CHAPTER IV
THE RESULT OF STUDY

A. Data Presentation

In this section, it would be described the obtained data of the students’ vocabulary score after and before taught by using picture crossword. The presented data consisted of mean, standard deviation, standard error.

1. The Result of Pre-test Score

a. The Result of Pretest Score of Experiment Class

The data was known the highest score was 80,0 and the lowest score was 50,0. To determine the range of score, the class interval, and interval of temporary, the writer calculated using formula as follows:

The Highest Score (H) = 80
The Lowest Score (L) = 50
The Range of Score (R) = H – L + 1
= 80 - 50 + 1
= 31

The Class Interval (K) = 1 + (3.3) x Log n
= 1 + (3.3) x Log 30
= 1 + (3.3) x 1.48
= 1 + 4.88 = 5.88
= 6
Interval of Temporary (I) \[ \frac{R}{K} = \frac{31}{6} = 5.17 = 5 \]

So, the range of score was 31, the class interval was 6, and interval of temporary was 5. Then, it was presented using frequency distribution in the following table:

**Table 4.1**

**Frequency Distribution of the Pretest Score**

<table>
<thead>
<tr>
<th>Class (K)</th>
<th>Interval (I)</th>
<th>Frequency (F)</th>
<th>Midpoint</th>
<th>The Limitation of each group</th>
<th>Frequency Relative (%)</th>
<th>Frequency Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 – 54</td>
<td>4</td>
<td>52</td>
<td>49.5 – 54.5</td>
<td>13.333</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>55 – 59</td>
<td>2</td>
<td>57</td>
<td>54.5 – 59.5</td>
<td>6.667</td>
<td>86.667</td>
</tr>
<tr>
<td>3</td>
<td>60 – 64</td>
<td>3</td>
<td>62</td>
<td>59.5 – 64.5</td>
<td>10</td>
<td>80.000</td>
</tr>
<tr>
<td>4</td>
<td>65 – 69</td>
<td>4</td>
<td>67</td>
<td>64.5 – 69.5</td>
<td>13.333</td>
<td>70.000</td>
</tr>
<tr>
<td>5</td>
<td>70 – 74</td>
<td>11</td>
<td>72</td>
<td>69.5 – 74.5</td>
<td>36.667</td>
<td>56.667</td>
</tr>
<tr>
<td>6</td>
<td>75 – 79</td>
<td>3</td>
<td>77</td>
<td>74.5 – 79.5</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>80 – 84</td>
<td>3</td>
<td>82</td>
<td>79.5 – 84.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>ΣF=30</strong></td>
<td><strong>ΣP=100</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Distribution Of Students’ Pretest Score can also be seen in the following figure.
It can be seen from the figure above, the students’ pretest scores in experimental group. There were four students who got score 50-54. There were two students who got score 55-59. There were three students who got score 60-64. There were four students who got score 65-69. There were eleven students who got score 70-74. There were three students who got 75-79. And there were three students who got score 80-84.

The next step, the researcher tabulated the scores into the table for the calculation of mean, Standard deviation, and standard error as follows:

Table 4.2

The Table for Calculating mean, Standard deviation, and standard error of Pretest Score.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Frequency (F)</th>
<th>Mid point (X)</th>
<th>X^2</th>
<th>F.X</th>
<th>F.X^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 – 54</td>
<td>4</td>
<td>52</td>
<td>2704</td>
<td>208</td>
<td>10816</td>
</tr>
<tr>
<td>55 – 59</td>
<td>2</td>
<td>57</td>
<td>3249</td>
<td>114</td>
<td>6498</td>
</tr>
<tr>
<td>60 – 64</td>
<td>3</td>
<td>62</td>
<td>3844</td>
<td>186</td>
<td>11532</td>
</tr>
<tr>
<td>65 – 69</td>
<td>4</td>
<td>67</td>
<td>4489</td>
<td>268</td>
<td>17956</td>
</tr>
<tr>
<td>70 – 74</td>
<td>11</td>
<td>72</td>
<td>5184</td>
<td>792</td>
<td>57024</td>
</tr>
<tr>
<td>75 – 79</td>
<td>3</td>
<td>77</td>
<td>5929</td>
<td>231</td>
<td>17787</td>
</tr>
<tr>
<td>80 - 84</td>
<td>3</td>
<td>82</td>
<td>6724</td>
<td>246</td>
<td>20172</td>
</tr>
</tbody>
</table>

\[ \sum F=30 \quad \sum F.X=2045 \quad \sum F.X^2=141785 \]

