CHAPTER III
RESEARCH METHODOLOGY

This chapter presents the methodology in conducting the research. This chapter provides four main parts of the investigation: research design, data collection technique, research procedures, and data analysis technique.

3. 1 Research Design

According to the aim of the research that investigates the effectiveness of using chain of short message service of vocabulary to enhance students' vocabulary of EFL high school students, the quantitative research method called quasi-experimental study was conducted. Sugiyono (2009, p. 77) stated that the quasi experimental design is a study aimed at revealing the effect of a particular treatment. The quasi experimental is also better used than pre-experimental design since it is not easy to obtain a control group which is used for the research (Sugiyono, 2012, p. 77). The quasi experimental design is also an expansion of true experimental design which is not easy to be conducted (Sugiyono, Ibid). Schematically, the design of the quasi experimental can be drawn as follows:

Table 1

The Schematic of The Quasi-Experimental Design

Group	Pre-test	Treatment	Post-test
Experimental	O_1	X	O_2
Control	O_3	-	O_4

Note:

- X represents the exposure of a group to an experimental variable
- O represents the process of observation or measurement (Campbell & Stanley, 1963, p.13)

Hatch and Farhaday (1982) stated that the variables are defined as an attribute of an object which divides from one object to another. There are two kinds of variable, that is independent and dependent variables. Independent variable is the selected, manipulated, and measured variable, while dependent variable is the variable which the researcher tries to determine the effect of the independent variable. The Chain of Short Message Service of Vocabulary is the independent variable and the scores of vocabulary test are the dependent variable. In order to strengthen the analysis, a qualitative research method in form of questionnaire is also conducted in the research.

3. 1. 1 Hypothesis

Hypothesis is defined as a prediction about the result of research. There are two hypothesis namely null hypothesis and alternative hypothesis. The null hypothesis (H_o) states that there is no difference between the result of experimental and control group after the treatment. The alternative hypothesis (H_1) states opposite to the null hypothesis (Hatch & Farhady, 1982, pp. 3-4). Thus, the hypotheses of the research are as follow:

- H_o = The use of Chain of Short Message Service of Vocabulary technique does not increase the students' vocabulary gains.
- H_1 = The use of Chain of Short Message Service of Vocabulary technique increases the students' vocabulary gains.

The result of independent t-test and dependent test gained from the scores of pre-test and post-test in experimental group and control group is the measurement of the acceptance of null hypothesis. If the result from each test is similar or higher than critical value of α=0.05, therefore the null hypothesis (H_o) is rejected because it means that the use of Chain of Short Message Service of Vocabulary technique increases the students' vocabulary gains. In the other hand, if the result is less than critical value of α=0.05, the null hypothesis (H_o) is accepted because it

means that use of Chain of Short Message Service of Vocabulary technique does not improve the students' vocabulary gains.

3. 2 Data Collection

3. 2. 1 Population and Sample

Population is a group of people having one or more characteristics that become the researcher's interest, while samples are selected part of population for observation and analysis (Best & Khan,1995, p. 13). The sample of the research was chosen in purpose since quasi-experimental design was not a random selection of subjects. Another reason underlying the selection of participants was that the researcher had conducted teaching practicum in the school so that it is considered much easier to gain the data. It was based on the same number of students and absence of significants difference of scores from two groups. The difference was determined by independent t-test from pre-test scores.

The population involved in the research was eleventh grade students from one of Senior High School in Bandung and the samples were two groups from one class that was divided into two groups.

3. 2. 2 Research Instrument

There were four instruments used in the research, namely pilot-test, pre-test, post-test, and questionairre. Based on those intruments, the collected data were analyzed to determine whether or not Chain of Short Message Service of Vocabulary technique enhances the students' vocabulary.

The pilot-test was conducted in other classes that was different from the class of experimental and control group to examine the validity, reliability and difficulty of the items that was administered to experimental and control group. Creswell (2012) stated that validity is demonstrating the match of the test intepretation and its purpose. On the other hand, reliability reveals the consistency and the stability of the scores of the instrument.

