

## **CHAPTER IV**

### **RESEARCH FINDINGS**

After collecting data from instrument researcher used, such as questionnaire, test, and documentation, the researcher analyzed data and presented data in this chapter. In addition, the researcher will continue by explaining the validity and the reliability used in collecting data, statistical analysis of the data, and hypothesis testing.

#### **A. Presentation of Data**

In presentation of data, the researcher presented data got from questionnaire, test, and documentation during research process at eighth grade of MTsN Sumber Bungur Pamekasan. The researcher got data related to the independent and dependent variables. For independent variable, the researcher used questionnaire to divide students who are visual, auditory, and kinesthetic. While the data got from test is to know the writing skill of auditory and visual learners and will be analyzed by t-test. Of course, before giving a test, the researcher consulted the topics of the test to the teacher of progressive class at eighth grade of MTsN Sumber Bungur Pamekasan and also continued by determining the validity and reliability of test.

## 1. Data Presentation of Questionnaire

In conducting research at eighth grade of MTsN Sumber Bungur Pamekasan, the researcher took all of students as sample of this research from the population. Then, the researcher spread out the questionnaire to all member of sample.

The questionnaire researcher used took from Bobbi DePorter, Mark Readon and Sarah Singer-Nourie's book entitled *Quantum Teaching: Orchestrating Student Success* on page 166-167. The questionnaires consist of 36 items which divided into 3 parts; they are 12 items visual indicator, 10 items for auditory indicator, and 12 items for kinesthetic indicator. In this questionnaire, the answer is available. The alternative answers provided by researcher are often, sometimes, and seldom. The result of questionnaire can be analyzed quantitatively because it can be interpreted into numerical form. Every item has 3 choices which have a value as follows:

- a. If the respondents select "often" will get score 2.
- b. If the respondents select "sometimes" will get score 1.
- c. If the respondents select "seldom" will get score 0.

Then, the researcher collected the answer of questionnaires then scored those questionnaires. The students have highest score in one of part will be included to the style. After that, the researcher identified visual, auditory, and kinesthetic students based on students' answer of questionnaire. Then, the researcher focused only to auditory and visual learners.

The researcher found nineteen visual learners, five auditory learners, two kinesthetic learners, four visual-auditory learners, one visual kinesthetic learner and one auditory-kinesthetic learner. (See table 1.2 in appendix II)

#### a. Validity of The Questionnaire

In this study, researcher used face validity proposed by David P. Harris for validity of the questionnaire. Before spreading out the questionnaire, researcher had consulted to the educators such as advisor of this thesis and examiner of the thesis proposal about validity of questionnaire. The researcher had asked them whether the questionnaire used by the researcher which took from Bobbi DePorter, Mark Readon and Sarah Singer-Nourie's book entitled *Quantum Teaching: Orchestrating Student Success* on page 166-167. The result of researcher's consultation showed that the questionnaire was appropriate.

#### b. Reliability of The Questionnaire

In measuring the reliability of the questionnaire, the researcher used the Alpha formula based on Suharsimi Arikunto<sup>1</sup>, it is following:

$$r_{11} = \left[ \frac{k}{k-1} \right] \left[ 1 - \frac{\sum \sigma b^2}{\sigma_t^2} \right]$$

$r_{11}$  = reliability of instrument

$\sum \sigma b^2$  = sum of variances of the item scores

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<sup>1</sup>Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*, (Jakarta: PT. Renika Cipta, 2010), page 231.

$$\sigma_t^2 = \text{total variance}$$

k= the sum of questionnaire items

To ease in counting the reliability of questionnaire, the researcher used distribution table of the questionnaire answers of students. (See in appendix IV).

### 1) The Computing the Items of Questionnaire

As mentioned above, questionnaire used by the researcher consists of three parts namely visual indicator, auditory indicator, and kinesthetic indicator. After all of the learning style is calculated, it will be found where students are auditory, visual and kinesthetic. So, students have the highest score in auditory indicator compared with other indicator will be included to auditory students. Furthermore, the computation of students' questionnaire will consist of three parts too.