1. **Calculating Mean**

\[ Mx = \frac{\sum Fx_i}{n} = \frac{2045}{3130} = 68.16 \]

2. **Standard Deviation**

\[ S = \sqrt{\frac{n\sum Fx_i^2 - (\sum Fx_i)^2}{n(n-1)}} \]

\[ S = \sqrt{\frac{30.141785 - (2045)^2}{30(30-1)}} \]
\[ S = \sqrt{\frac{4253550 - 4182025}{30.29}} \]
\[ S = \sqrt{\frac{71525}{870}} = \sqrt{82.21} = 9.06 \]

3. **Standard Error**

\[ SE_{md} = \frac{S}{\sqrt{N-1}} = \frac{9.06}{\sqrt{29}} = \frac{9.06}{5.38} = 1.68 \]

After Calculating, it was found that the standard deviation and the standard error of pretest score were 9.06 and 1.68.

4. **Normality Test**

It is used to know the normality of the data that is going to be analyzed whether both groups have normal distribution or not. The steps of normality test are:

**I.** Decide the limitation of upper group, from the class interval with 49.5; 54.5; 59.5; 64.5; 69.5; 74.5; 79.5; 84.5

**II.** Find the Z-score for the limitation of interval class by using the formula:

\[ Z = \frac{\text{the limitation of upper group} - M_x}{s} \]
\[ Z_1 = \frac{49.5 - 68.16}{9.06} = -2.05 \]
\[ Z_2 = \frac{54.5 - 68.16}{9.06} = -1.50 \]
\[ Z_3 = \frac{59.5 - 68.16}{9.06} = -0.95 \]
\[ Z_4 = \frac{64.5 - 68.16}{9.06} = -0.40 \]
\[
Z_5 = \frac{69.5-68.16}{9.06} = 0.14
\]

\[
Z_6 = \frac{74.5-68.16}{9.06} = 0.69
\]

\[
Z_7 = \frac{79.5-68.16}{9.06} = 0.25
\]

\[
Z_8 = \frac{84.5-68.16}{9.06} = 1.80
\]

**III.** Find the score of o-Z normal kurve table by using the score of the limitation of upper group until it was gotten the scores: 0.4798; 0.4332; 0.3289; 0.1554; 0.0557; 0.2549; 0.3944; 0.4641

**IV.** Find the score of each class interval by decrease the score of o-Z which first class minus the second class, the second class minus the third class, etc. except the score of o-Z is in the middle, it should be increased with the next score:

\[
0.4798 - 0.4332 = 0.0466
\]

\[
0.4332 - 0.3289 = 0.1043
\]

\[
0.3289 - 0.1554 = 0.1735
\]

\[
0.1554 + 0.0557 = 0.2111
\]

\[
0.0557 - 0.2549 = -0.1992
\]

\[
0.2549 - 0.3944 = -0.1395
\]

\[
0.3944 - 0.4641 = -0.0697
\]

\[
0.4641
\]

**V.** Find the expected frequency (fe) by crossing the score of every interval with the total of the students (n=30)

\[
0.0466 \times 30 = 1.398
\]
Table 4.3

The Expected Frequency (Fe)

From Observation Frequency (Fo) For The Experimental Class

<table>
<thead>
<tr>
<th>No</th>
<th>The limitation of each group</th>
<th>Z</th>
<th>score o-Z</th>
<th>score of class interval</th>
<th>fe</th>
<th>Fo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49,5</td>
<td>-2,05</td>
<td>0,4793</td>
<td>0,466</td>
<td>1,398</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>54,5</td>
<td>-1,50</td>
<td>0,4332</td>
<td>0,1043</td>
<td>3,129</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>59,5</td>
<td>-0,95</td>
<td>0,3289</td>
<td>0,1735</td>
<td>5,205</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>64,5</td>
<td>-0,40</td>
<td>0,1554</td>
<td>0,2111</td>
<td>6,333</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>69,5</td>
<td>0,14</td>
<td>0,0557</td>
<td>-0,1992</td>
<td>-5,976</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>74,5</td>
<td>0,69</td>
<td>0,2549</td>
<td>-0,1359</td>
<td>-4,185</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>79,5</td>
<td>1,25</td>
<td>0,3944</td>
<td>-0,0697</td>
<td>-2,092</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>84,5</td>
<td>1,80</td>
<td>0,4641</td>
<td></td>
<td>Σ=30</td>
<td></td>
</tr>
</tbody>
</table>

