CHAPTER III
RESEARCH METHODOLOGY

This chapter presents the explanation about procedures which are taken in this study in order to find out the answer to the research questions. This research applied quantitative approach with explanatory correlation design. There were two main parts of conducting the methodology selected. They involved the instrument test try-out and the real instrument test. This chapter includes research design, population and sample, research hypothesis, data collection, the research instruments try out, and data analysis.

3.1 Research Design

Since the main purpose of this research is to investigate whether there is any correlation between explicit grammatical knowledge and writing ability of EFL students, this research combined a quantitative approach and descriptive method. Quantitative approach was employed since this research will define the research questions based on the trends in the field of research site. Creswell (2012, p. 13) describes that quantitative approach is used if the researchers want to identify a research problem based on trends in the field or on the need to explain why something occurs. Creswell further says that describing a trend means that the research problem can be answered best by a study in which the researcher seeks to establish the overall tendency of responses from individuals and to note how this tendency varies among people. From the elaboration above, it is obvious that the quantitative approach is best employed in this study.

Based on the research question that will mainly investigate the correlation between two variables, this research is classified into descriptive research with

correlation method. Descriptive approach in this study is particularly the descriptive statistic approach due to the quantitative approach that has been elaborated in the previous paragraph. Arikunto (2007, p. 234) explains that descriptive research is the one that is intended to gather some information regarding the trend found in the field. It means that there is no administration and control in this kind of research.

The correlation method is used in this research since it is intended to investigate the correlation between the variables (Arikunto, 2007, p. 247). The degree of correlation between two variables is classified in the form of correlation coefficient. This is also supported by Creswell (2012, p. 338) opinion that in correlational research design, investigators use the correlation statistical test to describe and measure the degree of association (or relationship) between two or more variables or sets of scores. This opinion also implies that the researchers in this research do not attempt to control or manipulate the variables as in experiment; instead they relate using the correlation statistics, two or more scores for each person.

There are two types of correlation study as stated by Creswell (2012). They are explanatory design and prediction design. This study used explanatory design since this study will just investigate the degree of association between two variables. As stated by Creswell (2012, p. 340), explanatory design is a correlational design in which the researcher is interested in the extent to which two variables (or more) co-vary, that is where changes in one variable are reflected in changes in the other. The elaboration from experts above strengthens the reason why correlation method is perceived the best to reach the goals of this study.

In line with this title "The Correlation between Explicit Grammatical Knowledge and Writing Ability of EFL Students", the research is stated as follows:

X: the result of students' grammatical knowledge test

Y: the result of writing test

Figure 3.1 Illustration of Correlation cited from Sugiyono (2002 in Mayningsih, 209, p. 42)

The correlation of the two variables can be illustrated in the figure below.

3.2 Population and Sample

3.2.1 Population

According to Creswell (2012, p. 142), population is a group of individuals who have the same characteristics. Population in this study was the twelfth graders of a Senior High School in Bandung where the researcher did teaching practicum. This population was selected since the students in this grade has studied some grammar focus and practiced writing some genres in academic skill.

3.2.2 Sample

In quantitative approach, a target population (or sampling frame) is a group of individuals with some common defining characteristics that the researcher can identify and study (Cresswell, 2012, p. 142). In determining the sample, the researchers employ either probability or non-probability sampling approaches (Craswell, 2012, p. 124). In this research, the probability sampling with simple random sampling was employed. In this form, the researcher selected participants for the sample so that any individual had an equal probability of being selected from the population.

Regarding the number of participant, there are some arguments from experts. Creswell (2012) explained that there should be at least 30 participants in correlation method to establish relationship. Frankeal et al. (2012, p. 339) also stated that the minimum acceptable for correlation study is 30. Based on the two arguments from the two experts above, in this research, the researcher chose a class that consists of 36 students randomly from the population. This sample has fulfilled the requirement of minimum number of participant that should be assigned in a correlation study.

