CHAPTER III
RESEARCH METODHOLGY

A. Research Design

Zubair (2020) stated that research is the methodical and organized accumulation, arrangement, and analysis of data with the ultimate purpose of supporting decision-making through the research's findings. It is a methodical approach to solving a research problem, finding a solution, or gaining new facts. In this research use quantitative experimental as a research design.

According to Zubair (2020), experimental design is the process of carrying out research in an objective and controlled fashion so that precision is maximized and specific conclusions can be drawn regarding a hypothesis statement. It is a scientific method of conducting research in which one or more independent variables are altered and applied to one or more dependent variables in order to determine their influence on the latter. It is an attempt by the researcher to maintain control over all factors that may affect the result of an experiment. In doing this, the researcher attempts to determine or predict what may occur.

Hardani et al., (2023) explain that, the experimental design is described in statistics as the design of an information gathering experiment in which a variation is present or not, and it should be executed under the researcher's complete control. This word is commonly used to describe controlled experiments. To maximize the dependability of the results, these tests minimize the impacts of the variable. In this design, an experimental unit's process may comprise a group of people, plants, animals, and so on. According to Zubair (2020), an experimental design consists of two groups of subjects:

- Experimental group, it undergoes treatment, program, or intervention of interest.
- Control group, a predetermined set of diverse circumstances is placed on the individuals chosen for the experiment during the manipulation procedure. The collection of different circumstances is known as the independent variable, experimental variable, or treatment variable.

This research use cluster random sampling technique to determine the experimental and control classes. The steps taken included pre-test, treatment, and post-test. The pretest was given to students to measure their understanding of the material before using the Quizlet application, while the post-test was given after the use of the Quizlet application to measure the increase in student understanding. This research design was adapted from Sugiyono (2016) as follows:

Table 3. 1 Table of Research Design

Class	Pre-test	Treatment	Post-test
C	O1	-	O2
E	O1	X	O2

Source (Sugiyono, 2016)

Note:

E = Experiment Class

C = Control Class

O1 = Pre-Test

- = Treatment without using Quizlet Application

X = Treatment by using Quizlet Application

O2 = Post-Test

From the statement above, the researcher give a pre-test to the experimental and control classes to find out their initial ability in vocabulary mastery. After that, the experimental class receives treatment in the form of using Quizlet application (X). After the treatment is given, the researcher gives a post-test to measure how much the increase in scores obtained by students.

B. Research Variable

According to Oyebanji & Olayemi (2017) variables are therefore the names that are given to the variance we wish to explain and it is very critical to the research because the way the researcher uses or handles them in the research process could determine the nature and direction of the research. There are two types of variables; dependent variable and independent variable. The dependent variable is the variable focus or central variable on which other variables act any relationship. The independent variable is

selected with researchers to determine the relationship with dependents variables (Oyebanji & Olayemi, 2017) So, the variables in this research are:

1. The independent variable (X) is the input variable, which is cause, partially or completely, a particular outcome; it is the stimulus that influences the response, and the antecedent or modifiable factor to influence an outcome. This is a variable that influences or causes a change or emergence of the dependent variable. The independent variable in this research is the use of Quizlet Application.

2. The dependent variable (Y) is the result variable that caused totally or in part by the input, antecedent variables. This is the effect, consequence or response to the independent variable. Is a variable that is influenced by the independent variable. The dependent variable in this research is the students' vocabulary mastery.

In this research the Quizlet application as an independent variable to indicate students' vocabulary mastery and in a dependent variable the researcher choose students' vocabulary mastery. The description as follows:

Table 3. 2 Research Variable

Group	Independent Variable	Dependent Variable
Experimental Group	Quizlet application	Students' Vocabulary Mastery
Control Group	-	Students' Vocabulary Mastery

Based on the statement above, the researcher concludes that there are two variables in this research, namely X and Y where X (Quizlet Application) is the independent variable and Y (Vocabulary Mastery).

C. Research Population, Sample, and Sampling Technique

To conduct this research, the researcher determines the population, sample, and sampling technique as follows:

1. Population

According to Rukminingsih et al., (2020), is the whole of the research object, humans, values, objects, humans, to events that are used as research data sources. The population in this research is students of first grade of culinary art SMK Muhammadiyah 3 Metro for the academic year

2024/2025 each class consists of 15 and 15 students. The total population is 30 students divided into 2 classes.