VI. Chi-quadrat test ($X^2_{test}$)

\[
X^2_{observed} = \sum_{i=1}^{k} \frac{(fo-fe)^2}{fe} \\
= \frac{(4-1,398)^2}{1,398} + \frac{(2-3,129)^2}{3,129} + \frac{(3-5,205)^2}{5,205} + \\
\frac{(4-6,333)^2}{6,333} + \frac{(11-(-5,976)^2}{-5,976} + \frac{(3-(-4,18))^2}{-4,18} + \\
\frac{(3-(-2,091)^2}{-2,091}
\]
\[= 4.84 - 0.40 - 0.93 - 0.85 - 48.22 - 12.33 - 12.39\]
\[= -70.28\]

\[\alpha = 0.05\]

\[(dk) = k-1\]
\[= 7-1\]
\[= 6\]

\[X^2_{\text{table}} = 12.592\]

\[X^2_{\text{observed}} \leq X^2_{\text{table}} = \text{Normal}\]
\[-70.28 \leq 12.592 = \text{Normal}\]

By the calculation above, the researcher compare \(X^2_{\text{observed}}\) and \(X^2_{\text{table}}\) for \(\alpha = 0.05\) and \((dk) = k-1 = 7-1 = 6\), and got the score \(X^2_{\text{table}} = 12.592\) and \(X^2_{\text{observed}}\) smaller than \(X^2_{\text{table}}\) (-70.28 \leq 12.592).

The result of pretest of experiment class was normal.

b. The Result of Pretest Score of Control Class

Based on the data above, it was known the highest score was 80,0 and the lowest score was 50,0. To determine the range of score, the class interval, and interval of temporary, the researcher calculated using formula as follows:

The Highest Score (H) = 80
The Lowest Score (L) = 50
The Range of Score (R) = H - L + 
\[= 80 - 50 + 1\]
\[= 31\]
The Class Interval (K)  
\[ K = 1 + (3.3) \times \log n \]
\[ = 1 + (3.3) \times \log 30 \]
\[ = 1 + 4.88 \]
\[ = 5.88 \]
\[ = 6 \]

Interval of Temporary (I)  
\[ I = \frac{R}{K} = \frac{31}{6} = 5.17 = 5 \]

So, the range of score was 31, the class interval was 6, and interval of temporary was 5. Then, it was presented using frequency distribution in the following table:

Table 4.4

Frequency Distribution of the Pretest Score

<table>
<thead>
<tr>
<th>Class (K)</th>
<th>Interval (I)</th>
<th>Frequency (F)</th>
<th>Midpoint</th>
<th>The Limitation of each group</th>
<th>Frequency Relative (%)</th>
<th>Frequency Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 – 54</td>
<td>2</td>
<td>52</td>
<td>49.5 – 54.5</td>
<td>6,667</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>55 – 59</td>
<td>4</td>
<td>57</td>
<td>54.5 – 59.5</td>
<td>13,333</td>
<td>93,333</td>
</tr>
<tr>
<td>3</td>
<td>60 – 64</td>
<td>0</td>
<td>62</td>
<td>59.5 – 64.5</td>
<td>0</td>
<td>80,000</td>
</tr>
<tr>
<td>4</td>
<td>65 – 69</td>
<td>0</td>
<td>67</td>
<td>64.5 – 69.5</td>
<td>0</td>
<td>80,000</td>
</tr>
<tr>
<td>5</td>
<td>70 – 74</td>
<td>21</td>
<td>72</td>
<td>69.5 – 74.5</td>
<td>70,000</td>
<td>80,000</td>
</tr>
<tr>
<td>6</td>
<td>75 – 79</td>
<td>1</td>
<td>77</td>
<td>74.5 – 79.5</td>
<td>3,333</td>
<td>10,000</td>
</tr>
<tr>
<td>7</td>
<td>80 – 84</td>
<td>2</td>
<td>82</td>
<td>79.5 – 84.5</td>
<td>6,667</td>
<td>6,667</td>
</tr>
</tbody>
</table>

\( \Sigma F = 30 \)
\( \Sigma P = 100 \)

The distribution of students’ pretest score can also be seen in the following figure.
It can be seen from the figure above, the students’ pretest scores in experimental group. There were two students who got score 50-54. There were four students who got score 55-59. There was no student who got score 60-64. There was no student who got score 65-69. There were twenty one students who got score 70-74. There was a student who got 75-79. And there were two students who got score 80-84.

