Chapter Three

Research Methodology

In this chapter, the researcher talks about the research methodology used in the study. It includes the research design, population, sample, sampling, data collection method, and data analysis. The researcher will explain the reason why does he use his methodology in conducting the study. In addition, the researcher will explain all about it clearly in next paragraph.

Research Design

The researcher applied quantitative research design in this study. According to Creswell (2012), some major characteristics of quantitative research are creating purpose statements, research questions and specific hypothesis. Quantitative research also collecting numeric data from population using an instrument with preset questions and responses. Then, quantitative research is also "analyzing trends, comparing groups, or relating variables using statistical analysis" (p. 13). Based on the explanation above, some characteristics of quantitative were same with this study that also investigates the correlation between students' multiple intelligences and their academic achievement. This study also collected numeric data from a large number of people with an instrument. Hence, the appropriate research design for this study was quantitative research design based on the similarities of characteristics between quantitative research design and this study.

Since this research purposes to investigate the correlation between two variables of this study which were students' multiple intelligences and students' academic achievement, and then the researcher determined the correlational research design as the quantitative research method of this study. Correlation analysis is a statistical test to decide two or more variables or two sets of data have relation each other or not. The statistic that presents a linear correlation is the product moment correlation coefficient as the statistic of correlation

(Creswell, 2012). The researcher used explanatory research as one of correlational research design types. Explanatory research design is a correlational research design when the researcher is interested to explore two variables widely (Creswell, 2012). Thus, the quantitative research method of this study was explanatory correlation design.

Research Setting

This study took place at English Education Department of Universitas Muhammadiyah Yogyakarta. This decision was based on two reasons. First, the researcher wanted to investigate multiple intelligences in the context of English education students with the hope that the result of the study would give benefits for the lecturers and students to develop their performance in teaching and learning process. Second, conducting the research in EED of UMY made the researcher easy to collect data since the researcher was an active student of EED of UMY. In addition, the researcher collected the data during period of May-July 2017.

Research Population and Sample

The researcher selected the participants of this study before collecting data. The researcher decided population to determine research sample as representative of research population. Then, the researcher determined number participants using sampling strategy that suitable with this study in order to obtain reliable research data.

Research population. Population is a set of people or items under consideration in the study. In other words, population is a complete set of elements (persons or objects) covered by the study or with which the study is concerned. Oswala (2011) stated that the population is a number of persons or objects covered by the study or with which the study is focused, while sample is a small group selected to represent the population and participate in the study.

In this study, the researcher decided 121 EED of UMY students batch 2016 as the population of the study. This decision was based on the fact that students batch 2016 are fresh men students in EED of UMY which still have a time to get the beneficial of the study and to develop their intelligences based on the result of the study.

Research sample. The researcher determined research sample of the study after choosing population of the research. According to Oswala (2011), sample is a small group selected to represent the population and participate in the study. In this study, the researcher selected 93 students of the population as the sample of the study. This decision was based on Creswell's (2012) sample table which showed that if the population size of the study is 121, and the confidence interval is 5%, the researcher would have 93 students for being the sample of the study. Additionally, the researcher took the data from the sample by using simple random sampling. Simple random sampling is a sampling approach which gives each member of the population under the study has an equal chance of being selected to participate in the study (Creswell, 2012).

The researcher selected the sample by doing some steps. First, the researcher made a list of population by writing each name of EED of UMY students batch 2016 who are population of the study on 121 pieces of paper. Then, the researcher put those pieces of paper into a hat. The last, the researcher selected the sample by drawing 93 pieces of paper in the hat randomly.

Research Instrument

The researcher used two instruments to collect the data. Instrument is defined as what the researcher uses to collect data (Aina, 1995; ReSSI, 2017). Instrument is tools that are used in collecting the data. The instrument can be questionnaire sheet, pen, camera, tape recorder, etc. In this study, the researcher used questionnaire and document on students' GPA.

Questionnaire. In the study, the researcher used questionnaire to measure students' multiple intelligences. Questionnaire is set of statements or questions for obtaining statistically useful or personal information from individuals (Mathers, Fox, & Hunn, 2009). Thus, the researcher used the questionnaire as the appropriate instrument of this study because the researcher needed numerical data for investigating the correlation between multiple intelligences and students' academic achievement.

