CHAPTER III

RESEARCH METHODOLOGY

This chapter covers the research methodology and design, data source/ site and participant, data collection method, research instruments, and data analysis.

A. Research Method and Design

Based on the views of Ary, et al, (2010, p.420-421), the goal of quantitative research is to provide testable and verifiable hypotheses that explain findings by demonstrating how they originate from theoretical assumptions. According to Creswell (2014), quantitative research methods involve testing objective theories by examining relationships between variables. In another definition according to Sugiono (2011), can be seen as positivist-based techniques applied to samples or random populations whose research data is statistical. The last one definition from Arikunto (2005), A quantitative research is research in which the process uses many numbers from collecting data, interpreting data, and producing results.

The researcher uses quantitative methods specifically using quasi-experimental research. Based on Creswell (2009) say that Some types are included in quasi-experimental research, including single group interrupted time series design, control group interrupted time series design, and nonequivalent (pre- and post-test) control group design. The two sample groups that the researcher used in the experimental study were the control class and the experimental class. The

purpose of those classes was to examine the effect of using Duolingo application on students' vocabulary mastery. The experimental group was the one that used the Duolingo application for treatment, while the control group was the one that used the Quizizz application. The formula for the quasi-experimental design is explained as follows:

Table 3. 1

The Schematic of The Quasi-Experimental Design

Control Group	Pre-test	Quizizz	Post-test
Experimental Group	Pre-test	Duolingo	Post-test

The researcher actually carried out this research by giving first-grade SMAN 1 KEDIRI students experimental treatment employing Duolingo. This study took place over 5 meetings. They were formed from one pre-test meeting, three treatment meetings, and one final post-test meeting. Using quantitative methods is appropriate for this study because it aims to detect the influence of the media by applying this treatment.

B. Population and Sample

The researcher had to determine the population before starting sample collection. Sugiono (2010:117) states that a population is a geographic generalization made up of the following: an object or subject has quality and specific characteristics that the researcher has set out to learn about before drawing a

conclusion. Arikunto' (1992, p.108) defines population as the entire subject of study. The research population also specifies the sizes of these populations, if sizes can be defined, and how the sizes will be determined. Donald Ary, et al, (2014) claims that the population is the largest group to which generalizations can be made. Meanwhile, Population is defined as a collection of people who have similar characteristics, according to Creswell (2012).

The total sample should be selected before conducting the study. It would be a mistake to know how well we can get a sample to represent the population, but in general the largest portion of the sample is the largest portion of the population to be explained. According to Arikunto (2006: 109), a sample must be representative of a population resident. If there are less than 100 students in the overall population, it is better to take a sample of all of them; however, if there are more students in the total population, the sample size can be as high as 15-20% or as low as 10-15%.

According to Ary (2002: 163) where a sample is an aspect of the population. To be able to generalize from this study, a good sample size needs to be accurately reflecting the population. According to Sugiono (2015: 118), a sample is a part of the population with features that have been suggested for research. Population is a representative part of the population so, if the researcher finds information about the sample then it means that information is formed from the sample. In another definition of sample from Creswell (2012), defines a sample as a subset of the target population that the researcher intended to examine in order to draw conclusions about the target population as a whole.

SMAN 1 Kediri, which is located at JL. VETERAN 1 64123 Kediri, East Java, is the place of research. The population and sample of this study consist of first grade students at SMAN 1 Kediri for the academic year 2022-2023. This school was selected because it has excellent facilities to implement basic media and information. The sample of this research was two classes of the first grade. 30 students from Class XA, as the experimental group, which used the Duolingo application as a treatment. With 30 students, class XB was used as the control group and was given the Quizizz application. The class was chosen for similar reasons, such as the fact that their English scores are consistently below expectations and most of them are students who misbehave in class.