The pre-test was conducted in experimental and control group before employing the treatment in order to measure the current state of vocabulary knowledge of the students. On the other hand, the post-test was conducted in both groups at the end of the treatment to find out whether or not there is an improvement on students' vocabulary.

The questionairre was administered in experimental group after conducting the post-test. The questionairre was aimed at finding out students' responses toward Chain of Short Message Service of Vocabulary technique employed outside the classroom. There were ten statements formed in positive and negative sentences in the questionnaire to gain a serious and consistent response from the respondents. The instruments were constructed in checklist type based on Likert scale. Sugiyono (2012, pp. 96) states that the advantages of forming the checklist type in positive and negative sentences are the simplicity in forming, paper-less, the convenience in tabulating data, and visually interesting. The data gained are interval data.

3. 3 Research Procedures

Basicaly, the procedures of the research are as follows:

1. Organizing the Teacher Roles

   The researcher had roles as a non-participant observer for both experimental and control group. However, the observer constructed the vocabulary materials for the teacher. The teacher roles were to initiate the Chain of Short Message Service of Vocabulary by sending the vocabulary materials to the students and and making sure that every students in experimental group had achieved the vocabulary. The vocabulary materials which were sent to students were only verb. The teacher also had to employ further treatment by giving students more exposure before beginning the class in term of the vocabulary sent the day before the class. The complementary activity done outside the classroom in experimental group was Chain of Short Message

Service of Vocabulary and the control group was only received the exposure in the class as well as the treatment given in the experimental group since they were in the same class.

2. Organizing the Research Instrument

   Organizing the research instruments includes creating the test item for both pre-test and post-test, piloting the pre-test and post-test and forming statements for questionnaire.

3. Testing the Validity and Reliability of the Pre-test and Post-test through the Pilot Test

   The pre-test and pos-test items were tested before the treatment to find out whether or not the items had possessed the validity and reliability. Futhermore, The pilot test was intended to see the index of difficulty of the items. The participants of the pilot test were students in eleventh grader at the same school who did not participate in experimental group and control group.

4. Administering Pre-test to Experimental and Control Group

   The pre-test was conducted in experimental and control group before employing the treatment in order to measure the current state of vocabulary knowledge of the students.

5. Conducting the Treatment

   The Chain of Short Message Service of Vocabulary and an exposure of the vocabulary given in the message was employed in experimental group and in the control group was the exposure of the vocabulary only which is conducted. However, the learning materials given to them were approximately similar since the core treatment was employed outside the classroom, as can be seen in the following treatment schedule:

Table 3.2
The Schematic of Treatment Schedule

27th	28th	29th	30th	31st	1st	2nd	3rd	4th	5th

6th	7th	8th	9th	10th	11th	12th	13th	14th	15th
16th	17th	18th	19th	20th	21st	22nd	23rd	24th	25th
26th	27th	28th	29th	30th	1st	2nd	3rd	4th	5th
6th	7th	8th	9th	10th	11th	12th	13th	14th	15th

Blue = Pilot test on 27th August 2014

Green = Pre-test on 30th August 2014 - Post-test on 11th September 2014

Yellow = Treatment days

Red = Mid-term test

6. Administering Post-test to Experimental and control Group

   After applying the treatment, post-test was given to both experimental and control group at the end of the program to reveal the use of Chain of Short Message Service of Vocabulary in developing students' vocabulary.

7. Employing Questionnaire

   The questionnaire was formed based on Likert scale. The questionnaire, consisting of ten questions, was employed to see students responses toward Chain of Short Message Service of Vocabulary. The respondents ticked one area on the rating scale based on their opinion.

3. 4 Data Analysis

3. 4. 1 Scoring Technique

The research used the formula of processing scoring system without minus system to avoid a negative score. Pre-test and post-test were in the form of filling in the blank in 30 numbers. The score was determined by dividing the correct answers by 0.3. therefore the maximum score of the students is 100.