The researcher used questionnaire that is adapted from Gardner's (2000) Simple Multiple Intelligences Inventory. The questionnaire consists of 24 statements. The detail of the questionnaire presented on table below:

Table 2
The Detail of Questionnaire Statements

Statements	**Description**	**Statements**	**Description**
Q 1	To measure linguistic intelligence	Q 13	To measure musical intelligence
Q 2	To measure logical intelligence	Q 14	To measure interpersonal intelligence
Q 3	To measure spatial intelligence	Q 15	To measure intrapersonal intelligence
Q 4	To measure bodily-kinesthetic intelligence	Q 16	To measure naturalist intelligence
Q 5	To measure musical intelligence	Q 17	To measure linguistic intelligence
Q 6	To measure interpersonal intelligence	Q 18	To measure logical intelligence
Q 7	To measure intrapersonal intelligence	Q 19	To measure spatial intelligence
Q 8	To measure naturalist intelligence	Q 20	To measure bodily-kinesthetic intelligence
Q 9	To measure linguistic intelligence	Q 21	To measure musical intelligence
Q 10	To measure logical intelligence	Q 22	To measure interpersonal intelligence
Q 11	To measure spatial intelligence	Q 23	To measure intrapersonal intelligence
Q 12	To measure bodily-kinesthetic intelligence	Q 24	To measure naturalist intelligence

The researcher distributed the questionnaire in Indonesian language to make the participants understand and answer the questionnaire easily, and then it can also reduce the bias data.

Additionally, the researcher used structured and closed questionnaire. According to Cohen, Manion, and Morrison (2011), structured and closed questions propose the range of responses that participants will choose and it often more focus and directly to the point. It means that the participants only chosen an answer based on answer choices in the questionnaire, and the participants answered directly about themselves. In addition, scoring of questionnaire's response mode was described below:

Table 3

Scales of Questionnaire

Score	**Alternative Answer**
1	Statement does not describe you at all / *Pernyataan tidak menggambarkan Anda sama sekali.*
2	Statement describes you very little / *Pernyataan sangat sedikit menggambarkan Anda.*
3	Statement describes you pretty well / *Pernyataan menggambarkan Anda dengan cukup baik.*
4	Statement describes you exactly / *Pernyataan menggambarkan Anda dengan tepat.*

Students' GPA. In order to determine students' academic achievement level, the researcher used students' grade point average (GPA). The students' GPA was gained from two sources. The first, students' GPA was gained from questionnaire. The researcher asked the respondents to fill their GPA into the provided column in the questionnaire. The second, Students' GPA was gained officially from administration office of EED of UMY. However, the researcher only used students' GPA that was officially gained from administration office of EED of UMY to avoid the invalid data. In detail, students' GPA was used as an indicator

to determine their academic achievement level. The detail of students' GPA score was presented in Appendix E.

Data Collection Method

In this study, the researcher contacted 93 EED of UMY students batch 2016 who was selected to be a sample of the study randomly via social media such Line, WhatsApp, and Instagram. The researcher asked the students to complete the questionnaire of this study. In details, the researcher asked them to click the attached link in chat which was directly connected to Google Form with the link: (https://goo.gl/forms/mCbuKmnDRZk5Gn6r1), and then they answered the questionnaire's statements one by one based on the instruction given in the form.

Validity and Reliability

Validity is described as the degree to which a research study measures what it intends to measure, and the aims of validity in quantitative research was in order to provide the appropriate instrument and data statistical treatments (Cohen, Manion, & Morrison, 2007). In this study, the researcher tested the validity of questionnaire items by involving three expert judgments for analyzing questionnaire items. Those three experts are lecturers of English Education Department of Universitas Muhammadiyah Yogyakarta who seem to be master in this research's topic. Then, the valid questionnaire items (see Appendix B) were used for collecting data.

The first and the second expert judgment suggested to use all the original items from Gardner's (2000) simple multiple intelligences inventory. The expert argued that the all items were designed to measure multiple intelligences, and it means that the items are valid. The expert said that adapting all questionnaire items is useful in order to avoid invalid data. The third expert judgment recommended to replace some words in order to the translations would be more appropriate with the original statements. Several word replacements such as in item

1, 2, 5, 7, 8 and 11. In addition, the second expert judgment said that the researcher can use the adapted items.