To get sum of variance of items, the researcher find out variance of every items by using formula as follows:

$$\sigma^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N}$$

$\sigma^2$  = variance

$\sum X^2$  = sum of the squares of each score (i.e., each score is first squared, and then these squares are summed)

$(\sum X)^2$  = sum of the squared (the scores are first summed, and then this total is squared)

N= number of cases

#### a. Visual Indicator

The distribution of score every item and the computation of variance of each item can be seen table 4.1 in the appendix IV. The computation of total variance  $\sigma^2$  as follows:

$$\sigma_t^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N} \sigma_t^2 = \frac{5886 - \frac{179776}{32}}{32} \sigma_t^2 = \frac{5886 - 5618}{32} \sigma_t^2 = \frac{268}{32} \sigma_t^2 = 8,375$$

#### b. Auditory Indicator

The distribution of score every item and the computation of variance of each item can be seen in table 4.2 in the appendix IV. The computation of total variance  $\sigma^2$  as follows:

$$\sigma_t^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N} \sigma_t^2 = \frac{4512 - \frac{136900}{32}}{32} \sigma_t^2 = \frac{4512 - 4278,125}{32} \sigma_t^2 = \frac{233,875}{32} \sigma_t^2 = 7,309$$

#### c. Kinesthetic Indicator

The distribution of score every item and the computation of variance of each item can be seen table 4.3 in the appendix IV. The computation of total variance  $\sigma^2$  as follows:

$$\sigma_t^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N} \sigma_t^2 = \frac{3602 - \frac{106276}{32}}{32} \sigma_t^2 = \frac{3602 - 3321,1}{32} \sigma_t^2 = \frac{280,9}{32} \sigma_t^2 = 8,779$$

### 2) The Analysis of reliability of students' Questionnaire

After calculating the variance score of each items of students' questionnaire (see appendix IV) and the variance of total score of questionnaire items ( $\sigma^2_t$ ), it had been known that for visual indicator, the variance of total score of questionnaire items ( $\sigma^2_t$ ) is 8,375, for auditory indicator, the variance of total score of questionnaire items

$(\sigma^2_i)$  is 7,309, and for kinesthetic indicator, the variance of total score of questionnaire items  $(\sigma^2_i)$  is 8, 779.

As the researcher mentioned above, the questionnaire has 3 parts. Furthermore, the questionnaire has three the sum of variances of the items scores. Then, the researcher got the sum of variances of the items scores of visual indicator  $(\sum\sigma^2)$  is 4,384375, the sum of variance of the items scores of auditory indicator  $(\sum\sigma^2)$  is 4,334375, and the sum of variance of the items scores of kinesthetic indicator  $(\sum\sigma^2)$  is 4,712495.

Then, the sum of variance of the items scores  $(\sum\sigma^2)$  and variance of total score of questionnaire items  $(\sigma^2_i)$  of each indicator are inserted to alpha formula.

If the result of coefficient reliability shows the positive significance, the instrument is reliable. As stated by Sofyan Siregar that the criteria of the instrument called as reliable using this technique, when coefficient of reliability  $(r_{11}) > 0,60$ .<sup>2</sup> The table below is the result of reliability of the questionnaire:

a) Visual indicator

$$r_{11} = \left[ \frac{k}{k-1} \right] \left[ 1 - \frac{\sum \sigma b^2}{\sigma_t^2} \right]$$

$$r_{11} = \left[ \frac{12}{12-1} \right] \left[ 1 - \frac{4,384}{8,375} \right]$$

$$r_{11} = \left[ \frac{12}{11} \right] [1 - 0,523]$$

$$r_{11} = [1,091][0,477] \quad r_{11} = 0,520407 = 0,521$$

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<sup>2</sup>Sofyan Siregar, *Metode Penelitian Kuantitatif* (Jakarta: Kencana Prenada Media Group, 2014), 57.

