CHAPTER III

RESEARCH METHODOLOGY

This chapter presents the method use to conduct the research design, research method, population and sample, instruments, data collection and data analysis.

A. Research Method

This research used quantitative research method. Creswell (2013) states that quantitative research is method for testing certain theories by examining relationship between variables using research instrument that produce data in the form number analyzed using statistics. In addition, Crowl (1996: 10 in Suryani, 2015), "quantitative method is used to examine questions that can be best answered by collecting and statistically analyzing data that are in numerical form".

This research method provide the students with pre-test, treatment, and post test to find out the effect of snowball throwing technique compared by problem based learning in teaching grammar. Since there was no random sampling, the sample in this research is considered as nonequivalent sample which consisted of Experimental and Control group (Jackson, 2008: 323).

B. Research Design

This research conducted quasi-experimental as the research design. The quasi-experimental design was used because this method does not require random sampling (Jackson, 2008: 318).

In this research, two classes were taken as the sample classes; those were labeled as the experimental group and control group. The first group (e1) as the experimental group was given a pre-test (X1), treated by using snowball throwing technique (T), and then provided a post-test (X2). The second group (c1) as the control group was given a pre-test (X1), treated by using problem based learning (O) and a post-test (X2) (Hatch and Farhady 1982:21),. Here is the representation of the design:

Table 3.1

The Quasi Experimental Design

Group	Pre-test	Treatment	Post-test
Experimental	Xe 1	T	Xe 2
Control	Xc 1	O	Xc 2

Xe 1 : students' pre-test scores of experimental group

Xc 1 : students' pre-test scores of control group

T : Snowball Throwing Technique (STT)

O : Problem Based Learning (PBL)

Xe 2 : students' post-test scores of experimental group

Xc 2 : students' post-test scores of control group

The table shows that both classes are given a pre-test and a post-test, but the difference is in giving the treatments. In the experimental group, snowball throwing technique was given as a treatment to the students in the learning process. In contrast, for the control group, problem based learning was implemented as the treatment in learning process. After both treatments were

applied to both groups, a post-test was administered in order to investigate the result of the treatment.

C. Population and Sample

1. Population

According to Borg and Gall (1979: 179), population is all members of a real or hypothetical set of people or object to which we wish to generalize the result of the research. It is supported by Arikunto (2002) who stated that population is the whole subject of the research. The population of the research was the second grade of SMPN 2 Padalarang that consisted nine classes with a total of 315 students.

2. Sample

A sample is a part or a representation of the whole population that is investigated in the research. A sample should reflect the characteristics of the selected population (Kahn, 1990:27). In this research the two classes that exist in the population was chosen. In accordance with the research design, the two classes were divided into the experimental group and control group (VIII-G as experimental class and VIII-H as control class); both classes consisted of 36 students.

D. Research Instruments

In this research, observations and a pre-test were used to gain the information about the grammar ability of the students from both groups. Then a post-test and

interview were distributed to obtain more information about the students' responses toward the use of snowball throwing technique and problem based learning in teaching grammar. All research instruments were also meant to investigate (objective).

1. Test

In this research, pre-test and post-test were administered. A pre-test was conducted to find out initial differences between the experimental and control groups' levels in grammar ability before receiving the treatment. While a post-test was conducted to find out the students' progress after treatments. The post-test procedure was similar to the pre-test procedure.

2. Observation

Observations were conducted to collect the data about the students' performances during the teaching and learning process. This study used the focused observation method. This method was chosen because it could refine the judgment about the students' activity (Hopkins, 1993).

3. Interview

Interview is a technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program or situation (Boyce and Neale, 2006). In addition, Interview is the technique to get the data by question and answer process orally from the respondent. Interview is a technique of verbal communication that is a communication for giving information. (Nasution 1991:53 in Haryudin 2016).

E. Data Collection

The data were collected from test, observation and interview.

1. Test

   There are two types of test namely pre-test and post-test. The pre-test instrument consisted of 35 multiple-choice questions. The test was administered to both groups on 21th January 2019 for experimental group and 22nd January 2019 for control group during the school hours. At the end of the treatments, the post test was conducted. This test was given to both groups (control and experimental groups) to find out the improvements of their grammar ability after the experimental group received the treatments. The test was administered to both groups on 7th February 2019 for experimental group and 12nd February 2019 for control group.

