

CHAPTER III

RESEARCH METHOD

A. Research Design

In this research the researcher uses experimental research. Experimental research is the only type of research that can test hypotheses to establish cause-effect relationships. It represents the strongest chain of reasoning about the links between variables. In experimental research the researcher manipulates at least one independent variable, controls other relevant variables, and observes the effect on one or more dependent variables. Experimental research is the most structured of all research types. In an experimental study, the researcher is in on the action from the very beginning, selecting the groups, deciding how to allocate treatment to the groups, controlling extraneous variables, and measuring the effect of the treatment at the end of the study (Gay, 2012:250-251).

According to Sugiyono (2001) there are several forms of experimental design that can be used in research, namely: pre-experimental design, true experimental design, factorial design, and quasi experimental design. In this research the researcher uses quasi experimental design. Quasi experimental designs are used when researchers can't randomly assign subjects to treatments and have less control over other factors. This makes them vulnerable to various threats that can affect the accuracy of their findings (Ary, D., Jacobs, LC, & Sorensen, 2010). Quasi-experimental design involves the use of a control class and an experimental class, so the researcher will choose two

classes to compare to see the effect of the Problem Based Learning Model. Researchers used problem based learning model in learning to find out the effect of PBL on students' critical thinking skills in expository text in class XI at ISHS 1 Mukomuko.

Table 3.1
Quasi Pretest – Posttest Design

Quasi Experimental Design			
Experimental Class	Pre-test	PBL Treatment	<i>Posttest</i>
Control Class	Pre-test	Conventional	<i>Posttest</i>

(Creswell, 2016)

This study used a Quasi Experimental design with a Pre-test–Post-test Control Group Design approach. The quasi-experimental design was chosen because the researcher could not perform full randomization (Random Assignment), so the control group and experimental group were formed based on groups that already existed in the field. In this research design, there are two groups, namely the experimental group and the control group.

The experimental group was given treatment in the form of the application of the problem based learning approach. Before being given treatment, students were given an initial test or pre-test to measure students' critical thinking skills when writing expository texts. After being given PBL treatment, students were then given a final test or post-test to see the differences and effects of the application of the PBL approach on the critical thinking skills of ISHS 1 Mukomuko students when writing expository texts.

Meanwhile, the control group was given a more conventional learning process, namely the learning process that is usually applied by teachers, without being given PBL treatment. Similar to the experimental group, students in the control group were also given a pre-test and a post-test to find the differences that occurred, so that the results could be compared with the experimental group. In this way, it can be analyzed how much influence the application of the PBL approach has on the critical thinking skills of ISHS 1 Mukomuko students when writing expository texts.

B. Variable of the Research

In this study there are two variables, namely the independent variable, and the dependent variable. This is in accordance with the statement of Nana Sudjana (1988: 24) who expressed the following opinion: Variables in research can be divided into two categories, namely free variables and dependent variables or independent variables and dependent variable. The independent variable is the treatment variable or deliberately manipulated to determine its intensity on the dependent variable. The dependent variable is the variable that arises due to the independent variable, therefore the dependent variable becomes the benchmark. In this research, the use of PBL in the experimental class is the independent variable (X), while student learning outcomes in the critical thinking skills in expository text as the dependent variable (Y).

C. Population and Sample

1. Population

In a study, determining the population is an important step to ensure that the results obtained reflect the actual conditions. The population refers to a group of individuals or objects that have specific characteristics aligned with the research objectives. This research implements a group population, in which 5 classes of the eleven grade will be the population. The population is made up of all individuals who belong to a specific class of persons, things, or events (Ary, D., Jacobs, L.C., & Sorensen, 2010). The population of this study is all the students in class XI at Islamic Senior High School 1 Mukomuko. There are 5 classes in grade XI: XI A, XI B, XI C, XI D, XI E and XI F with a total of 180 students.