3.3 Research Hypothesis

Hypothesis as stated by Arikunto (2007, p. 43) is the prediction towards the problem of relation between two or more variables. There are two kinds of hypothesis; hypothesis null and hypothesis alternative. The former means that there is no any relationship between variables observed. It is indicated by H_0. The latter means that there is any relationship between variables observed. It is indicated by H_a.

Regarding this study, when there is a correlation between explicit grammatical knowledge and writing ability of EFL students, the alternative hypothesis is accepted and the null hypothesis is rejected.

3.4 Data Collection

3.4.1 Research Instrument

An instrument is a tool for measuring, observing, or documenting quantitative data (Creswell, 2012, p. 151). Creswell also stated that the researchers use instruments to measure achievement, assess individual ability, observe behavior, develop a psychological profile of an individual, or interview a person.

There are four major types of information in quantitative research as proposed by Crewell (2012); performance measures, attitudinal measures, behavioral measures, and factual information. In this research the type of data used was performance measures since this type means a data to assess an individual's ability to perform on achievement test, intelligent test and etc. Achievement test as defined by Vogt (2005 in Creswell, 2012, p. 152) is a test where the individual's grade is a measure of how well he or she did in comparison with a large group of test takers. These measures are available through instruments reported in literature. In short, from the categories of data explained by experts above, this study used performance test with achievement test.

There are two kinds of instrument used in this study; grammaticality judgment test and writing test.

i) Grammaticality Judgment Test (GJT) is administered to measure students' ability in grammatical knowledge. GJT in this study is the test to measure students' explicit grammatical knowledge. The item of GJT was adapted from four sources involving study of Mirzaei et al. (2011), Savage et al. (2010), Azar (1999) and Autotick English Grammar Test Worksheet level 3. The four sources were arranged according to the participant's grade. The first source designed by Mirzaei et al. originally following Ellis's (2004, 2006, and 2009) was selected to know the format of explicit grammatical judgment test. Furthermore it was also used since the guideline of the instrument test has been received by expert judgments and going through development and validation processes. The second source was adapted to know what kind of grammar should be given to EFL students. The third and fourth sources were applied to know the example of grammatical sentences. In short, the format of the present test is adapted from Mirzaei et al. study. Meanwhile the content of grammar test given was adapted mostly from Savage et al., Azar (1999) and

Autotick English Grammar Test. The test items in the study of Mirzaei et al. were fully modified following the average ability of participants in present study.

The test was delivered in the written form. The time allotted in this test is 30 minutes. In the test, the participants have to do some error corrections. The participants were required to identify only an error word in each item. They then were asked to give the correct version of that ungrammatical word for each item. As to the scoring procedure for each item, a half point (0.5) was assigned to the identification part and another half point for the correction of the test takers' judgment. Grading system is as follows:

- 0.5 point for correct classification for each item
- 0.5 point for correct form for each item.
- If the classification is correct but the correct form is not correct, the participant will get 0.5 score.
- If the classification is not correct but the correct form is true, the participant will not get any point. This is based on the assumption that a participant just guesses the answer and does not know the reason.

There are 25 items in this test. The result of this test is used as variable X. So to calculate the test achieved by each student, the result of the test will be calculated using the following formula:

$$S = CA/N \times 100$$

Where:

S ***:*** Final test score ***N*** ***:*** Number of questions

CA ***:*** Number of correct answer

(Arikunto, 2003 in Furqon, 2012, p. 21)

The scores were then interpreted in order to classify participants' explicit GJT ability based on criteria about level of student's ability. It can be seen in the following table:

Table 3.1 The Criteria of the Student's Level of Mastery Cited from PAP (Penilaian Acuan Patokan in http://www.pps.unud.ac.id/thesis/pdf_thesis/unud-379 1262323796-thesis%20chapter%201-3%20.pdf)

Score	**Level of Mastery**
90 – 100	Very Good
80 – 89	Good
65 – 79	Sufficient
55 – 64	Insufficient
Less than 55	Poor

ii) Writing Test was administered to measure students' ability in writing skill. In this study the students were asked to write a narrative text since this text genre is frequently taught in each of grades in senior high school. The time allotted in this test is 50 minutes. The result of this test was used as variable Y. In assessing writing, the writing product of participants was assessed according to the writing criteria of narrative scoring rubric adapted from Education Department of Western Australia (1997a in Emilia, 2012, p. 159-162). The detailed rubric can be seen in appendix A8.