2. Observation

   Data from observation were collected using observation sheet and each category from the table was describe briefly. The data from observation were collected during treatments and the schedule of the treatments can be seen in the following table:

Table 3.2
Treatments Schedule of Experimetal Group

Meetings	Date
Meeting 1	24 January 2019
Meeting 2	28 January 2019
Meeting 3	31 January 2019
Meeting 4	4 February 2019

Table 3.3
Treatments Schedule of Control Group

Meetings	Date
Meeting 1	25 January 2019
Meeting 2	29 January 2019
Meeting 3	1 February 2019
Meeting 4	8 February 2019

3. Interview

   The data from interview was involved six respondents from each group. For the experimental group the interview was conducted after class on 10th Fabruary 2019 and for control group the interview was conducted after class on 15nd February 2019.

F. Data Analysis

Data analysis in the research includes data analysis on instrument try out, pre-test data, post-test data and/ or n-gain.

1. Data Analysis on Instrument try out

The try out item should be tested to measure its validity and reliability before conducting pre-test and post-test (Brown, 1998 in Juhaendi, 2013).

a. Validity

Validity test was intended to find out whether or not the test instrument was appropriate to use in this study. This research used Anatest V4 to in process of calculation. The criteria of validity were shown in table 3.3.

Table 3.4

r Coefficient Correlation (Validity)

Raw Score	Interpretation
0.8-0.1	Very High
0.6-0.8	High
0.4-0.6	Moderate
0.2-0.4	Low
0.0-0.2	Very Low

Arikunto (2002)

The data gathered from the try out test were analyzed using corrected item total correlation in Anatest V.4 for windows. The result of the statistical computation on the try out test is presented in the table 3.4 below.

Table 3.5

The Result of Validity Test

Item Number	Raw Score	Interpretation
-	0.8-0.1	Very High
5,6,26,29	0.6-0.8	High
4,17,19,25,27,32,35	0.4-0.6	Moderate
1,2,3,8,12,14,18,23,24,30,31,34,37,38	0.2-0.4	Low
-	0.0-0.2	Very Low

Based on the table above, 25 items were valid and could be used as research instrument. While 15 items were not valid and could not be used as the research instrument.

b. Reliability

Reliability is the extent which a test is produced in contrast result when administered under similar condition (Hatch and Farhadi, 1982 in Juhaendi, 2013). To find out the reliability of the test items, the present study used internal consistency method which is facilitated by Cronbach Alpha formula.The criteria is presented in the following table.

Table 3.6

r Coefficient Correlation

Alpha	**Reliability degree**
0.00-0.199	very low
0.20-0.399	low
0.40-0.599	fair
0.60-0.799	high
0.80-1.00	very high

(Sugiono,2001)

The result of computation of reliability test by using Anatest V.4 showed that the reliability of the items from Cronbach Alpha formula is 0,72 with the total items 40. Based on the table above, it can be assumed that the reliability of test items was high due to the value in between 0.60-0.799 and could be used as the research instrument.

2. Data Analysis on Pre-test

Pre-test was administered at the beginning of the experiment in order to obtain the initial equivalence between the groups. To determine the equivalence of the experimental and control groups, this study used t-test to test the hypothesis.

The process of testing research hypothesis is important. It enables concerned individuals to deduce meaning as well as make decisions based on the outcomes of the test (accepting or rejecting the null hypothesis (Anakadi, 2015).

The hypothesis as follows:

H_0= there is no difference between the mean of pretest score for the experimental group and control group.

H_1= there is significance difference between the mean of pretest score for the experimental group and for the control group.

a. Testing the normal distribution

The normal distribution was used to compare the mean of a sample to some hypothesized mean for the population in case of large sample when population variance is known, compare the sample proportion to a theoretical value of population or for determining the difference in proportions of two independent samples when and happens to be large and to determine the significance of median, mode, coefficient of correlation among others. (Kothari, 2004)

In the research, the present study used Kolmogrov-Smirnov's formula to analyze the normal distribution. The table data output from SPSS 22.00 for windows.

