

CHAPTER III RESEARCH METHOD

A. Approach and Type of Research

This study uses a quantitative method with quasi experimental research design that aims to evaluate the effectiveness of using Augmented Reality on Vocabulary Mastery to Seventh Grade Students of SMP ISLAM AL AZHAR 52 Kota Bengkulu. The quantitative method was chosen because it allows researchers to measure specific variables and personalize the effect of the intervention, namely the use of AR in learning. In the experimental approach, researchers compare two class, experimental class will be taught using Augmented Reality and the control class taught with conventional methods. This is in line with the statement of Gay, Mills, and Airasian (2012) which states that experimental research allows researchers to identify cause and effect relationships between variables.

In addition, experimental research also provides an opportunity to control outside variables that may affect the results, so that the validity of the research results can be better maintained. According to Fraenkel and Wallen (2012), experimental design not only distinguishes the groups involved, but also involves measuring the results before and after treatment. The use of AR in learning is expected to increase student motivation and learning outcomes.

Moreover, this research is supported by the results of Radu's (2014) study which shows that the use of technology, especially Augmented Reality, can increase student engagement and improve understanding of the concepts taught.

Table 1. Nonequivalent Control Class Design

Subject	Pre-test	Treatment	Post-test
Experimental Class	01	X	02
Control Class	03	X0	04

Note:

01 : Pre Test For The Experimental Class

02 : Post Test For The Experimental Class

03 : Pre Test For The Control Class

04 : Post Test For The Control Class

X : Treatment using Augmented Reality (AR)

Xo: No Treatment

B. Location and Time of Research

This research was conducted at SMP Islam Al Azhar 52 Kota Bengkulu, in the second semester of the 2024/2025 academic year

C. Research Variables

In this study, there are two types of variables: dependent variables, which are influenced by other variables, and independent variables, which affect other variables. The variables in this study are as follows:

1. English Vocabulary Mastery (Y)
2. Augmented Reality (AR) on Teaching English (X)

D. Population and Sample

1. Population

Population refers to the general scope that consists of objects or subjects with specific qualities and characteristics determined by the researcher for analysis, from which the researcher can draw conclusions about the study's findings. In this study, the population comprises all seventh-grade students at SMP Islam Al Azhar 52 Kota Bengkulu for the 2024/2025 academic year, divided into four classes: A, B, C, D. The total population can be seen in the table below.

Table 2. Population of Students

No.	Class	Gender		Total
		Female	Male	
1.	VII. A	16	17	33
2.	VII. B	16	13	29
3.	VII. C	16	16	32
4.	VII. D	13	19	32
Total				126

2. Sample

The researcher will select 64 students of seventh graders from this and split them into two groups: the

experimental group and the control group. To guarantee that every student has an equal chance of being chosen, this sample is chosen using simple randomness. This sampling strategy is crucial to preventing bias in the study and increasing the validity of the findings. The accuracy of the research findings can be improved and the effects of the intervention can be more impartially examined by researchers with the use of appropriate sampling techniques.

Table 3. Total students in the experiment and control class

No.	Class	Classroom	Gender		Total
			Male	Female	
1.	Experimental group	VII. C	16	16	32
2.	Control group	VII. D	19	13	32
Total					64

E. Research Instrument

1. Test

The instruments used in this research consist of two main parts to measure students' achievement in vocabulary and sentence structure comprehension in English:

A. Vocabulary Test

1. Pre-test: Administered before the treatment to assess students' initial vocabulary knowledge.
 - a. Format: Multiple-choice with 25 questions based on

vocabulary items related to English descriptive texts.

b. Topic: Descriptive text with AR visuals.

c. Indicators:

1) Identifying meanings of vocabulary words.

2) Using vocabulary in proper context.

3) Understanding synonyms and antonyms.

2. Post-test: The same test is given after the treatment to measure improvement in students' vocabulary knowledge after the implementation of Augmented Reality (AR) in teaching.

1. Validity test

According to Donald Ary et al. (2010), validity is a crucial consideration in the development and evaluation of measurement instruments. They explain that validity refers to how well an instrument measures what it is intended to measure. The criteria for test validity state that if the significance is < 0.05 , the question item is considered valid. To assess the validity of each question item, the score of that item is correlated with the total score. A question item is deemed valid if $r\text{-count} > r\text{-table}$; if $r\text{-count} \leq r\text{-table}$, the question is considered invalid.

Table 4. Interpretation of Validity

Item	r Tabel	Significance	r Count	Results
1	0,355	0,009	.449**	Valid
2	0,355	0,045	.351*	Valid
3	0,355	0,001	.568**	Valid
4	0,355	0,019	.408*	Valid
5	0,355	0,642	0,084	Unvalid
6	0,355	0,131	0,269	Unvalid
7	0,355	0,330	0,175	Unvalid
8	0,355	0,492	0,124	Unvalid
9	0,355	0,003	.501**	Valid
10	0,355	0,204	0,227	Unvalid
11	0,355	0,642	0,084	Valid
12	0,355	0,021	.401*	Valid
13	0,355	0,135	0,266	Unvalid
14	0,355	0,009	.450**	Valid
15	0,355	0,179	0,240	Valid
16	0,355	0,492	0,124	Valid
17	0,355	0,000	.633**	Valid
18	0,355	0,094	0,296	Unvalid
19	0,355	0,642	0,084	Unvalid
20	0,355	0,942	-0,013	Valid
21	0,355	0,121	0,276	Valid
22	0,355	0,642	0,084	Valid
23	0,355	0,003	.501**	Unvalid
24	0,355	0,009	.447**	Unvalid
25	0,355	0,008	.455**	Valid
26	0,355	0,216	0,221	Unvalid
27	0,355	0,204	0,227	Unvalid
28	0,355	0,028	.382*	Valid
29	0,355	0,062	0,329	Unvalid