Beside the experts did expert judgment, they also become rater who score the questionnaire items by giving scale score from 1-4. Then, the score was used to analyze questionnaire item validity using Gregory's formula (Retnawati, 2016). Aiken's V formula is defined as:

$$\mathbf{V} = \frac{\sum \mathbf{s}}{\mathbf{n}(\mathbf{c} - \mathbf{1})}$$

The "***s***" value obtained from the rating given by rater (***r***) subtract the highest integer assigned to the lowest validity category ($\mathbf{1_0}$). The "***n***" people towards an item in terms of the extent to which the test measures the constructs it purports to measure. While "***c***" is the integer assigned to the highest validity category.

Additionally, based on validity indicator of Retnawati (2016) (see table 4), The *V*-value is low validity when the *V*-value is lower than 0.4. Then, the *V*-value is moderate validity when the *V*-value is in between the range of 0.4-0.8. The last, the *V*-value is high validity when the *V*-value was highest than 0.8.

Table 4

The Result of Aiken Coefficient for Multiple Intelligences Questionnaire

Item	**Rater 1**	**Rater 2**	**Rater 3**	**S 1**	**S 2**	**S 2**	**∑s**	**V**	**Description**
1	2	4	4	1	3	3	7	0.78	Moderate Validity
2	3	4	4	2	3	3	8	0.88	Moderate Validity
3	4	4	4	3	3	3	9	1.00	High Validity
4	4	4	4	3	3	3	9	1.00	High Validity
5	4	4	4	3	3	3	9	1.00	High Validity
6	4	4	4	3	3	3	9	1.00	High Validity

7	3	4	4	2	3	3	8	0.88	Moderate Validity
8	3	4	4	2	3	3	8	0.88	Moderate Validity
9	4	4	4	3	3	3	9	1.00	High Validity
10	4	4	4	3	3	3	9	1.00	High Validity
11	4	4	4	3	3	3	9	1.00	High Validity
12	4	4	4	3	3	3	9	1.00	High Validity
13	4	4	4	3	3	3	9	1.00	High Validity
14	4	4	4	3	3	3	9	1.00	High Validity
15	4	4	4	3	3	3	9	1.00	High Validity
16	4	4	4	3	3	3	9	1.00	High Validity
17	4	4	4	3	3	3	9	1.00	High Validity
18	4	4	4	3	3	3	9	1.00	High Validity
19	4	4	4	3	3	3	9	1.00	High Validity
20	4	4	4	3	3	3	9	1.00	High Validity
21	4	4	4	3	3	3	9	1.00	High Validity
22	4	4	4	3	3	3	9	1.00	High Validity
23	4	4	4	3	3	3	9	1.00	High Validity
24	4	4	4	3	3	3	9	1.00	High Validity

From the result, it can be concluded that there are twenty items have high validity. They are item number 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, and 24. Whilst there are four items have moderate validity. They are item number 1, 2, 7, and 8. In conclusion, the researcher used all the items to measure students' multiple intelligences.

In order to get the stability or consistency data, Cohen, Manion and Morrison (2007) stated that reliability test is needed in quantitative research. The reliability can be defined as stability, equivalence, and internal consistency of the instrument (Cohen, Manion, &

Morrison, 2007). An alternative reliability calculation can be found by using Cronbach's Alpha coefficient. The reliability guidelines can be seen in the table below:

Table 5

Category of Reliability

Score	Category
> 0.90	Very Highly Reliable
0.80-0.90	Highly Reliable
0.70-0.79	Reliable
0.60-0.69	Marginally/Minimally Reliable
< 0.60	Unacceptably Low Reliability

There were 24 items of questionnaire that were distributed to 93 students of EED of UMY batch 2016. The reliability of questionnaire was 0.781 which included in reliable category with interval 0.80-0.90. It means the questionnaire was good to be used. The result of questionnaire reliability was shown below:

Table 6

The Result of Reliability Test

Cronbach's Alpha	N of Items
0.781	**24**

Table 7

The Result of Reliability Test Per-Items

Item	Cronbach's Alpha if Item Deleted	Item	Cronbach's Alpha if Item Deleted
Q1	**0.793**	**Q13**	**0.779**
Q2	**0.777**	**Q14**	**0.762**
Q3	**0.777**	**Q15**	**0.772**