These steps below were taken to test the normal distribution:

1) Looking at the hypothesis

   Ho= The distribution of the scores are normally distributed

   H1= The distribution of the scores are not normally distributed;

2) Analyzing the normal distribution by using Kolmogrov-smirnov formula in SPSS 22.0 for windows;

3) Comparing the level of significance to test hypothesis. If the result is more than the level of significance (0.05), the null hypothesis is accepted, the score are normally distributed.

b. The variance homogeneity

In analyzing the variance homogeneity, the present study used Levene's formula in SPSS 22.00. These are the steps taken to test variance homogeneity:

1) Stating the hypothesis

   Ho= the variance of the experimental and control group are homogeneous

   H1= the variance of the experimental and control group are not homogeneous;

2) analyzing the variance homogeneity using SPSS 22.0 for windows;

3) Comparing the level of significance value to test hypothesis. If Levene's test is significant at $p < 0.05$, it means that the null hypothesis is incorrect and the variances are significantly difference. But, if Levene's is non

significant at p>0.05. It means that the variance is approximately equal (Field, 2009).

c. The independent t-test

The t-test is calculated from the sample data and then compared with its probable value based on t-distribution at a specified level of significance and degrees of freedom for accepting or rejecting the null hypothesis (Kothari, 2004). In addition, the primary purpose of t-test is to determine whether the means of the two groups' scores are different from a statistically significant degree as stated by Kranzel and Moursound (1999:89 in Juhaendi, 2013).

There are some requirements of the data which must be considered before conducting t-test. First, the data should be measured in form of interval or ratio. Second, the data should be homogeneous or formed in the same type. Third, the data should have a normal distribution (Coolidge, 2000: 143).

The procedures of t-test computation were as follow:

1) Stating the hypothesis

Ho= there is no difference between the mean of pretest score for the experimental group and control group.

H1= there is significance difference between the mean of pretest score for the experimental group and for the control group;

2) Finding the t value with independent sample test computation in SPSS 22.0 for windows;

3) Comparing the significance value with the level of significance for testing hypothesis. If the significance value is less than the level of significance (0.05), the null hypothesis is rejected. It means that the two groups are different. In contrast, if the significance value is more than the level of significance (0,05), the null hypothesis is accepted. It means that the two groups are equivalent.

3. Data Analysis on Post-test

Post-test was given at the end of the experiment, and t-test was also used to find out whether the hypothesis (null hypothesis) was rejected or accepted. If the null hypothesis was accepted, it means that there was no difference between the experimental and control groups after implementing both different approaches. The stages of analyzing post-test data is similar with analyzing pre-test data. The analysis of post test data can be used when there is no significant differences between the mean scores of pre-test of experimental group and control group through independent sample t-test

If the significance value of independent sample t-test of post test is less than the level of significance (0.05), the null hypothesis is rejected. It means that there is any significance difference between students who were taught by using cooperative learning and those who were taught by using problem based learning. In contrast, if the significance value is more than the level of significance (0,05), the null hypothesis is accepted. It means that there is no significance difference

between students who were taught by using cooperative learning and those who were taught by using problem based learning.

4. Data Analysis on N-Gain

The analysis of n-gain is conducted to find out whether the hypothesis (null hypothesis) was rejected or accepted. The stages of analyzing n-gain data is similar with analyzing post test data. The n-gain score test can be used when there is any significant differences between the mean scores of pre-test of experimental group and control group through independent sample t-test.

N-gain score can be calculated with formalation as follows:

$$\text{N-Gain} = \frac{\text{posttest score- pretest score}}{\text{Score maximum- pretest score}}$$

After get the N-gain score, the normality test, homogeneity test and independent T-test is conducted. If the significance is lower than 0,05 the null hypothesis is rejected and alternative hypothesis is accepted.

If the significance value of independent sample t-test of n-gain is less than the level of significance (0.05), the null hypothesis is rejected. It means that there is any significance difference between students who were taught by using cooperative learning and those who were taught by using problem based learning. In contrast, if the significance value is more than the level of significance (0,05), the null hypothesis is accepted. It means that there is no significance difference between students who were taught by using cooperative learning and those who were taught by using problem based learning.

To know which one is better, the mean of n-gain score can be analyzed based on the categorization. The categorization of the acquisition of N-gain score can be determined by the value of N-gain in the form of percent (%). The division of categories of acquisition of N-gain values can be seen in the following table:

Table 3.7
Categorization of N-Gain Score

N-Gain Score	Category
G > 0,7	High
0,3 ≤ G ≤ 0,7	Medium
G < 0,7	Low

Melzer in Syahfitri, 2008

And for the categorization of n-gain in percent can be seen in following table:

Table 3.8

Categorization of Interpretation of the Effectiveness of N-Gain

Percentage (%)	Interpretation
< 40	Not effective
40-55	Less effective
56-75	Effective enough
>76	Effective

Hake, R.R (1999)