3. 4. 2 The Validity Test of The Pilot-test

Content validity was conducted to test the validity in the research. Sugiyono (2012, pp. 129) states that content validity which measures the effectiveness of the

conducted program can be made by comparing the contents of the instrument with the determined contents of the draft. The research employed the Pearson product-moment correlation formula to find out the validity. The formula was proposed as follows:

$$r = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

X= Score item which its validity is assessed

Y= Total score gained by the sample

r= Pearson product-moment correlation coefficient

N= Number of respondent

(Kranzler & Moursund, 1999, p. 56)

Anates V4 was employed to calculate the data. The obtained value from correlation coefficient (r) value was compared to $r_{critical}$. If $r_{obtained} \geq r_{critical}$, it means that the item is valid, and if the $r_{obtained} \leq r_{critical}$, it means that the item is not valid.

3. 4. 3 The Reliability Test of the Pilot-test

Reliability was used to reveal the consistency of the result. Split-half method was conducted in the research to test the reliability. The Spearman-Brown formula was used that is defined as follows:

$$r_{11} = \frac{2r_{1/2\,1/2}}{\left(1 + r_{1/2\,1/2}\right)}$$

r_{11} = Coefficient Correlation of Reliability

$r_{1/2\,1/2}$ = Correlation between X (odd items) and Y (even items)

(Arikunto, 2012, pp. 106-110)

In processing the test, the research used AnatesV4 and the obtained coefficient was intepreted in following categorization:

Table 3.1
Category of Coefficient Correlation of Reliability

Coefficient Correlation	Interpretation
0.0 – 0.20	Low
0.20 – 0.40	Moderate
0.40 – 0.70	High
0.70 – 1.00	Very High

3. 4. 4 The Difficulty Index

The difficulty index is an assumption that a good item should not be too difficult or too easy (Arikunto, 2012, pp. 222-225). The formula used to find the difficulty index is as follows:

$$P = \frac{B}{JS}$$

P = difficulty index

B = number of students who answers the item correctly

JS = number of students

3. 4. 5 Data Analysis on Pre-test and Post-test

3. 4. 5. 1 The Normal Distribution Test

The data are determined as normal distribution when the students' score are closed to the average score, above or below one standard deviation. Field (2009, p. 144) stated that in investigating the normal distribution, the Kolmogorov-Smirnov test can be employed. The test compares the scores in the sample to a normally distributed set of scores with the same mean and standard deviation. The data was calculated through SPSS 20 for Windows.

There are steps conducted in the normal distribution test of the Kolmogorov-Smirnov test, they are stating the hypotheses and setting the alpha

level, analyzing the groups' scores, and interpreting the output data. The first step is setting the alpha level at 0.05 (two-tailed test) and the hypotheses are as follows:

- H_0 = the score of experimental and the control group are normally distributed
- H_A = the score of the experimental and the control group are not normally distributed

The data gained were analyzed and intepreted by this way: if the result is non-significant ($p < 0.05$) it means that the distribution of the sample is significantly different from normal distribution (probably normal) and the null hypothesis is rejected. In contrast, if the result is significant ($p > 0.05$) then the distribution is approaching the normal distribution and the null hypothesis is accepted (Field, 2009, p. 139).

3. 4. 5. 2 The Homogeneity of Variance Test

Field (2009, p. 149) stated that homogeneity of variance means when the research goes through levels of one variable, the variance of the other variables should not change. If the research has collected groups of data, it means the variance of the outcome variables of the research should be the same in each of these groups. In addition, Kranzler & Moursund (1999) stated that the more homogeneous the group, the lower the variance.

The research used the Levene's test to examine the homogeneity of variance of the scores. The test was computed through SPSS 20 for Windows. There were three steps in employing the Levene's test. The first steps is stating hypothesis and setting the alpha level. The alpha level set is at 0.05 ($\alpha = 0.05$) and it is the maximum error points that can be tolerated. The hypotheses are as follow:

- H_0 = the variances of the control and experimental group are homogenous.
- H_A = the variances of both groups are not homogenous.