C. Research Instrument

A research instrument is a tool used to record, measure, or observe quantitative data Creswell, (2014). An instrument is a means that the researcher uses to get information. Instruments are equipment or facilities that researchers employ to gather data in order to get simpler, better findings that are comprehensive and organized for easy processing (Arikunto, 2006). The researcher describes the tool utilized to gather data in order to determine the researcher's conclusions in this section. According to Sugiyono (2015:148), an instrument is a collection of instruments used to quantify social and natural phenomena. Ary et al, (2010, p. 643) define an instrument as a tool used to operationally define a variable. In this study use one instrument that is a test. The test was designed to find out the influence of using Duolingo in enhancing vocabulary mastery after applying it to students.

1. Test

A test is a simple method of measuring a person's ability, knowledge, or performance in a certain field. It is used to collect data on students' vocabulary mastery. According to Arikunto (1998, p.139), a test is a tool designed to evaluate learners' learning outcomes and its purpose is to measure their achievement of specific criteria. Ary (2010, p. 201) defines a test as a series of stimuli given to a person with the goal of elicit reactions that will allow a numerical score to be issued. To measure students' vocabulary mastery in this study, the researcher used a test. To collect data, this study uses a pre-test and post-test given to one group.

The first instrument is a test. Pre- and post-tests were the kinds of tests employed in this study. A pre-test measures one or more characteristics that are evaluated for experiment participants before their administration of a treatment (Creswell 2008:301). The second instrument is post-test. According to Creswell (2008), a post-test is a measurement of certain traits or qualities that is given to experiment participants following a treatment. The researcher administered two tests in order to collect data. Pre- and post-test were administered for both classes, the pre-test was given prior to the therapy and the post-test was given following the treatment. Both the experimental and controlling groups took the tests. The identical exam was taken by the researcher for both classes. There were 20 multiple-choice items in the exam, each item's score for the right response is shown on a scale of 5.

These findings are going to be analyzed along with the pre-test results to see how successfully Duolingo has helped students' vocabulary. In general, this research employs a quantitative methodology in which the process uses many numbers from collecting data, interpreting data, and producing results, stated in Arikunto (2005). It then uses formulas that correlate with the goals of the research to analyze the data and provides a descriptive explanation of the findings. The tasks in this study included filling in the blanks, translating sentences from the learners' mother tongue to the target language and the reverse, and matching pictures to words.

2. Validity and Reliability

To make sure the instrument being used is accurate, a validity test is carried out. If an instrument can find the proper data for a variable and measure what is intended, then it is considered correct. To obtain the pretest and posttest scores, the researcher administers test questions to a class that doesn't participate in the research. After getting the instrument score, the researcher uses the SPSS program with "Pearson's Bivariate Correlation" to examine the validity of the instrument by comparing the pretest and posttest results to ensure instrument validation. The findings indicated that 20 of the exam questions were acceptable. Questions from valid inquiries create the pretest and posttest.

Even though the instrument is tested multiple times at various times, the purpose of the reliability test is to make sure that it is reliable and accurate.

Using the SPSS program's "Reliability Analysis," the researcher tested the pretest and posttest to make sure they were accurate, reliable, and competent to demonstrate the participants' achievements. The reliability is quite strong, as indicated by the Cronbach's Alpha result of 0.688.

D. Data Collection Techniques

This study employed a pre-test and post-test to gather data. Prior to receiving therapy, the experimental class and control class took the pre-test to ascertain the students' baseline vocabulary knowledge. Determine student's starting vocabulary knowledge. Following the administration of the pretest, the experimental class received instruction from the researchers on how to use Duolingo for learning a new language. vocabulary using the Duolingo, while no treatment was given to the control group. any medical treatment. There were four sessions for the treatment. Class 10A became the experimental class or treatment group, while class 10C became the control group. The researcher taught both courses for five meetings, which included a pre- and post-test. The researcher instructed the control group for five meetings, which included a pre- and post-test.

1. Pre-test

A pre-test is a test completed by the teacher before teaching. The purpose of the pretest is to assess students' basic understanding of the material that will be covered.

