variants.

**b)The used statistic formula of the test is:**

$$F = \frac{biggestvariants}{smallestvariants}$$

**c)The test criterion**

Accepted $H_0$ if $F_{ratio} < F\ \frac{1}{2}\alpha\ (V_1 - V_2)$, with $V_1 = n_1$-1 and $V_2 = n_2$-1

*Sugiyono (2016)*

**3.Hypothesis Test**

A hypothesis is an assumption about a population parameter. This assumption can be true or not. It is a method of making statistical decisions using experimental data, the best way to determine whether a statistical hypothesis is true would examine the entire population. After collecting the data, the researcher analyzed them in order to find out whether the use of CAI technique could increase the students' achievement in reading related to things in the classroom.

Hypothesis testing is intended to see whether the hypothesis that is proposed in this research is accepted or not, to test the hypothesis, Repeated Measures T-test was conducted and the used formula of the test is t-test which frames at this below formula:

$$t_{-test} = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1{}^2}{N_1} + \frac{S_2{}^2}{N_2}}}$$

Notes:

$\overline{X}_1$ = the means of the experiment class

$\overline{X}_2$ = the means of the control class

S = the standard devitiation

$N_1$ = the number of students' in the experimental class

$N_2$ = the number of students' in the control class

Before using t-test formula the researcher would determine the average variant ($S^2$)

**The variant ($S^2$) is calculated by formula:**

$$S^2 = \frac{(N_1-1)S_1^2+(N_2-1)S_2^2}{N_2(N_2-1)}$$

Notes:

$N_1$ = Number of students' in experimental class

$N_2$ = Number of students' in control class

$S_1^2$ = Variant of experimental class

$S_2^2$ = Variant of control class

$S^2$ = Variant

**The criteria are:**

$H_0$ : $H_0$ is accepted if t-ratio $<$ t-table

$H_a$ :$H_a$ is accepted if t-ratio $>$ t-table

Based on the explanation above, the researcher concluded that the hypothesis is an assumption about a population parameter. This assumption may be true or not be true when sample data are not consistent with the statistical hypothesis, so the hypothesis is rejected because the test is used to know whether the hypothesis that is proposed can be accepted or rejected. The formula which is used in this test is t-test.