Participants' writing scores were then classified into the following categorization of writing mastery.

Table 3.2 Students' Mastery Level in Writing

(Cited from Education Department of Western Australia, 1997a in Emilia, 2012)

Range Score	**Level of Mastery**
85-100	Extending
75-85	Consolidating
65-75	Developing
50-65	Beginning

3.4.2 Research Procedures

In collecting the data, this study takes several procedures:

a. Preparing research instrument (achievement test); GJT and writing test.
b. Trying out the two research instruments to the participants.
c. Checking the validity, reliability, difficulty index, and discrimination index of the text using *Microsoft Excel 2007*.
d. Giving the real test (Explicit GJT and writing test) to the participants.
e. Scoring the participants' result on two instruments.
f. Classifying the participants' scores on two instruments administered.
g. Calculating the correlation between the two test results using Pearson Product Moment formula employing *SPSS* (If the data were not normally distributed, the Spearman formula was employed).
h. Analyzing the result through the relevant theories and drawing a conclusion of this research.

The procedure above has to be taken carefully one by one to prevent the emergence of mistakes during the research. Furthermore, the explanation about the procedure is clearly presented in the next section.

3.4.2.1 Instrument Try-Out

Trying out the instruments is very important for a research especially for the research that the instrument is designed by the researchers themselves (Arikunto, 2007, p. 165). This is aimed to make sure that the instrument used can be applied to collect the desired data. In this correlation study, the try-out was also implemented to find out the appropriateness of each item for the participants. As cited from Arikunto (2007, p.170), there are two kinds of instrument test; test instrument and non-test instrument. This study employs the former. It follows that trying out the instrument test follows the requirements related to that type of instrument. In this study, the try-out is applied to 36 students. Arikunto (2007) summarized that there are 5 steps to conduct instrument test try-out. The 5 steps will be elaborated one by one after this section.

3.4.2.1.1 Validity test

Validity test is a test that is conducted to find out whether the test level can measure what is intended to measure (Arikunto, 2007, p. 170). Test is an instrument arranged particularly for measuring something definite and important. The criteria of validity test as proposed by Arikunto (2007, p. 171) involves the way to answer, particular situation, time allotment, and certain procedure. If the requirements above have been completed, it is expected that the validity of a test has been achieved. In this present study, as mentioned in the previous part, there are two kinds of instruments. They are explicit grammatical judgment test (GJT) and writing test. The former's validity in this matter will be calculated using *Microsoft Excel 2007*. Meanwhile, the latter's validity will be analyzed following the principle suggested by Arikunto (2007).

Furthermore, Arikunto (2007) also said that the validity of a test is determined by some regulations such as answering system, particular situation, time, and procedure. If those requirements have been fulfilled well, the validity of a test has been achieved accurately. The framework from Arikunto is applied since the test just asks the participant to write an essay form. So the statistical computation cannot be applied.

3.4.2.1.2 Reliability test

Reliability test is one of the most important elements in test quality. It has to do with the consistency, or reproducibility, or an examinee's performance on the test. For example, if a researcher wanted to administer a test with high reliability to an examinee on two occasions, he or she would be very likely to reach the same conclusions about the examinee's performance both times. A test with poor reliability, on the other hand, might result in very different scores for the examinee across the two test administrations. If a test yields inconsistent scores, it will be better to modify the test for achieving a reliable test.

In this study, the reliability of the explicit GJT was calculated by using *Microsoft Excel 2007*. Meanwhile, the writing test's reliability was analyzed by using single test single trial method as suggested by Arikunto (2007, p. 172). The steps to compute the reliability are as follows:

- Apply the instrument (writing test) to participants
- Score participants' work
- Classify the score into two same parts (it may be based on even-odd number)
- Name code X for first part and code Y for second part.
- Compute the correlation between the two parts using Pearson Correlation Formula.