2. Sample

Sample is any subset of units collected from a population (Rukminingsih, et al., 2021). In this research the researcher would conducted in the class by taking student as a sample. The researcher use samples taken from the population X Culinary Art 1 as the experimental class and X Culinary Art 2 as the control class

3. Sampling Technique

In this research, researcher used cluster random sampling technique as a sampling technique. This technique involves dividing the population into groups (clusters) and then randomly selecting several groups to be sampled. In this study, two classes from the existing population, namely X Culinary Art 1 and X Culinary Art 2, were selected as samples by random method. Thus, X Culinary Art 1 served as the experimental group and X Culinary Art 2 as the control group. This technique allows the researcher to obtain a representative sample and reduce potential bias, as each group has an equal chance of being selected (Creswell, 2018)

D. Research Instrument

According to Rukminingsih et al., (2020), a research instrument is a tool used to measure observed natural and social phenomena. The goal is to collect data or information that is useful to answer research problems. In this research, researcher used test as the instrument. Test is a set of questions that must be answered. Responded or carried out by the person being tested. Tests are used to measure the extent to which a student has mastered the lessons that have been delivered during the learning process.

In this research, the test was intended to determine the effect of using the Quizlet Application on increasing students' vocabulary mastery. There are two types of tests used in this research, namely pre-test and post-test (Zubair, 2020). The purpose of giving the pre-test is to determine students' vocabulary mastery and their scores before treatment. Meanwhile, the post-test was used to determine the increase in vocabulary mastery and vocabulary mastery scores after treatment. Apart from that, the pre-test and post-test are in written form, the questions are in the form of multiple choices

and there are questions about synonyms, antonyms, etc. The test questions that will be used are as follows:

1. Pre Test

Pre-test is a test carried out to measure students' initial abilities before participating in learning activities. The researcher made 30 multiple choice questions for two classes. There is X Culinary Art 1 as the control class and X Culinary Art 2 as the experimental class. The material in this test is a vocabulary test. The pre-test used for pre-activities to know the students' vocabulary mastery before using Quizlet Application.

2. Post Test

Post-test is the final testing given after the teaching process is complete. This test needs to be carried out as a tool to measure student learning progress, as well as to evaluate learning programs. The researcher made 30 multiple choice questions for two classes. There is X Culinary Art 1 as the control class and X Culinary Art 2 as the experimental class. The material in this test is a vocabulary test. The pre-test used for pre-activities to know the students' vocabulary mastery after use Quizlet Application.

E. Validity and Reliability Instrument

1. Validity

According to Hardani, et al., (2023), validity is a measuring tool that guarantees the validity of the measurement from the scale determined through the variables used in determining the relationship of an event or phenomenon.

Validity refers to extent to which the test measures what it was intended to measure (Sugiyono, 2019) it means that the test measures what was claimed to measure. To measure whether the test has a good validity, the researcher analysis the test form empirical validity.

Validity formula as follows:

$$Rxy = \frac{\sum xy}{\sqrt{(\sum x^2)(\sum y^2)}}$$

Notes:

r_{xy} = coefficient between variable X and Y

$\sum xy02$ = sum of the result of X and Y for each students

$\sum x^2$ = sum of each item

$\sum y^2$ = sum of total score/total items

2. Reliability

The second measure of quality in quantitative research is the reliability or accuracy of an instrument. Rukminingsih, et al.,(2020) states that reliability means the consistency and stability of the score of an instrument. In addition, the research instrument consistently had the same situation on the repeated opportunities.

Arikunto (2016) explain that the reliability of the test is an instrument can be trusted to be used for collecting data because it has been good. It's means that reability is needed to know whether the test has a good quality or not.