Table 3.2
The population

No	Classes	The number of students
1.	XI A	30
2.	XI B	30
3.	XI C	30
4.	XI D	30
5.	XI E	30
6.	XI F	30
Total		180 Students

Source: The English Teacher at Islamic Senior High School 1 Mukomuko

2. Sample

The sample is part of the population (Ary, D., Jacobs, LC, & Sorensen, 2010). Based on the population mentioned above, the sample selected for this study comprised only 2 classes out of 6. In order to effectively achieve the research objectives, the researcher chose to use a purposive sampling technique that allows the selection of the most relevant classes to the focus of the study. In this case, class XI.B consisting of 30 students was chosen as the experimental group, while class XI.C which also consisted of 30 students was chosen as the control group. With this approach, researchers can focus on in-depth and relevant analysis of the influence of problem based learning on students' critical thinking in writing expository text.

Table 3.3
Sample of the Research

No	Classes	The number of students
1.	XLB	30
2.	XI C	30
Total		60 Students

D. Instrument of the Research

Research tools are also an important aspect to collect accurate and comprehensive data. The selection of tools depends on the research question, objectives, and nature of the data needed. The tools used will have a direct impact on the quality and reliability of the research findings. The instrument used in this study is a test. The test applied is a writing test; namely, students

are asked to write an expository text on a given topic. In the process, students have enough time to search for information, compose sentences, and convey their ideas in detail and logically according to the structure of the expository text.

Initially, students were given an initial test (pre-test) to measure students' critical thinking skills when writing expository texts. After being given PBL treatment, students were given a final test (post-test) to see the differences and effects of implementing the PBL approach on ISHS 1 Mukomuko students' critical thinking skills when writing expository texts. In this way, it can be analyzed how much influence the implementation of PBL has on the critical thinking skills of ISHS 1 Mukomuko students.

Table 3.4
Blue Prints Test

No.of Students	Type	Main Material	Durations	Indicators	Scores
1	Writing Test	Expository Text	60 Minutes	1. Interpretation	1-4
2				2. Analysis	1-4
3				3. Evaluation	1-4
↓				4. Inference	1-4
↓				5. Explanation	1-4
30				6. Self-Regulation	1-4

The table above is a systematic evaluation planning guideline to measure students' critical thinking skills in writing expository texts. This test is designed for 30 students and is carried out in 60 minutes. The main material tested is expository text, which is a type of text that aims to explain a topic logically and informatively and is supported by facts and rational reasons.

Before starting writing, students are given instructions and directions that aim to guide them in understanding the assignment and assessment expectations.

This test evaluates six indicators of critical thinking based on Facione's theory (2015), namely: interpretation (the ability to understand and interpret information), analysis (the ability to analyse information and argument structure), evaluation (the ability to assess the quality of information or arguments), inference (the ability to draw logical conclusions from available information), explanation (the ability to explain ideas clearly and coherently), and self-regulation (the ability to reflect on and evaluate one's own thinking process).

Each indicator is scored in the range of 1 to 4, which indicates the level of student mastery of these critical thinking skills. This blueprint helps assessors to conduct systematic, objective, and comprehensive evaluations of students' writing results and supports learning objectives that focus on improving critical thinking skills in the context of writing expository texts.

E. Data Collection Technique

The experimental procedure in this study was designed systematically to ensure the accuracy of the data obtained. This study was conducted through three main stages, namely the implementation of the pre-test, the implementation of the treatment, and data collection through the post-test. This study focuses on the application of the Problem-Based Learning (PBL) learning model in learning to write expository texts with the topic of the

benefits of technology for education. Class XI B at ISHS 1 Mukomuko was designated as the group

1. Pre-test

The initial stage carried out was the pre-test, which was given to both groups, both experimental and control. This pre-test was in the form of an individual expository text writing assignment with the theme of the the impact of technology on education. The aim was to measure students' initial abilities in writing expository texts and to show the extent of their critical thinking skills before receiving treatment. The pre-test also functions as a data comparison to determine the increase in learning outcomes after treatment was given. The pre-test assessment was carried out using critical thinking indicators according to Facione (2015), which include interpretation, analysis, evaluation, inference, explanation, and self-regulation. The pre-test results were analyzed to ensure that both groups had relatively balanced initial abilities before treatment was given.