The formula is as follow:

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{(\{N\sum X^2 - (\sum X)^2\}\ \{N\sum Y^2 - (\sum Y)^2}}$$

Where:

r = correlation coefficient

X = score of the first instrument

Y = score of the second instrument

XY = the result of score A multiple score B for each respondent

X^2 = square of instrument A

Y^2 = square of instrument B

(Kranzler and Moursund, 1999, p. 56)

The result from Pearson formula is still a half of reliability of the test.

- To obtain the reliability of the whole test, the Spearman-Brown formula is applied. The Formula is:

$r_{11} = 2 \text{ X } r_{1/21/2} / (1+ r_{1/21/2})$

Where:

r_{11} : reliability coefficient

$r_{1/21/2}$: correlation coefficient for each half of the test item

- r obtained (reliability score) was then compared with r critical that was obtained from *product moment r values* (See appendix A7).

The result was determined based on the following interpretation:

If r obtained > r critical = valid

If r obtained < r critical = invalid

(Sugiyono, 2008 in Furqon, 2012, p. 26)

3.4.2.1.3 Difficulty Index

Difficulty index as stated by Arikunto (2007, p. 176) is the test quality in accommodating the respondents to answer it correctly. To find the difficulty index, this test will use *Microsoft Excel 2007*. However, the discrimination power index computation will just be applied to explicit GJT. After obtaining the result, the classifications of result were applied to the table below.

If calculated manually, the formula to compute the difficulty index is as follow:

$$P = B/J$$

Where: P = Facility/ index of difficulty

B = the number of correct answer

J = the number of subject taking the test

(Arikunto, 2007, p. 176)

Table 3.3 Criteria of Difficulty Index

(Cited from Arikunto, 2003 in Furqon, 2012, p. 27)

Index of Difficulty	**Difficulty Degree**
0. 00 – 0. 30	Difficult item
0. 31 – 0. 70	Moderate item
0. 71 – 1. 00	Easy item

3.4.2.1.4 Discriminating Power Index

Discriminating power as stated by Arikunto (2007, p. 177) is the quality of the test in discriminating between the skilled participant and less skilled participant. In operating it, the participant must be in even number. To calculate this discriminating power index, *Microsoft Excel 2007* will be applied.

If calculated manually, the formula to compute the discrimination power index is as follow:

$$D = B_A/ J_A – B_B/J_B$$

Where:

D = Discrimination power index

B_A = the number of participant in upper group answers correctly

J_A = the number of participant in upper group

B_B = the number of participant in lower group answers correctly

J_B = the number of participant in lower group

(Arikunto, 2007, p. 177)

After obtaining the result of discrimination power index, the classification and recommendation should be applied as following table.

Table 3.4 Classification of Discrimination Power Index

(Cited from Arikunto, 2003 in Furqon, 2012, p. 24)

Discrimination Power Index	**Interpretation**
≤-0. 01	Worst (must be discarded)
00. 00 – 0. 20	Poor

0. 21 – 0. 40	Moderate
0. 41 – 0. 70	Good
0. 71 – 1. 00	Excellent

3.5 Data Analysis

Analyzing the data is the next step after the collecting data. First, after the test was implemented to students, the analysis stated by scoring the result of the test. Then, the process is finding the level of participants in Grammatical Judgment Test (GJT) and writing ability. To find out the mastery of two variables, computing the mean of each variable is necessary. The formula to compute the mean is as written below.

$$M_X = \sum X / N \qquad M_Y = \sum Y / N$$

Where: M_X = mean x (explicit GJT) N = number of participant

$\sum X$ = the sum of x score M_Y = mean y (writing ability)

$\sum Y$ = the sum of y score

(Cited from Kranzler and Moursund, 1999, p. 8)

Afterwards, it is necessary to make sure that the data are normally distributed or not. This study utilizes SPSS (Statistical Package for Special Sciences) as it is one of the oldest and the most widely-used statistical software package.

In explanatory correlation design, there are some characteristics involved in it as stated by Creswell (20120. The characteristics are as follows:

- The investigators correlate two or more variables.
- The researchers collect the data one point in time.
- The investigator analyzes all participants as a single group.