Q4	**0.778**	**Q16**	**0.763**
Q5	**0.767**	**Q17**	**0.767**
Q6	**0.769**	**Q18**	**0.779**
Q7	**0.775**	**Q19**	**0.789**
Q8	**0.770**	**Q20**	**0.769**
Q9	**0.761**	**Q21**	**0.759**
Q10	**0.778**	**Q22**	**0.767**
Q11	**0.769**	**Q23**	**0.779**
Q12	**0.790**	**Q24**	**0.767**

Data Analysis

There are two types of data analysis for quantitative research design. The first is descriptive statistic. According to Cohen, Manion, and Morrison (2007), descriptive statistic is used to describe and synthesize the data. It will be used to determine the frequencies, central tendency (mean, modes, and median), and dispersal (standard deviation and range). The second is inferential statistics which is used to measure the hypothesis whether the hypothesis is accepted or rejected (Creswell, 2012). Therefore, the researcher used descriptive statistics and inferential statistics using Pearson Product Moment Correlation (*r*) to analyze the data and to answer all three research questions of the study.

The first research question about students' multiple intelligences level was analyzed using descriptive statistics. The researcher used descriptive statistic to present and describe the data by indicating central tendency (mean, modes, and median). Then, the researcher categorized the level of students' multiple intelligence into three categories. They were high, moderate, and low. Those categories were conducted using Supranto's (2000) formula. The formula was as written below:

$$c = \frac{Xn - X1}{k}$$

Where:

c = the range prediction (class width, class size, class length)

k = the number of class that the researcher wants

X n = the maximum score of variable

X 1 = the minimum score of variable

In this study, the maximum score of students' multiple intelligences was 92.0 and the its minimum score was 40.0. Then, the researcher calculated those scores to make students' multiple intelligences category using Supranto's (2000) formula. The detail calculation as presented below:

$$C = \frac{92 - 40}{3}$$

$$c = \frac{52}{3}$$

$$c = 17.3$$

After calculating the score, the result showed that the range score of each category was 17.3. The detail category of students' multiple intelligences was as seen in the table below:

Table 8

Category of Students' Multiple Intelligences

Scale	**Description**
≥ 74.8	High
57.4 – 74.7	Moderate
40.0 – 57.3	Low

In order to answer the second research question about students' academic achievement level, the researcher also used descriptive statistic to analyze the data of students' academic achievement. The maximum score of students' academic achievement was 4.00, and its minimum score was 2.79. The researcher categorized the level of students' academic achievement into three categories using Supranto's formula (2000). Then, the categories were good, moderate, and poor. After calculating those score, the result showed that the range score of each category was 0.40. The detail category of students' academic achievement was as seen in the table below:

Table 9

Category of Students' Academic Achievement

Scale	**Description**
≥ 3.61	Good
3.20 – 3.60	Moderate
2.79 – 3.19	Poor

In detail, the students who have GPA score which is higher than 3.61 belongs to good category. Then, the students who have GPA score with the range of 3.20 – 3.60 belongs to moderate category. The last, the students who have GPA score whit the range of 2.79 – 3.19 belongs to poor category.

Additionally, the last research question about the correlation between multiple intelligences and students' academic achievement was answered and analyzed using inferential statistic. As the study is explanatory correlation design, the researcher used Pearson Product Moment (r) to investigate the correlation between multiple intelligences and students' academic achievement. However, the researcher tested normality of the data before analyzing the data using inferential statistic. Normality test was used to determine whether

the data distribution is normal or not (Cohen, Manion, & Morrison, 2007). Then, in order to determine whether the correlation has strong correlation or not, the researcher categorized the correlation into five criteria. The criteria were conducted by Cohen et al (2007). Those criteria were very low, low, moderate, strong, and very strong. The detail criteria are as seen in the table below:

Table 10

The Correlation Criteria

Interval Coefficient	**Correlation Level**
0.00 – 0.199	Very Low
0.200 – 0.399	Low
0.400 – 0.599	Moderate
0.600 – 0.799	Strong
0.800 – 1.000	Very Strong

In detail, the were five criteria of correlation. First, the correlation with interval coefficient of 0.00 – 0.199 belongs to very low correlation level. Second, the correlation with interval coefficient of 0.200 – 0.399 belongs to low correlation level. Third, the correlation with interval coefficient of 0.400 – 0.599 belongs to moderate correlation level. Fourth, the correlation with interval coefficient of 0.600 – 0. 799 belongs to strong correlation level. The last, the correlation with interval coefficient of 0.800 – 1.000 belongs to very strong correlation level.