The next step, the researcher tabulated the scores into the table for the calculation of mean, Standard deviation, and standard error as follows:
Table 4.5
The Table for Calculating mean, Standard deviation, and standard error of Pretest Score.

<table>
<thead>
<tr>
<th>Interval (F)</th>
<th>Frequency (F)</th>
<th>Mid point (X)</th>
<th>X^2</th>
<th>F.X</th>
<th>F.X^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 – 54</td>
<td>2</td>
<td>52</td>
<td>2704</td>
<td>104</td>
<td>5408</td>
</tr>
<tr>
<td>55 – 59</td>
<td>4</td>
<td>57</td>
<td>3249</td>
<td>228</td>
<td>12996</td>
</tr>
<tr>
<td>60 – 64</td>
<td>0</td>
<td>62</td>
<td>3844</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65 – 69</td>
<td>0</td>
<td>67</td>
<td>4489</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>70 – 74</td>
<td>21</td>
<td>72</td>
<td>5184</td>
<td>1512</td>
<td>108864</td>
</tr>
<tr>
<td>75 – 79</td>
<td>1</td>
<td>77</td>
<td>5929</td>
<td>77</td>
<td>5929</td>
</tr>
<tr>
<td>80 – 84</td>
<td>2</td>
<td>82</td>
<td>6724</td>
<td>164</td>
<td>13448</td>
</tr>
</tbody>
</table>

\[ \sum F = 30 \quad \sum F.X = 2085 \quad \sum F.X^2 = 146642 \]

1. Calculating Mean

\[ M_x = \frac{\sum F X_i}{n} = \frac{2085}{30} = 69.5 \]

2. Standard Deviation

\[ S = \sqrt{\frac{n \sum F X_i^2 - (\sum F X_i)^2}{n(n-1)}} \]

\[ S = \sqrt{\frac{30 \times 146642 - (2085)^2}{30(30-1)}} \]

\[ S = \sqrt{\frac{4399260 - 4347225}{30.29}} \]

\[ S = \sqrt{\frac{52035}{870}} = \sqrt{91.28} = 9.55 \]

3. Standard Error

\[ SE_{md} = \frac{S}{\sqrt{n-1}} = \frac{9.55}{\sqrt{30-1}} = \frac{9.55}{\sqrt{29}} = \frac{9.55}{5.38} = 1.77 \]

After Calculating, it was found that the standard deviation and the standard error of pretest score were 9.55 and 1.77.
4. **Normality Test**

It is used to know the normality of the data that is going to be analyzed whether both groups have normal distribution or not. The steps of normality test are:

I. Decide the limitation of upper group, from the class interval with 49.5; 54.5; 59.5; 64.5; 69.5; 74.5; 79.5; 84.5

II. Find the Z-score for the limitation of interval class by using the formula:

\[
Z = \frac{\text{the limitation of upper group} - M_x}{s}
\]

\[
Z_1 = \frac{49.5-69.5}{9.55} = -2.09
\]

\[
Z_2 = \frac{54.5-69.5}{9.55} = -1.57
\]

\[
Z_3 = \frac{59.5-69.5}{9.55} = -1.04
\]

\[
Z_4 = \frac{64.5-69.5}{9.55} = -0.52
\]

\[
Z_5 = \frac{69.5-69.5}{9.55} = 0
\]

\[
Z_6 = \frac{74.5-69.5}{9.55} = 0.52
\]

\[
Z_7 = \frac{79.5-69.5}{9.55} = 1.04
\]

\[
Z_8 = \frac{84.5-69.5}{9.55} = 1.57
\]

III. Find the score of o-Z normal kurve table by using the score of the limitation of upper group until it was gotten the scores: 0.4817; 0.4419; 0.3505; 0.1985; 0.0000; 0.1985; 0.3508; 0.4419
IV. Find the score of each class interval by decrease the score of o-Z which first class minus the second class, the second class minus the third class, etc. except the score of o-Z is in the middle, it should be increased with the next score:

\[
\begin{align*}
0.4817 - 0.4419 &= 0.0398 \\
0.4419 - 0.3505 &= 0.0911 \\
0.3505 - 0.1985 &= 0.1523 \\
0.1985 + 0.0000 &= 0.1985 \\
0.0000 - 0.1985 &= -0.1985 \\
0.1985 - 0.3508 &= -0.1523 \\
0.3508 - 0.4419 &= -0.0911 \\
0.4419 &= 0.4419
\end{align*}
\]