b) Auditory indicator

$$r_{11} = \left[ \frac{k}{k-1} \right] \left[ 1 - \frac{\sum \sigma b^2}{\sigma_t^2} \right]$$

$$r_{11} = \left[ \frac{10}{10-1} \right] \left[ 1 - \frac{4,334}{7,309} \right]$$

$$r_{11} = \left[ \frac{10}{9} \right] [1 - 0,592]$$

$$r_{11} = [1,111][0,408] \quad r_{11} = 0,453288 = 0,453$$

c) Kinesthetic indicator

$$r_{11} = \left[ \frac{k}{k-1} \right] \left[ 1 - \frac{\sum \sigma b^2}{\sigma_t^2} \right]$$

$$r_{11} = \left[ \frac{12}{12-1} \right] \left[ 1 - \frac{4,712}{8,779} \right]$$

$$r_{11} = \left[ \frac{12}{11} \right] [1 - 0,537]$$

$$r_{11} = [1,091][0,463] \quad r_{11} = 0,505133 = 0,506$$

From the table above, it is known that alpha cronbach from visual is 0,521, auditory is 0,453 and kinesthetic is 0,506 or >0, 60. Therefore, the instrument is reliable.

## 2. Data Presentation of Test

Test is the instrument used to know writing skill of auditory learners as independent variable of group one and visual learners as independent variable as group two. The writing skill's score of both groups is analyzed by research design,

namely independent t-test. Therefore the writing skill score of learners can be seen in appendix V.

The researcher applied the criteria of scoring based on lesson plan of English teacher of the eighth grade progressive class of MTsN Sumber Bungur Pamekasan in scoring the writing skill of both groups. Those criteria can be seen in lesson plan of English lesson in the appendix X.

#### **a. Validity of The Test**

Test is a set of question or exercise to measure someone's skill or knowledge.<sup>3</sup> Test is used to collect data related to dependent variable (variable Y). Here, test is used to measure auditory and visual learners' writing skill. Thus, the researcher checked the validity of test by applying content validity. This validity is more appropriate to the test which the researcher used in this research.

Content validity means the task given to students should cover all samples of the domain skill or in the knowledge to be assessed. So, it means that task given to students should suitable with syllabus or lesson plan or what students have learned. In researcher test, researcher provide test suitable with what students' have learned. The researcher chooses topic "daily activities text" because it has learned by students and proved by lesson plan. So, the test that the researcher gave to the students is absolutely valid.

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<sup>3</sup>*Longman Dictionary of American English* (Pearson, 2009), 1047.



## b. Reliability of The Test

Good test must valid and reliable. So that, researcher should not only check the validity but also check the reliability. Reliability means that scores from an instrument are able and consistent.<sup>4</sup> It means reliability related to the result of the test. To help in accounting the reliability, researcher presented distribution table of scores of test which can be seen in appendix V. Then, the scores are accounted by using alpha formula. Alpha formula is suitable with the test because it can be used in measuring reliability of instrument which the score not 1 and 0. Therefore, this formula is suitable because the scoring of test using form 5 until 1.

### 1) The Computing Variance of Students' Test

It does not directly account the reliability of students' scores, but the researcher should account the variance of scores and the variance of total score of students. The variance of score of test can be seen in appendix V. While the computation of variance of total score of students' test as follow:  $\sigma_t^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N} \sigma_t^2 =$

$$14599 \frac{-\frac{346921}{24}}{24} \sigma_t^2 = \frac{14599 - 14455,0417}{24} \sigma_t^2 = \frac{1439583}{24} \sigma_t^2 = 5,9982625$$

### 2) The Analysis of Reliability Students' Test

In checking the reliability of the instrument used at this research, the researcher uses alpha formula. If the result of coefficient reliability shows the positive significance, the instrument is reliable. As stated by Sofyan Siregar that the criteria of

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<sup>4</sup>Creswell, *Educational Research*, 2012, 159.

the instrument called as reliable using this technique, when coefficient of reliability ( $r_{11}$ ) > 0,60.<sup>5</sup> The table below is the result of reliability of the questionnaire:

$$r_{11} = \left[ \frac{k}{k-1} \right] \left[ 1 - \frac{\sum \sigma b^2}{\sigma_t^2} \right]$$

$$r_{11} = \left[ \frac{7}{7-1} \right] \left[ 1 - \frac{2,677}{5,999} \right]$$

$$r_{11} = \left[ \frac{7}{6} \right] [1 - 0,447]$$

$$r_{11} = [1,167][0,553]$$

$$r_{11} = 0,645351 = 0,646$$

From the table above, it is known that alpha cronbach 0,646 or >0, 60. Therefore, the instrument is reliable.