2. Treatment

After the pre-test was conducted, the experimental class received a treatment involving the Problem Based Learning Approach and the impact of technology use material to evaluate its effect on students' writing skills in expository texts. In contrast, the control class underwent a traditional learning method without using PBL. The steps for the treatment are outlined as follows:

Table 3.5
Procedures of Experiment by Simamora et al. (2017):

PBL Stages	Objective	Activity	Duration
Orienting Students to the Problem	Awaken interest student to problems that will solved and built context topic .	1. The teacher delivers objective learning based on topic . 2. Questions lighter submitted to student based on topic . 3. Students watch videos or see infographics For understand context problem 4. Discussion beginning about issues raised	10 minutes
Organizing Students for Learning	Prepare student in a way individuals and groups For explore topics and identify required information .	1. The teacher distributes text expository short related topic 2. Students observe structure and characteristics linguistics text 3. Discussion group started with distribution group small (3–5 people)	20 minutes
Guiding Individual and Group Investigations	Push student explore , collect information , and compile argument in a way collaborative .	1. Student compile an outline or write paragraph argumentative in group 2. Discussion For choose argument main and add proof supporter 3. Teachers provide guidance reflective	25 Minutes
Developing and Presenting the Work	Presenting results Work group or individual and accept bait come back from teachers and friends .	1. Student in a way individual write expository text with notice geberic structure and characteristics linguistics text . 2. After finished writing , students exchange text with Friend peers For giving and receiving bait come back using the Peer Review Sheet 3. Students do revision text based on bait come back .	25 Minutes

PBL Stages	Objective	Activity	Duration
Analyzing and Evaluating the Problem-Solving Process	Reflecting on the learning process , thinking critical , and the resulting solutions .	1. The teacher submits question reflective 2. Students write reflection personal 3. Discussion open about what has been studied and how they finish problem	10 minutes

3. Post Test

After the learning process was completed, students in the experimental and control groups were given a post-test in the form of an individual expository text writing assignment, with the same topic as in the pre-test. The post-test assessment used the same indicators as in the pre-test, namely based on Facione's theory (2015), which includes six aspects of critical thinking skills: interpretation, analysis, evaluation, inference, explanation, and self-regulation. Then the post-test results from the experimental and control groups will be compared to determine whether the use of the Problem-Based Learning model has a significant effect on improving students' critical thinking skills.

F. Data Analysis Technique

Data Analysis is the process of regularly applying statistical techniques to describe and illustrate, condense and recap, and evaluate data. The following is the Data analysis of this research:

1. Data Description

The data obtained in this study are presented first to provide an initial overview before further analysis is carried out. According to Putri & Fitria

(2021), descriptive data is an effort to display data so that the data can be presented well and interpreted easily. Data presentation is done in the form of tables and graphs to make it easier to understand. This data includes the results of students' writing tests before and after treatment, which will later be analyzed to see the patterns of change and trends that occur. This data description aims to provide an initial understanding of the data collected before entering a more in-depth analysis stage.

2. Descriptive Data Analysis

Descriptive statistical analysis is a statistic used to analyze data by describing or depicting the collected data as it is without intending to make conclusions that apply to the public or generalization. This analysis is only an accumulation of basic data in the form of descriptions alone in the sense that it does not seek or explain interrelationships, test hypotheses, make predictions or draw conclusions (Muhson, 2006). Descriptive statistical analysis techniques that can be used include:

- a. Presentation of data in the form of tables or frequency distributions and crosstabs. With this analysis, the tendency of research findings will be known, whether they fall into the low, medium or high category.
- b. Presentation of data in visual form such as histograms, polygons, ogives, bar charts, pie charts, and symbol diagrams.
- c. Calculation of measures of central tendency (mean, median, mode).
- d. Calculation of measures of location (quartiles, deciles, and percentiles). Calculation of measures of distribution (standard

deviation, variance, range, quartile deviation, mean deviation, and so on

1) Mean

The mean is a representative of a data set or an average value which is considered to be the value closest to the actual measurement results. Determining the mean can be done by adding up all the data values, then dividing it by the number of data. For more details to determine the mean can use the following formula:

$$M_x = \frac{\sum X}{N}$$

2) Standard Deviation

Standard deviation is the distribution of data in a sample to see how far or how close the data values are to the average. One of the functions of the standard deviation formula is to provide an overview of the distribution of data relative to the average. To determine the deviation data can use the following formula:

$$SD = \sqrt{\frac{\sum x^2}{N}}$$

3) MAX

The MAX function is used to display the maximum (largest) value or number contained in a data cell/range.