The reliability test by the formula as stated by Arikunto (2016) as follows:

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

Where:

r_{11} = coefficient reliability is appropriate

r_{xy} = coefficient between variable X and Y

The criteria of reliability based on Arikunto as follows :

Table 3. 3 Criteria of Interval Coefficient

Interval Coefficient	Criteria
0,00 – 0,19	Very low
0,20 – 0,39	Low
0,40 – 0,59	Medium
0,60 – 0,79	High
0,80 – 1,00	Very High

Source: (Sugiyono, 2019)

F. **Data Collecting Technique**

According to Sugiyono (2019), the method of data collection is an important thing in research, because this method is management strategy or method used by researcher to collect data and added in their research. Some of the techniques are used in this research are as follows:

1. Giving pre-test to students

    The pre-test was given at the first meeting during the research in order to find out the problems and students` scores on vocabulary mastery. Pre-test was carried out before treatment. The researcher was given a written test to the students. The test is in the form of paper and contains question about vocabulary such as verb, adverbs, nouns, and adjectives. The pre-test was carried out in the experimental class and control class.

2. Providing treatment to students

    After giving pre-test, the researcher conducted treatment in class on the students. The treatment contains vocabulary mastery. The treatment that be used in this research is the Quizlet application. Before the learning starts, the researcher explained how to use the Quizlet application. After students understood about Quizlet application, the researcher explained the learning theme that would be studied. After that students learn to use the Quizlet application independently by using their respective hand phone. Treatment is carried out in experimental class.

3. Giving post-test to students

    Researcher conducted research by giving tests to students after being given treatment. Post-test was given so that researcher know the value obtained by students after using the Quizlet application media about vocabulary mastery. Post-test was conducted in the experimental class and control class with given test. The test types same with pre-test before.

G. Data Analyzing Technique

In this research, the data was obtained from the experimental group and the control group. To know the difference between the groups.

The t-test formula as following:

$$T = \frac{Mx - My}{\sqrt{\left(\frac{\sum x^2 + \sum y^2}{Nx + Ny - 2}\right)\left(\frac{2}{Nx} + \frac{2}{Ny}\right)}}$$

Where:

T   = Total score

Mx   = Mean of Experimental Group

My   = Mean of Control Group

Nx   = Numbers of students in Experimental Group

Ny   = Numbers of students in Control Group

X^2 = Standard of Deviation of Experimental Group

Y^2 = Standard of Deviation of Control Group

1. Normality Test

        Rukminingsih et al., (2020) explain that, 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 computation is that the data must fulfill the qualification of normal distribution. Therefore analyzing the normality of distribution the students' score is crucial. That calculates by using SPSS (Statistical Package for Social Science) for normality. The tests of normality employed were Shapiro Wilk. The hypothesis for the normality test is formulated as follows:

H_o = The data have normal distributed

H_a = The data do not have normal distributed.

While the criteria of normality test are follows:

H_o = mean accepted if Sig ≥ a = 0.05

H_a = mean accepted if Sig < a = 0.05

2. Homogeneity Test

        According to Sugiyono (2019), 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 research, the researcher used ANOVA. The formula can be seen as follows:

The hypothesis formula:

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

$H_{o=}\ \sigma_{1^2} \neq \sigma_{2^2}$ both sample have different of variants

The use statistic formula of the test:

F $= \dfrac{Biggest variants}{Smallest variants}$

The test $H_{o=}\ \sigma_{1^2} = \sigma_{2^2}$ both sample have the quality of variants.

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

The test criteria

Accepted H_o if $F_{ratio} \geq F\frac{1}{2}a\ (V_1 - V_2)$ with $V_1 = n_1 - 1$ and $V_2 = n_2 - 1$

H. Statistic Hypothesis

Hypothesis is assumptions about population parameters. This assumption may or may not be true. It is a method of making statistical decisions using experimental data (Arikunto, 2016). The best way to determine whether a statistical hypothesis is correct would be to examine the entire population. After collecting the data, the researcher analyzed it to find out whether the use of regalia could improve students' achievement in vocabulary about things in class.

Hypothesis testing is intended to see whether the hypothesis proposed in this study is accepted or not, to test the hypothesis. Repeated measurement T-test was carried out and the test formula used was the T-test which framed the formula below:

$$t-_{test} = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\dfrac{S_{1^2}}{N_1} + \dfrac{S_{2^2}}{N_2}}}$$

Where:

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

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

S = the standard deviation

N = 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') The Variant (S) is calculating by formula:

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

Note:

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.