2. Treatment

Treatment is the act of providing information according to the research's goal. The treatment that provides the conditions for which the effect was assessed. In this research, the researcher used Identifying pictures. Identifying pictures. is one of the alternate methods for teaching vocabulary in English, according to Lado (1994:156). Words and sentences can be illustrated with pictures of various kinds and colors. Original paintings. Since handmade images don't have to be particularly artistic, they can also be used. Using images will help you memorize English words more quickly. Even if the image concept is stale, it is still relevant. It's also applied to kids who speak fluent English.

As an example: Images of flowers, fruits, animals, etc.

Table 3. 2

Procedure of Treatment

Experimental Group Using Duolingo	**Control Group Using Quizizz**
The researcher met the students, looked over the attendance list, inquired about their conditions, provided motivation, and explained the subject matter.	The researcher met the students, looked over the attendance list, inquired about their conditions, provided motivation, and explained the subject matter.

To determine the student's abilities, the researcher administered a pre-test.	To determine the student's abilities, the researcher administered a pre-test.
- The teacher gives an explanation about the Descriptive text. Then, Additionally, the researcher provided an explanation of the Duolingo app that they will play in class. The researcher used the Duolingo application as media. The application is played in a classroom on an individual basis. - Using the app, the students choose a phone lesson that includes ten to fifteen tasks. The exercises were in the category of Phrases.	- The teacher gives an explanation about the Descriptive Text - Meanwhile, in the control class, researchers used the Quizizz application as media. The application is played in the classroom individually. - The students choose a phone lesson that includes ten to fifteen tasks. The exercises were in the category of Phrases
The researcher provides feedback on the task of the students.	The researcher provides feedback on the task of the students.
The researcher provides conclusions about the material the students have learned today.	The researcher provides conclusions about the material the students have learned today.

Following this meeting, a post-test was administered by the researcher. This test is used to determine students' achievement	Following this meeting, a post-test was administered by the researcher. This test is used to determine students' achievement
Closing	Closing

3. **post test**

The two classes—the experimental class and the control class—will then each receive a posttest. The posttest aims to determine whether there is an increase in student learning outcomes between the control class and the experimental class after being given treatment.

E. The Process of Data Collection

The researcher of this study selected participants from classes XA & XC. The researcher employed tests to collect the data.

1. Meeting I

The researcher greeted and introduced himself to the students during this meeting. After that, the researcher clarified that she had attended their class in order to get the necessary material for his research. After the researcher introduction to the class, the writer looked through the attendance list to see who was present and who wasn't in the classroom that day. Then the researcher gave each student a test to begin the lesson.

2. Meeting II

The researcher greeted each student in the room, went over the attendance sheet, conducted everyone in prayer before the class started studying the subject, and went through what had been discussed during the previous meeting. Then the researcher used Duolingo to present the students an image of an animal, and the students were instructed to use the app to identify the animal and what it means. Following that, the researcher gave the students an opportunity to ask questions. Several of them inquired about the reason for the task they had completed, and the researcher responded by describing the description text.

The researcher used Duolingo to provide them with listening activities. The students were given audio on animals, and the researcher asked them to identify the correct response based on what they heard. In addition to filling in the blanks with fill-in phrases on animals that Duolingo also provided, the students were required to rephrase some statements. The researcher then invited every student to describe an object on their own, and some were told to read their writing aloud to the other students. Afterwards, the writer and students compiled their collective knowledge.

3. Meeting III

At the beginning of the meeting the researcher greeted each student in the room, went over the attendance sheet, conducted everyone in prayer before the class started studying the subject, and went through what had been discussed

during the previous meeting. Then, the researcher started the main activity. The students are divided into groups by the researcher, who then instructs them to sit in those groups. The researcher encourages students to identify the meaning, correct spelling, and attributes of several animal photographs using Duolingo. Subsequently, the instructor presents a few samples of descriptive writings to help students grasp the material. to make their comprehension better.

The researcher provided them with Duolingo exercises that included listening to words, asking them to interpret sentences, and having them complete certain tasks. further requested that they do certain fill-in-the-blank activities in groups by collectives. Additionally, each group was told to write and recite a brief factual statement that served as a description. a brief, factual sentence that you can read out to other groups, after that the students and the researcher summarized their collective learning at the conclusion of the class.