4) MIN

The MIN function is the opposite of MAX where MIN is used to display the minimum (smallest) value or number contained in a cell/range.

5) Range

The range, which is usually given the symbol R, is a statistical measure that shows the distance between the lowest score and the highest score.

3. Pre-Requirement Data Analysis

a. Normality Test

The Normality test is a test that is carried out as a prerequisite for conducting data analysis. A Normality test is carried out to determine good and feasible data to prove whether the data is normally distributed or not. Normality test is seen from the pretest and post-test data results. The normality test of the pretest and post test data results used is This test was conducted using IBM SPSS version 25 for Windows. The decision criteria in the normality test in SPSS according to Arifin (2017) are:

- 1) If the significance value is $p > 0.05$, the data is normally distributed.
- 2) If the significance value is $p < 0.05$, the data is not normally distributed.

After the normality test is carried out using the Shapiro - Wilk test and the data is stated to be normally distributed, it is then continued with a homogeneity test of two variances on the pretest and post-test data results using the Levene test with Statistical Package For Social Sciences (SPSS) 25 for Windows software.

b. Homogeneity Test

Homogeneity test is conducted to determine whether students in the class have homogeneous variance or not. Homogeneity test of two variances on the results of pretest and posttest data using Levene's test with Statistical Package For Social Sciences (SPSS) 25 for Windows software. The decision criteria in the homogeneity test in SPSS according to Arifin (2017) are:

- 1) If the significance value $p < 0.05$ means that the data is declared non-homogeneous.
- 2) If the significance value $p > 0.05$ means that the data is declared homogeneous.

From the test results, the data of both groups have the same variance, so the hypothesis test is carried out with the sameness using the one sample t test.

c. Hypothesis Test

Hypothesis testing is a statistical method used to determine whether there is enough evidence in a data sample to draw conclusions about a population. This involves formulating a hypothesis that has been set by the researcher where the hypothesis is There is a significant effect of PBL on students' critical thinking skills in writing expository text at islamic senior high school 1 Mukomuko (The alternative hypothesis) and there is no significant effect of PBL

on students' critical thinking skills in writing expository text at islamic senior high school 1 Mukomuko (The null hypothesis).

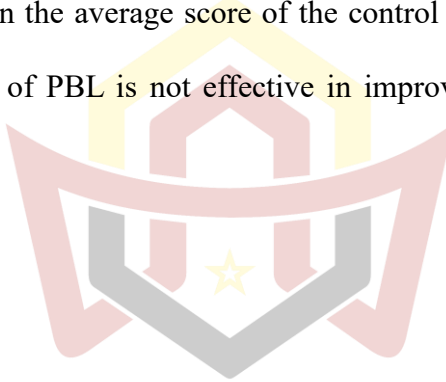
In this study, the researcher used the t-test to test the hypothesis that had been proposed. The t-test used in this study is specifically the Independent Sample t-test. This test is to determine the difference in the average of two independent populations/data groups (Nuryadi, et.al., 2017). The t-test will be analyzed using SPSS version 25 software with the following criteria:

- 1) Levene's Test is used to test the equality of variance between two groups.
 - a) If $p < 0.05 \rightarrow$ different variances.
 - b) If $p > 0.05 \rightarrow$ equal variances
- 2) Selection of t-Value
 - a) If the variances are equal (Levene's Test is not significant), use the t-value in the equal variance assumed row.
 - b) If the variances are different (Levene's Test is significant), use the t-value in the equal variance not assumed row.

If the t-value is significant ($p < 0.05$) in the equal variance assumed row, then there is a significant difference between the experimental group and the control group. Conversely, if the t-value is not significant ($p > 0.05$) in the equal variance assumed row, then there is no significant difference between the two groups.

The results of the t-test are interpreted using the following criteria:

- 1) If the ig value is greater than or equal to 0.05, then H_0 is accepted, which indicates that the average score of the experimental class is higher than the control class, and the use of PBL is effective in improving students' speaking skills.
- 2) If the sig value is less than 0.05, then H_0 is rejected, which means that the average score of the experimental class is the same as or less than the average score of the control class, this indicates that the use of PBL is not effective in improving students' speaking skills



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