- The researcher obtains at least two scores for each individual in the group (one for each variable).
- The researcher reports the use of the correlation statistical test (or an extension of it) in the data analysis.
- Finally, the researcher makes interpretation or draws conclusion the statistical test result.

To compute the degree of association between the two variables, this study employs Pearson Product Moment Computation. The formula is as follow:

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{(\{N\sum X^2 - (\sum X)^2\}\ \{N\sum Y^2 - (\sum Y)^2}}$$

Where:

r = correlation coefficient

X = score of the first instrument

Y = score of the second instrument

XY = the result of score A multiple score B for each respondent

X^2 = square of instrument A

Y^2 = square of instrument B

(Cited from Kranzler and Moursund, 1999, p. 56)

After obtaining the value r (degree of correlation), the result was interpreted based on following criteria:

Table 3.5 Interpretation of Correlation Degree cited from Creswell (2012, p. 347)

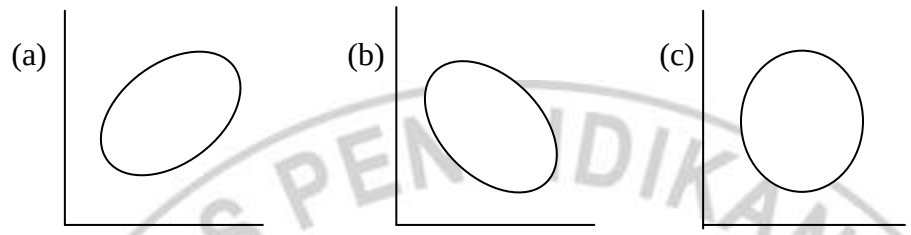
Coefficient Interval	Interpretation
0. 20 – 0. 35	Slight relationship.
0. 36 – 0. 65	Moderate (Useful for limited prediction)
0. 66 – 0. 85	Strong (Good prediction can result from one variable to the other)
0. 86 and above	Very strong relationship

After obtaining the two scores, the scores were plotted on a graph (scatterplots). The association between two scores involves positive correlation and negative correlation. When examining a graph, it is important to identify if the points intersect, or move in the same or opposite directions. Regarding the direction of association, Creswell (2012, p. 345) explained that:

- In a positive correlation (indicated by a "1" correlation coefficient), the points move in the same direction; that is, when X increases, so does Y or, alternatively, if X decreases, so does Y.
- In a negative correlation (indicated by a "-"correlation coefficient), the points move in the opposite direction; that is, when X increases, Y decreases, and when X decreases, Y increases.
- If scores on one variable do not relate in any pattern on the other variable, then no linear association exists.

The forms of association in correlation study as proposed by Creswell are as follows:

Figure 3.2 Patterns of Association between Two Variables (Cited from Creswell, 2012, p. 346)



The three pictures above show the correlation between two variables. The explanations of each pattern are as follows:

(a) Picture depicts a positive linear relationship of scores, where low (or high) scores on one variable relate to low (or high) scores on a second variable.
(b) Picture depicts a negative linear relationship result, where low scores on one variable relate to high scores on the other variable.
(c) Picture depicts uncorrelated and nonlinear relationships, where the variables are independent each other. A particular score on one variable does not predict any information about the possible score on the other variable.

If the data obtained are not linear or the data are not distributed normally, the researcher must use the Spearman Correlation. The formula is as follow:

$$r_s = 1 - \frac{6\sum D^2}{n\,(n^2 - 1)}$$

Where: D = the difference between each pair of ranks

D^2 = the square of those differences n = the number of pairs rankings

After determining the correlation coefficient, it is necessary to find out whether the hypothesis is accepted or not. The hypothesis testing can be gained by seeing the significance value. If the significance value is more than 0.05, it means H_0 is accepted and H_a is rejected. Conversely if the significance value is less than 0.05, it can be concluded that H_0 is rejected and H_a is accepted. The significance value will appear after the computation of correlation coefficient using SPSS software.

After finding out whether there is a significance correlation or not, the next step is interpreting and discussing the findings which will be elaborated in the next chapter.