4. Meeting IV

The researcher starts the lesson by greeting all students in the class. lesson, saying a prayer as a group, looking over the student list, and getting their input on the previous materials. The researcher requested that students determine the definition, correct spelling, and characteristics of the creatures. in various Duolingo-illustrated animal photos. Students are shown an example of a descriptive text video on "Dolphin" and asked to provide opinions.

The researcher provided them with Duolingo exercises that included listening to words, asking them to interpret sentences, and having them complete

certain tasks. further requested that they do certain fill-in-the-blank activities. Each student was given instructions to prepare a factual report based on the short text. The researcher gave a summary of the lesson's content at the conclusion and gave the students advice on how to be ready for the post-test at the next meeting. The researcher also expressed appreciation to them for their assistance.

5. Meeting V

At the beginning of the meeting the researcher greeted each student in the room, went over the attendance sheet, conducted everyone in prayer before the class started studying the subject, and went through what had been discussed during the previous meeting. Then, the researcher started the post test. The researcher distributed tests to all students to collect data from students to investigate students' vocabulary towards the use of Duolingo. The researcher also expressed appreciation to them for their assistance.

F. Technique of Data Analyses

The researcher performed a quantitative analysis on the data. There will be a comparison of the pretest and posttest final results. to see whether there are any significant differences in the students' scores between the two periods of instruction using Duolingo. According to Sugiono (2014, p. 207), data analysis is a step that comes after all the information has been acquired from respondents and other sources. The final stage of an experiment is data analysis, or in this case, data processing. Data analysis, according to Ary et al. (2010, p. 95), explains how

researchers will examine data in order to evaluate hypotheses and/or find answers to research questions.

following the pre- and post-test data collection by the researcher. The results of the pre- and post-test scores were compared by the researcher. After that, the data was analyzed, and the results were determined using the Analysis of Covariance (ANCOVA) method with a 5% degree of significance. To determine if there was a significant difference in this research, the mean difference score between the experimental and control classes was examined using ANCOVA. In addition, the difference between the pretest and posttest results of each class for the experimental group and control group is the score. Before conducting the test, it is necessary to conduct a prerequisite test analysis which includes Normality test, Homogeneity test of variances, Homogeneity Regression, and Linear Relationship between Covariate and Dependent Variable.

1. **ANCOVA (Analysis of Covariance)**

   Researchers employed ANCOVA because the sample in this study was not selected at random. Then, using SPSS version 23, the analysis of covariance (ANCOVA) was carried out. The purpose of this data research is to find out how students who use the Duolingo application and students who do not apply the Duolingo application. Following the research, this statistical test was used to determine the effectiveness of using Duolingo on students' vocabulary mastery after the research.

Additionally, the following value or importance criteria are used to assess whether an effectiveness is accepted or rejected:

Ho is accepted, H1 is rejected if the value of Sig. > a is 0.05

Ho is rejected, H1 is accepted if the value of Sig. < a is 0.05

2. Testing of Hypotheses

The following are the hypotheses, which are based on the assumption and will be tested using Analysis of Covariance:

a. The Alternative Hypothesis (Ha): The Duolingo application has an impact on students' vocabulary mastery if <sig $\alpha = 0.05$ (5%). It indicates that the null hypothesis (Ho) is rejected, and the alternative hypothesis (Ha) is accepted. So, it can be concluded that the use of the Duolingo application for students' vocabulary mastery is effective. The Duolingo application helps students master vocabulary. This is clearly shown by the difference between the controlled class and the experimental class.

b. Null Hypothesis (Ho): If > sig $\alpha = 0.05$ (5%) or there is no effect of the Duolingo application on students' vocabulary knowledge, then the null hypothesis (Ho) is accepted and the alternative hypothesis (Ha) is rejected. The null hypothesis states that there is no significant effectiveness of Duolingo on students' vocabulary mastery. So, it means that the use of the Duolingo application for student vocabulary mastery is not effective. This is clearly shown by the difference between the controlled class and the experimental class.