CHAPTER III

RESEARCH METHODOLOGY

Introduction

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 chapter includes research method, research participants, data collecting techniques, and data analysis.

3.1   Research Method

This study used a quantitative approach with a correlation method. Quantitative research is considered appropriate as this research analyzes the data through systematic process by using certain computation. It is in line with Burns (1995) and Arikunto (2003) who state that quantitative research is an attempt to investigate an issue by using numerical data and statistical processing.

Moreover, correlation method is also considered appropriate as this research is concerned with the investigation to find out the correlation between students' ability in comprehending Indonesian and English texts. It is relevant with Hatch & Farhady (1982) and Burns (1995) who state that correlation method is a process of showing the existence of relationship between two or more variables and how strong the relationship is.

3.2   Research Participants

The participants of this study were voluntarily chosen from a class of ten year students in a public senior high school in Bandung. This selection was based on the reason that the students have a quite good ability in reading English texts and they have learnt to read several kinds of texts in English, especially Narrative texts. Specifically, the present study decided to choose only thirty (30) students, as it is in line with Gay, Mills, and Airasian (2006) who suggest there should be at least 30 (thirty) participants in correlation study to establish a relationship.

3.3   Data Collecting Techniques

Several techniques are employed to collect the data of this study, as follows: distributing questionnaire and administering achievement test. Through these methods, necessary information about students' ability in reading Indonesian and English texts are expected to be obtained. Each instrument is clearly elaborated in the next sections.

3.3.1   Questionnaire

Relevant to the second research question, a questionnaire was used in order to find out students' perception towards reading and the factors that help students improve their reading ability in both first and second languages. The questionnaire contains twelve questions, ten close questions and two open questions (see Appendix A.1). It was made in Indonesian to make it easier for participants to answer the questions.

3.3.2 Achievement Test

Achievement test was given in order to measure the participants' reading ability in comprehending Indonesian and English texts, as it is relevant to the first research question. It was constructed in multiple-choice questions since it is considered practical (Dornyei, 2007, p.115).

The test contains six different Narrative texts: three texts are Indonesian and the other three are English (see Appendix A.2). Each text contains five questions, so the overall questions are amount to 30 (thirty) multiple-choices questions. The texts and questions were taken from several textbooks the participants used in their school (*Berbahasa Indonesia Untuk Kelas X SMA/MA*; *English for Grade X*).

In scoring the test, the right answer was marked one (1) point and the wrong answer was marked zero (0) point, so the overall raw score from the right answers in this achievement test is 30 points. After marking the test, the present study tried to obtain the final scores by using S formula below.

$$S = \frac{CA}{N} \times 100$$

Figure 3.1 *S* Formula

Where:

S   : final test score   *N*   : number of questions

CA   : number of correct answers

(Nuranti, 2002; Wardani, 2008)

The scores then should apply the interpretation in order to classify participants' reading ability (Nuranti, 2002; Wardani, 2008). The classifications are presented in Table 3.1.

Table 3.1

Classification of Students' Reading Ability

Score Range	Classifications
≤ 59	Poor
60 – 69	Average
70 – 89	Good
≥ 90	Excellent

This study employed those research instruments above in collecting data needed. Practically, it took several procedures in collecting data, as follows:

a. Preparing research instruments (questionnaire and achievement test).

b. Trying out the research instruments as an attempt to check its validity and reliability (also difficulty index and discrimination index for achievement test).

c. Administering the achievement test and distributing the questionnaire to participants (see Appendix A.1 and A.2).

d. Scoring the participants' achievement test and questionnaire results.

e. Calculating the data by using a certain formula.

f. Analyzing the result through the relevant theories and drawing a conclusion of this research.

Those procedures above should be taken carefully one by one to prevent the emergence of mistakes during the research. Furthermore, explanation about the procedures is clearly presented in the next sections.

3.4   Trying Out the Research Instruments

A good test at least possesses two qualities, which are validity and reliability (Harris (1969) cited in Apriyani, 2010, p.42). In order to get the requirement of a good test, the test was first tried out before it was actually administered and the result then was calculated in order to find out its validity and reliability (Sugiyono, 2008, p.178). Besides, difficulty index and discrimination index were also calculated, as difficulty index shows items which are considered easy and difficult, while discrimination power is calculated to find out the significance of test items in determining participants' reading skill (Arikunto (2003) cited in Apriyani, 2010, p.43).