### c. Data Analysis

In previous sub-chapter, the researcher has explained about questionnaire and test with their validity and reliability. Then, the researcher analyzed the writing skill scores by using statistical form, comparative study. In comparing the scores of both groups, auditory and visual learners, the researcher applied the formula of independent t-test theory. To have the researcher easier in analyzing the data  $X_1$  (auditory learners) and  $X_2$  (visual learners), the researcher utilized frequency distribution table and the computation follow some steps below:

1. Finding out the mean score of group 1 from variable  $X_1$  (auditorylearners) by

$$\text{using formula, } M_1 = \frac{\sum X_1}{N_1}$$

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<sup>5</sup>Siregar, *Metode Penelitian Kuantitatif*, 57.

$M_1$  = Mean score of group 1 from variable X

$\Sigma X_1$  = the sum of scores group 1 from variable X

$N_1$  = the number of participants in group

From the table 4.1 in the appendix IV, it can be seen that  $\Sigma X_1$  is 424 and the  $N_1$  is 32. So,  $M_1$  can be searched by formula above, the way to calculate is the sum of scores of group 1 from variable X divided by the amount of respondents of group 1, it can be seen in the following computation.

$$M_1 = \frac{\Sigma X_1}{N_1} = \frac{424}{32} = 13, 25$$

So, from the calculation above, the mean score of group 1 ( $M_1$ ) is 13, 25.

2. Finding out the mean score of group 2 from variable  $X_2$  (visual learners) by

using formula,  $M_2 = \frac{\Sigma X_2}{N_2}$

$M_2$  = Mean score of group 2 from variable X

$\Sigma X_2$  = the sum of scores group 2 from variable X

$N_2$  = the number of participants in group

From the table 4.2 in the appendix IV, it can be seen that  $\Sigma X_2$  is 370 and the  $N_2$  is 32. So,  $M_1$  can be searched by formula above, the way to calculate is the sum of scores of group 2 from variable X divided by the amount of respondents of group 2, it can be seen in the following computation.

$$M_2 = \frac{\Sigma X_2}{N_2} = \frac{370}{32} = 11, 5625$$

So, from the calculation above, the mean score of group 2 ( $M_2$ ) is 11, 5625.

3. Finding out the  $x_1$  and  $x_2$  by using formula:

$$x_1 = X_1 - M_1 \quad \text{and} \quad x_2 = X_2 - M_2$$

$x_1$  = score deviation of group 1

$X_1$  = score of group 1

$M_1$  = mean score of group 1

$x_2$  = score deviation of group 2

$X_2$  = score of group 2

$M_2$  = mean score of group 2

The calculation by using formula above it can be got the mean scores of auditory learners is 13,25 and the mean scores of visual learners is 11,5625. To find out the deviation, the researcher should minus the scores of each participant of each group by the mean score of their own group. Then, the result of it is squared. So, 39,2 is gained from the sum of  $x_1^2$  for group 1 and 98,411 is obtained from the sum of  $x_2^2$  from group 2. See in appendix IX.