30	0,355	0,135	0,266	Valid
31	0,355	0,204	0,227	Valid
32	0,355	0,131	0,269	Valid
33	0,355	0,016	.414 [*]	Valid
34	0,355	0,029	.381 [*]	Valid
35	0,355	0,194	0,232	Unvalid
36	0,355	0,226	0,217	Valid
37	0,355	0,189	0,235	Valid
38	0,355	0,409	0,149	Valid
39	0,355	0,179	0,240	Unvalid
40	0,355	0,703	0,069	Valid

(Appendix 3)

2. Reliability test

Reliability of the test items refers to the degree of consistency or stability of those items. To measure the reliability of the items, Cronbach's Alpha calculation is used. The formula is expressed as follows:

$$r_{11} = \left[\frac{n}{n-1} \right] \left[1 - \frac{s_i^2}{s_t^2} \right]$$

Note:

n : number of items

s_i^2 : variance of scores for each item

s_t^2 : variance of total scores

The researcher used 40 multiple-choice test items at this time of reliability test. The other class was used for a trial from a different classroom but belonging to the same course on which the research will be carried out. Subjects

The number of participants enrolled in this trial was 32 students. Once the trial was finished, the authors examined the test questions data for reliability. Reliability The reliability coefficient as measured for the test was 0.857. Here, since the value that is permissible to be considered as reliable is 0.700, it can be seen that the test is highly or strongly reliable in nature.

Table 5. The Result of Reliability

Reliability Statistics	
Cronbach's Alpha	N of items
0.857	40

(Appendix 3)

Based on the table above, it be concluded that the questions with a total of 40 questions that were tasted on a total 32 students are very suitable to be used in the post-test that will be carried out by the researcher because it shows that the results of Cronbach's Alpha reach 0.857. The value of Cronbach's a Alpha might be interpreted as follows, according to Hair et al., (2010) in (Ahdika, 2021).

Table 6. Cronbach's Alpha Level of Reliability

Cronbach's Alpha Score	Level of Reliability
0.0 – 0.20	Less Reliable
>0.20 – 0.40	Rather Reliable
>0.40 – 0.60	Quite Reliable
>0.60 – 0.80	Reliable
>0.80 – 1.00	Very Reliable

(Appendix 3)

F. Data Collection Technique

The researcher utilized pre-test and post-test methods for data collection:

1. Pre-Test

Designed to evaluate students' initial abilities in vocabulary and sentence structure comprehension. It was conducted before introducing AR-based teaching methods.

2. Treatment

The treatment involves teaching vocabulary and sentence structure using AR technology. Over five sessions, the researcher used AR tools to enhance students' interaction with English content. Students learned vocabulary by visualizing 3D objects and practiced sentence structure by describing them.

3. Post-test

After completing the treatment, a post-test was conducted to measure improvements in vocabulary knowledge and sentence structure abilities. New topics were introduced in the post-test to assess the impact of AR on their English learning compared to the pre-test results.

The classification of student scores in both pre-test and post-test is based on Depdikbud (1985) as follows:

Score Range	Classification
96-100	Excellent
86-95	Very Good
76-85	Good
66-75	Fairly Good
56-65	Fairly
36-55	Poor
0-35	Very Poor

Adapted from Heaton, J.B. (1998). Writing English Language Tests)

G. Data Analysis Technique

The researcher analyzed the pre-test and post-test results using homogeneity and normality tests to evaluate the effectiveness of AR-based teaching.

1. Normality Test

A normality test is commonly used to determine whether

the data follows a normal distribution. Used to determine if the data follows a normal distribution. SPSS was used to assess the normality of the data.

2. Homogeneity Test

The homogeneity test aims to identify if the research population is homogeneous. This test evaluates whether the data from different samples share the same variance. The following criteria are applied to determine homogeneity:

- a. Significance level (α) = 0.05
- b. If $\text{sig} > \alpha$, the variances of the samples are considered equal (homogeneous).
- c. If $\text{sig} < \alpha$, the variances are not equal (not homogeneous). SPSS is used for this assessment.

3. T-Test

The T-test in SPSS will be employed for data analysis, utilizing the specified formula. This test evaluates the significance of the partial effects of independent variables on the dependent variable while assuming other independent variables remain constant.

- a. If the significance level is $< \alpha$ (0.05), it indicates that the independent variable has an effect on the dependent variable.
- b. If the significance level is $> \alpha$ (0.05), it shows that the independent variable does not have a significant effect on the dependent variable.

4. N-Gain Data

The N-Gain test is a method to assess improvements in learning outcomes or understanding following an intervention, such as teaching or training. It evaluates the effectiveness of the intervention in enhancing a person's knowledge or skills. N-Gain measures the change relative to the initial score (pre-test) and the final score (post-test). The formula for calculating N-Gain is:

$$\text{N-Gain} = (\text{Post-test score} - \text{Pre-test score}) / (\text{Ideal score} - \text{Pre-test score})$$

Alternatively, it can be calculated as:

$$\text{N-Gain} = (\text{Maximum score} - \text{Pre-test score}) / (\text{Post-test score} - \text{Pre-test score})$$

N-Gain Interpretation: N-Gain values are classified into three categories for easier understanding:

- High: $\text{N-Gain} > 0.7$
- Medium: $0.3 \leq \text{N-Gain} \leq 0.7$
- Low: $\text{N-Gain} < 0.3$