3.4.1   Validity

Validity is defined as the degree, to which a test measures what it is supposed to measure (Sugiyono, 2008, p.177). In order to find out the validity of questionnaire and achievement test, the questionnaire was first tried out and the result was computed with certain formula of validity, which is Pearson Product Moment correlation formula. The formula is:

$$r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{[N\sum x^2 - (\sum x)^2][N\sum y^2 - (\sum y)^2]}}$$

Figure 3.2 Pearson Product Moment Formula

Where:

r : correlation coefficient   *y* : total score which is gained

x : item which its validity is assessed   *N* : the number of participants

(Coolidge, 2000, p.116)

After the result was found out, it is necessary to make sure that the correlation coefficient is significant by computing the correlation coefficient with *t* formula (Coolidge, 2000, p.118), as follows:

$$t = \frac{r}{\sqrt{\frac{1-r^2}{N-2}}}$$

Figure 3.3 *t* Formula

Where:

t : significance of correlation coefficient   *N* : number of participants

r : correlation coefficient

(Coolidge, 2000, p.118)

In order to find out whether the ***t obtained*** is significant or not, it then should be applied to the interpretation:

if $t_{obtained} > t_{critical}$ = valid

if $t_{obtained} < t_{critical}$ = invalid

(Coolidge, 2000; Arikunto, 2003; Sugiyono, 2008)

The ***t critical*** is acquired from critical values in distribution table, at level of significance *p = 0.05* and certain degree of freedom *df = N – 2* (Arikunto, 2003; Sugiyono, 2008). The distribution table can be seen in Appendix D.2.

3.4.1.1 Validity of Questionnaire

Before collecting the required data, the present study distributed the questionnaire to a try out class and then calculated the results to find out its validity, then the try out scores were tabulated (see Appendix B.1). The process then went to calculating the results by using Pearson Product Moment formula. The correlation coefficient was computed by using *t* formula to follow Coolidge (2000, p.118) to make sure that the validity is significant. The calculations can be seen in Appendix B.3.

The next step is to determine whether *t obtained* exceeds *t critical* or not (Coolidge, 2000; Arikunto, 2003; Sugiyono, 2008). The *t critical* was found out as **1.701**, as it was got from determining the level of significance (*p*) and the degree of freedom (*df*). The level of significance and the degree of freedom in this study are *p = 0.05* and *df = 28*.

From the calculation, it was found out that all items in questionnaire were considered valid since the *t obtained* exceeded the *t critical* (Coolidge, 2000; Arikunto, 2003; Sugiyono, 2008). The result can be seen in Appendix B.3.

3.4.1.2 Validity of Achievement Test

By taking the same techniques in trying out the questionnaire, the achievement test was also administered to a try out class and the result was calculated to find out its validity. The result of trying out test can be seen in Appendix B.2. The calculation of achievement test's validity was going through the computation by Pearson Product Moment formula and *t* formula to follow

Coolidge (2000, p.118). The result of *t obtained* then was considered valid and significant as it exceeded the *t critical* (Coolidge, 2000; Arikunto, 2003; Sugiyono, 2008). The result and calculation can be seen in Appendix B.5.

3.4.2   Reliability

Reliability is the extent to which the result can be regarded consistent or stable (Brown, 1990, p.98). Thus, a test can be considered reliable if it is consistent with the result if it is used more than once to the same objects in different times (Harris (1969) cited in Apriyani, 2010, p.42).

In this research, the *split-half* method was used to find out the reliability of questionnaire and achievement test, as it was considered appropriate to calculate the reliability of instruments (Sugiyono (2002) cited in Pekarasa, 2003, p.39). By taking this method, several steps were also taken. The trying out result was equally separated into two parts based on the items' order, and it became the first half and the second half. Those data then were calculated firstly by using Pearson Product Moment correlation formula. The correlation coefficient from calculation then was calculated by using Spearman Brown formula, as it was considered appropriate to calculate the reliability (Sugiyono (2002). The formula of Spearman Brown is:

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

Figure 3.4 Spearman Brown Formula

Where:

r_{11} : reliability coefficient

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

<div align="right">(Sugiyono, 2008, p.190)</div>

The result of reliability coefficient then should be applied to **r** value in Product Moment table (Sugiyono, 2008, p.190). The Product Moment table can be seen in Appendix D.1. Then the result should apply the interpretation:

$$\text{if } r_{obtained} > r_{critical} = \text{valid}$$
$$\text{if } r_{obtained} < r_{critical} = \text{invalid}$$

<div align="right">(Coolidge, 2000; Sugiyono, 2008)</div>

3.4.2.1 Reliability of Questionnaire

Regarding to the methods in calculating the reliability, the try out result of questionnaire was equally separated into first and second half, and it was calculated by using Pearson Product Moment and Spearman Brown formula to get the reliability coefficient (Sugiyono, 2008, p.190). The calculation can be seen in Appendix B.4. After the calculation, it was found out that the reliability coefficient of questionnaire, which is also called **r obtained**, is **0.659**, whereas the **r critical** in this study is **0.361**, which is got from determining **p** at level **0.05** and **N = 30**. Based on the interpretation, the questionnaire is considered reliable since the **r obtained** exceeds the **r critical** (Coolidge, 2000; Sugiyono, 2008).