The second was analyzing the scores using Levene's test through SPSS 20. The last is Intepreting the result. The result were interpreted by this way: if the result of the test is interpreted to be significant at $p \leq 0.05$ and it means that the null hypothesis is rejected and the variances are significantly difference. In contrast, the result is interpreted to be non-significant if $p > 0.05$ and it is concluded that the null hypothesis is accepted and the variances are approximately equal (Field, 2009, p. 150).

3. 4. 5. 3 Independent t-test

The independent t-test is used to analyze a relevant relationship between the independent variable (treatment) and the dependent variable (vocabulary score) that is measured on experimental and control group. Field (2009, p. 239) stated that the test is focused on determining whether or not there is a significant difference between the predictor (independent variable) and the model (dependent variable).

There were three steps in employing the independent t-test. The first step was stating the hypothesis and setting the alpha level. The alpha level was set at 0.05 (two-tailed test) and the hypotheses are as follow:

- H_o = the two samples are from the same population; there is no significant difference between the two samples.
- H_o = the two samples are from the same population; there is a significant difference between the two samples.

The second step is analyzing the groups' scores using the independent t-test in SPSS 20 for windows. The formula of the independent t-test is as follows:

$$t = \frac{M_i - M_j}{\sqrt{\frac{S_i^2}{N_j} + \frac{S_j^2}{N_i}}}$$

t = independent t-test

M = mean

s^2 = variance

N = numbers of participants

(Kranzler & Moursund, 1999)

The last is comparing the result with the significance level. The null hypothesis (H_o) is rejected if the result ≥ 0.05 which means there is a significant difference of mean between experimental and control group. In contrast, if the result < 0.05, the null hypothesis (H_o) is accepted which means that there is a no significant difference of mean between experimental and control group.

3. 4. 5. 4 Dependent t-test

In the research, dependent t-test was aimed to find out whether or not the experimental group have a progression after conducting the treatment. There were three steps in employing the dependent t-test. The first was stating the hypothesis and setting the alpha level. The alpha level was set at 0.05 (two-tailed test) and the hypotheses are as follow:

- H_o = the two samples are from the same population; there is no significant difference between the two samples.
- H_o = the two samples are from the same population; there is a significant difference between the two samples.

The second was analyzing the groups' scores using the dependent t-test in SPSS 20 for windows. The results is in the value or t_{obt}. The formula of the dependent t-test is as follows:

$$t = \frac{M_D}{\frac{n\sum D^2 - (\sum D)^2}{n(n-1)}}$$

t = dependent t-test

M = mean difference (obtained by dividing $\sum D$ by n)

n = numbers of participant

D = difference between pre-test and post-test

(Kranzler & Moursund, 1999)

Lastly, the result was compared with the significance level. The null hypothesis (H_o) is rejected if the result ≥ 0.05. It means there is a significant difference between the pre-test and post-test scores. In contrast, if the result < 0.05, the null hypothesis (H_o) is accepted which means there is no significant difference between the pre-test and post-test scores before and after the treatment.

3. 4. 5. 5 The Calculation of Effect Size

The effect size is used to determine the strength of relationship between independent variables and dependent variables (Field, 2009, p. 57). To calculate the effect size, the research used a correlation coefficient of effect size. The formula was proposed as follows:

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

r = effect size

t = the independent t-test value

df = degree of freedom (N1+N2-2)

After calculating the effect size, its value is compared and analyzed by using the table's scale. The correlation coefficient of effect size is always positive and range from 0 to 1.00. The scale is as follows:

Table 3.4
The Scale of Effect Size

Effect Size	r value

Small	0.100
Medium	0.243
Large	0.371

(Coolidge F. L., 2000, p. 151)

3. 4. 6 Data Analysis on Questionnaire

The questionnaire was used to find out the strengths and weaknesses of Chain of short message service of vocabulary according to the students' point of view. The questionnaire was constructed using Likert scale.

The data gained were analyzed and intepreted based on the frequency of students' answer. Hatch and Farhady (1982, p. 46) proposed the percentile formula as follows:

$$P = 100\frac{F}{N}$$

P = Percentile

F = Frequency of students' answer

N = Respondent