4. Finding out the standard score deviation of group 1 by using formula,

$$SD_1 = \sqrt{\frac{\Sigma X_1^2}{N_1}}$$

$SD_1$  = standard score deviation of group 1

$\Sigma X_1^2$  = the sum of score deviation that is squared from group 1

$N_1$  = the number of participants in group 1

From the table 8.1 in the appendix IX, it can be seen that  $\Sigma X_1^2$  is 39,2 and the  $N_1$  is 5. So,  $SD_1$  can be searched by formula above, the way to calculate is the

researcher should divide the sum of score deviation of group 1 that is squared by the amount of participants of group 1 and account the square of root.

$$SD_1 = \sqrt{\frac{\sum X_1^2}{N_1}} SD_1 = \sqrt{\frac{39,2}{5}} SD_1 = \sqrt{7,84} SD_1 = 2,8$$

So, from the calculation above, the researcher can find the standard score deviation of group 1 is 2,8.

5. Finding out the standard score deviation of group 2 by using formula,

$$SD_2 = \sqrt{\frac{\sum X_2^2}{N_2}}$$

$SD_2$  = standard score deviation of group 2

$\sum X_2^2$  = the sum of score deviation that is squared from group 2

$N_2$  = the number of participants in group 2

From the table 8.2 in the appendix IX, it can be seen that  $\sum X_2^2$  is 98,411 and the  $N_1$  is 19. So,  $SD_2$  can be searched by formula above, the way to calculate is the researcher should divide the sum of score deviation of group 2 that is squared by the amount of participants of group 2 and account the square of root.

$$SD_2 = \sqrt{\frac{\sum X_2^2}{N_2}} SD_2 = \sqrt{\frac{98,411}{19}} SD_2 = \sqrt{5,179} SD_2 = 2,275$$

So, from the calculation above, the researcher can find the standard score deviation of group 2 is 2,275.

6. Determining the standard error of mean group 1 by using formula,

$$SE_{M1} = \frac{SD_1}{\sqrt{N_1 - 1}}$$

$SE_{M1}$  = standard error of mean group 1

$SD_1$  = standard deviation score for group 1

$N_1$  = the number of participants in group 1

From the calculation in the previous step, it can be seen that  $SD_1$  is 2,8 and the  $N_1$  is 5. So,  $SE_{M1}$  can be searched by formula above, the way in calculating is that the researcher should minus 1 to the number of participants of group 1. Then, the researcher should divide standard deviation score of group 1 by the square of root of number participants of group 1 which minus 1.

$$SE_{M1} = \frac{SD_1}{\sqrt{N_1-1}} = \frac{2,8}{\sqrt{5-1}} = \frac{2,8}{\sqrt{4}} = \frac{2,8}{2} = 1,4$$

So, from the computation above, it can be known that standard error of mean value of group 1 ( $SE_{M1}$ ) is 1,4.

7. Determining the standard error of mean group 2 by using formula,

$$SE_{M2} = \frac{SD_2}{\sqrt{N_2-1}}$$

$SE_{M2}$  = standard error of mean group 2

$SD_2$  = standard deviation score for group 2

$N_2$  = the number of participants in group 2

From the calculation in the previous step, it can be seen that  $SD_2$  is 2,275 and the  $N_1$  is 19. So,  $SE_{M2}$  can be searched by formula above, the way in calculating is that the researcher should minus 1 to the number of participants of group 2. Then, the researcher should divide standard deviation score of group 2 by the square of root of number participants of group 2 which minus 1.

$$SE_{M2} = \frac{SD_2}{\sqrt{N_2-1}} SE_{M2} = \frac{2,275}{\sqrt{19-1}} SE_{M2} = \frac{2,275}{\sqrt{18}} SE_{M2} = \frac{2,275}{4,242} SE_{M2} = 0,536$$

So, from the computation above, it can be known that standard error of mean value of group 2 ( $SE_{M2}$ ) is 0,536.