3.4.2.2 Reliability of Achievement Test

By taking the same steps in finding out the questionnaire's reliability, the calculation of achievement test's reliability was also going through *split-half* method then it was calculated by using Pearson Product Moment and Spearman Brown formulas to get the reliability coefficient (Sugiyono, 2008). The calculation can be seen in Appendix B.6. The *r obtained* of achievement test is **0.738**. Based on the interpretation, the achievement test was considered reliable since the *r obtained* exceeds the *r critical* (Coolidge, 2000; Arikunto, 2003; Sugiyono, 2008).

3.4.3 Difficulty Index

Difficulty index needs to be calculated as an attempt to find out the difficulty level of a test (Arikunto (2003) cited in Apriyani, 2010, p.30). The formula to find out the difficulty index is:

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

Figure 3.5 Difficulty Index Formula

Where:

P : difficulty index T : number of participants

B : total of right answer

(Arikunto, 2005)

After obtaining the result, the classifications were applied to follow Arikunto (2003), which are presented in Table 3.2.

Table 3.2

Classifications of Difficulty Index

Difficulty Index Score	Classifications
0.00 – 0.30	Difficult
0.31 – 0.70	Moderate
0.71 – 1.00	Easy

Difficulty index of questionnaire was not calculated since it is necessary only for achievement test. The process then went to calculating the try out rest result by using *P* formula above. The calculation can be seen in Appendix B.7. The result then was applied to the interpretation (Arikunto, 2003), as presented in Table 3.3 below.

Table 3.3

Difficulty Index of Achievement Test

Items	*P* Score	Classifications
Q2, Q4, Q5, Q7, Q8, Q13, Q14, Q16, Q17, Q23, Q24, Q26, Q30	0.9	Easy
Q1, Q3, Q6, Q11, Q15, Q18, Q19, Q21, Q22, Q28	0.8	
Q9, Q10, Q12, Q20, Q25, Q27, Q29	0.7	Moderate

The result above shows that 23 items were considered easy since its *P* score are in easy range (**0.71 – 1.00**), while seven items are considered moderate as its *P* score are in moderate range (**0.31 – 0.70**).

3.4.4   Discrimination Power Index

Discrimination power index needs to be calculated in order to find out the significance of test items in determining participants' skill, especially reading skill in this study (Arikunto (2003) cited in Apriyani, 2010, p.30). The questionnaire's discrimination power index was also not calculated since it is necessary only for achievement test.

Several steps were taken in calculating the discrimination power index to follow Arikunto (2003). First, try out test result were sorted based on the value. Then, it was equally separated into two parts: the first half is the *upper group* and the second half is the *lower group*. Next, the number of students who answered right and wrong in both groups needs to be determined. The process then went to calculate the discrimination power index by using formula, as follows:

$$D = \frac{B_u}{J_u} - \frac{B_l}{J_l}$$

Figure 3.6 Discrimination Power Index Formula

Where:

D : discrimination power index B_u : participant in upper group answers right

J_u : participants in upper group B_l : participant in lower group answers right

J_l : participants in lower group

(Arikunto, 2003)

After obtaining the result of discrimination power index, the classification and recommendation should be applied (Arikunto, 2003), as presented in Table 3.4.

Table 3.4

Classifications of Discrimination Power Index

D Scores	Classifications	Recommendation
≤ -0.01	Worst	Definitely discard
0.00 – 0.19	Poor	Review in depth
0.20 – 0.29	Moderate	Need to check
0.30 – 0.39	Good	Possibilities for improve
≥ 0.39	Excellent	Retain

By taking those steps above, try out test result was being sorted, divided, and calculated by using *D* formula (see Appendix B.8). After obtaining the result, then the classifications and recommendations were applied, as presented in Table 3.5 below.

Table 3.5

Discrimination Power Index of Achievement Test

Items	*D* Score	Classifications
Q4, Q23	0.13	
Q5, Q15, Q16, Q17, Q21, Q22, Q24	0.20	**Poor**
Q2, Q7, Q8, Q11, Q12, Q13, Q14, Q19, Q20, Q25, Q26, Q27, Q28, Q30	0.27	**Moderate**
Q1, Q3, Q6, Q9, Q10, Q18, Q29	0.33	**Good**

The result above shows that nine items were considered poor, 14 are considered moderate, and seven were considered good. Then the

30

recommendations were applied to follow Arikunto (2003), in order to improve the achievement test quality.

3.5   Data Analysis

The questionnaire and achievement test were administered to the participants as those were considered good and reliable based on the trying out result. By administering the instruments, the data were obtained then it was calculated and analyzed by using certain formula. Before analyzing the data, it is necessary to make sure that the data were normally distributed or not (Coolidge, 2000, p.114). This study utilized SPSS 16 (Statistical Package for Social Sciences) as it is one of the oldest and the most widely-used statistical software package, and is among the better ones available (*http://ittraing.iu.edu/*). The equations of *Kolmogorov-Smirnov* and *Saphiro-Wilk* were used to find out the normality distribution.

The result of normality distribution determines the formula which is employed to analyze the data. If the data is normally distributed, then Pearson Product Moment formula is applied, as it is also a correlation formula for parametric statistic and interval data (Sugiyono, 2008, p.210). The Pearson Product Moment formula is:

$$r = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{[N\sum x^2 - (\sum x)^2][N\sum y^2 - (\sum y)^2]}}$$

Where:

$\sum x$: total of *x* scores

$\sum y$: total of *y* scores

Σxy : total of each *x* multiplied by each *y*

Σx^2 : total of the squares of each *x* scores

Σy^2 : total of the squares of each *y* scores

$(\Sigma x)^2$: square of the total of *x* scores

$(\Sigma y)^2$: square of the total of *y* scores

N : number of participants

<div align="right">(Coolidge, 2000, p.116)</div>

The result of correlation coefficient is then being interpreted to find out its strength to follow Sugiyono (2008, p.257). The interpretations are presented in Table 3.6.

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Table 3.6

Correlation Coefficient Interpretation

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Coefficient Interval	Correlation
0.000 – 0.199	Very weak
0.200 – 0.399	Weak
0.400 – 0.599	Moderate
0.600 – 0.799	Strong
0.800 – 1.000	Very strong

<div align="right">(Sugiyono, 2008, p.257)</div>

After finding out the correlation coefficient, it is necessary to find out whether it is significant or not by using t formula (Coolidge, 2000, p.118), as follows:

$$t = \frac{r}{\sqrt{\dfrac{1-r^2}{N-2}}}$$

Where:

t : significance of correlation coefficient

r : correlation coefficient

N : number of participants

(Coolidge, 2000, p.118)

The result from *t* formula, which is also called *t obtained*, then should be applied to the interpretation that correlation coefficient is significant if the *t obtained* exceeds the *t critical*, and vice versa. Several steps are taken in determining the *t critical* in distribution table. First, it is necessary to decide whether using a one-tailed or two-tailed test of significance. Since this study suggests the alternative hypothesis (H$_a$), then a *two-tailed* test of significant was required, as alternative hypothesis is non-directional (Coolidge, 2000; Sugiyono, 2008). Second, level of significance (*p*) and degree of freedom (*df*) also need to be determined. As stated in previous sections, this study used *p = 0.05* and *df = 28*.

In the other hand, Spearman Correlation for Ranked Data formula is employed if the data is not normally distributed, as it is a correlation formula for non-parametric statistic and ranked data (Coolidge, 2000, p. 127). The formula is:

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

Figure 3.7 Difficulty Index Formula

Where:

r_s : correlation coefficient   *N* : number of participants

D : the difference between participants' ranks

(Coolidge, 2000, p.127)

Firstly, the data should be converted into ranked data before being computed. The conversion is made by using a formulation from Microsoft Excel software '**RANK (number, ref, order)**'. Then the ranked data is computed to find out the differences (**D**) and these differences are squared (**D^2**). The squared differences are then being summed to get **ΣD^2**. After gaining the result, then it should be applied to the interpretation in Table 3.6 above to find out its strength.

After finding out the strength of **r obtained**, the **r critical** also need to be determined. It is determined by finding out the critical value at certain level of significance (**p = 0.05**) and number of participants (**N = 28**). The result of correlation coefficient of Spearman Correlation, which is called **r_s** or **r obtained**, then needs to apply the interpretation:

$$\text{if } r_{obtained} > r_{critical} \quad = \text{valid}$$

$$\text{if } r_{obtained} < r_{critical} \quad = \text{invalid}$$

(Coolidge, 2000; Sugiyono, 2008)

The interpretation above explains that if the **r obtained** exceeds the **r critical** then the correlation coefficient is statistically significant, and vice versa.

After determining the correlation coefficient, it is necessary to find out whether the hypothesis is accepted or not. The null and alternative hypotheses for both Pearson Product Moment and Spearman Correlation for Ranked Data correlation are as follows:

$$\mathbf{H_o} \quad : \rho = 0$$

$$\mathbf{H_a} \quad : \rho \neq 0$$

(Coolidge, 2000, p.118; Sugiyono, 2008, p.258)