8. Determining the error difference between mean score of group 1 and group 2

by using formula,  $SE_{M1-M2} = \sqrt{SEM1^2 + SEM2^2}$

$SE_{M1-M2}$  = standard error difference between mean score of group 1 and group 2

$SEM1^2$  = standard error of group 1 that is squared

$SEM2^2$  = standard error of group 2 that is squared

From the calculation in the previous step, it can be seen that  $SE_{M1}$  is 1,4 and the  $SE_{M2}$  is 0,536. So,  $SE_{M1-M2}$  can be searched by formula above, the way to calculate is squaring  $SE_{M1}$  and  $SE_{M2}$ . Then, the result of both squares is summed than determined the square of root.

$$SE_{M1-M2} = \sqrt{SEM1^2 + SEM2^2}$$

$$SE_{M1-M2} = \sqrt{SEM1^2 + SEM2^2}$$

$$SE_{M1-M2} = \sqrt{1,4^2 + 0,536^2}$$

$$SE_{M1-M2} = \sqrt{1,96 + 0,287296} SE_{M1-M2} = \sqrt{2,247296} SE_{M1-M2} = 1,499$$

So, from computation above, it can be known that standard error difference between mean value of group 1 and group 2 ( $SE_{M1-M2}$ ) is 1,499.

9. Determining the t-value or  $t_0$  by using formula,  $t_0 = \frac{M_1 - M_2}{SE_{M1} - SE_{M2}}$

$t_0$  = t-value

$M_1$  = mean score of variable X1

$M_2$  = mean score of variable X2

From the calculation in the previous step, it can be seen that  $M_1$  is 13, 25 and the  $M_2$  is 11, 5625 and  $SE_{M_1-M_2}$  is 1,499. So, t-value can be searched by formula above as follows:

$$t_o = \frac{M_1 - M_2}{SE_{M_1} - SE_{M_2}}$$

$$t_o = \frac{13,25 - 11,5625}{1,499} t_o = \frac{1,6875}{1,499} t_o = 1,1257505003 \quad t_o = 1,126$$

After analyzing the data above, it can be seen that t-value ( $t_o$ ) of this research is 1,126. To know whether the hypothesis of this research is accepted or rejected, the researcher compares t-value with t-table or consults t-value to t-table in the hypothesis testing in next discussion.

### 3. Data Presentation of Documentation

In the previous chapter that documentation is used to collect, to complete and to support data whether the data in the research is valid or not. The result of documentations is:

- a. Names of Students of the Eighth Grade in Progressive Class of MTsN Sumber Bungur Pamekasan.
- b. Students' questionnaire answer sheet.
- c. Questionnaire answers' score of students.



- d. Auditory and visual learners' writing skill answer sheet.
- e. Writing skill score of students.
- f. Lesson Plan of English subject.

## **B. Hypothesis Testing**

Hypothesis testing is done by consulting t-value to t-table. It is important to conclude the result of the study. In hypothesis testing, researcher tests the hypothesis. Test here is needed to prove whether alternative hypothesis ( $H_a$ ) which used in this research is accepted or rejected. If  $t_o$  has some or higher value than t-table, it means that null hypothesis ( $H_0$ ) is rejected. If  $t_o$  is less than t-table, it means that null hypothesis ( $H_0$ ) is accepted.

Null hypothesis ( $H_0$ ) of this research is auditory learners at eighth grade students of MTsN Sumber Bungur Pamekasan do not have better in writing skill comparison with visual learners and Alternative hypothesis ( $H_a$ ) of this research is auditory learners at eighth grade students of MTsN Sumber Bungur Pamekasan have better in writing skill comparison with visual learners. However, this research prefers to use alternative hypothesis. Then, to decide whether alternative is accepted or rejected, the researcher consulted t-value of this research to t-table which is in the appendix VII with degree freedom using formula  $df = (N_1 + N_2 - 2)$ . Number of sample of auditory learners is 5 and number of sample visual learners 19.

$$df = (N_1 + N_2 - 2) \quad df = (5 + 19 - 2) \quad df = (24 - 2) \quad df = 22$$

Thus, the degree of freedom is 22. Based on table 6, the value of 60 in significant level 5% is 2,07 and in significant level 1% is 2,82. However, the t-value is 1,126. It means t-value is lower than t-table. Therefore, alternative hypothesis is failed to be accepted. So that, null hypothesis can be accepted namely Auditory learners of eighth grade of MTsN Sumber Bungur Pamekasan do not have better in writing skill comparison with visual learners.