V. Find the expected frequency (fe) by crossing the score of every interval with the total of the students (n=30):

\[
\begin{align*}
0.0398 \times 30 &= 1.194 \\
0.0911 \times 30 &= 2.733 \\
0.1523 \times 30 &= 4.569 \\
0.1985 \times 30 &= 5.955 \\
-0.1985 \times 30 &= -5.955 \\
-0.1523 \times 30 &= -4.569 \\
-0.0911 \times 30 &= -2.733
\end{align*}
\]
### Table 4.6

The Expected Frequency (Fe) From Observation Frequency (Fo) For The Experimental Class

<table>
<thead>
<tr>
<th>No</th>
<th>The limitation of each group</th>
<th>Z</th>
<th>score o-Z</th>
<th>score of class interval</th>
<th>fe</th>
<th>fo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49,5</td>
<td>-2.09</td>
<td>0.4817</td>
<td>0.0398</td>
<td>1.194</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>54,5</td>
<td>-1.57</td>
<td>0.4419</td>
<td>0.0911</td>
<td>2.733</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>59,5</td>
<td>-1.04</td>
<td>0.3505</td>
<td>0.1523</td>
<td>4.569</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>64,5</td>
<td>-0.52</td>
<td>0.1945</td>
<td>0.1985</td>
<td>5.955</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>69,5</td>
<td>0.00</td>
<td>0.0000</td>
<td>-0.1985</td>
<td>-5.955</td>
<td>21</td>
</tr>
<tr>
<td>6</td>
<td>74,5</td>
<td>0.52</td>
<td>0.1945</td>
<td>-0.1523</td>
<td>-4.569</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>79,5</td>
<td>1.04</td>
<td>0.3505</td>
<td>-0.1911</td>
<td>-2.733</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>84,5</td>
<td>1.57</td>
<td>0.4419</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**VI. Chi-quadrat test ($X^2_{test}$)**

\[
X^2_{observed} = \sum_{i=1}^{k} \frac{(fo-fe)^2}{fe}
\]

\[
= \frac{(2-1.194)^2}{1.194} + \frac{(4-2.733)^2}{2.733} + \frac{(0-4.569)^2}{4.569} +
\]

\[
\frac{(0-5.955)^2}{5.955} + \frac{(21-(-5.955)^2}{-5.955} + \frac{(1-(-4.569)^2}{-4.569} +
\]

\[
\frac{(2-(-2.733)^2}{-2.733}
\]

\[
= 0.54 + 0.58 - 4.56 - 5.95 - 112.01 - 6.78 - 8.19
\]

\[
= -136.37
\]

\[\alpha = 0.05\]

\[(dk) = k-1\]

\[= 7-1 = 6\]
\[ X_{\text{table}}^2 = 11,070 \]
\[ X_{\text{observed}}^2 \leq X_{\text{table}}^2 = \text{Normal} \]
\[-136.37 \leq 12,592 = \text{Normal} \]

By the calculation above, the researcher compare \( X_{\text{observed}}^2 \) and \( X_{\text{table}}^2 \) for \( \alpha = 0.05 \) and \( (dk) = k-1 = 7-1 = 6 \), and got the score 
\[ X_{\text{table}}^2 = 12,592 \] and \( X_{\text{observed}}^2 \) smaller than \( X_{\text{table}}^2 \) (-136.37 \leq 12,592).

The result of pretest of experiment class was normal.

c. **Homogeneity Test**

<table>
<thead>
<tr>
<th>Sample</th>
<th>( dk = n-1 )</th>
<th>( S_i^2 )</th>
<th>( \text{Log } S_i^2 )</th>
<th>( (dk) \times \text{log } S_i^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>30-1=29</td>
<td>82,0836</td>
<td>1.91</td>
<td>55.39</td>
</tr>
<tr>
<td>X2</td>
<td>30-1=29</td>
<td>91,2025</td>
<td>1.96</td>
<td>56.84</td>
</tr>
<tr>
<td>Total=2</td>
<td>58</td>
<td></td>
<td>( \sum = 112.23 )</td>
<td></td>
</tr>
</tbody>
</table>

\[ S = \frac{(n_1 \times S_1^2) + (n_2 \times S_2^2)}{n_1 + n_2} \]
\[ = \frac{(29 \times 82,0836) + (29 \times 91,2025)}{29+29} \]
\[ = \frac{2380,4244 + 2644,8725}{58} = \frac{5025,2969}{58} = 86.64 \]

\[ \text{Log } S = \text{Log } 86.64 = 1.93 \]

\[ B = (\text{log } S) \times \sum(n-1) \]
\[ = 1.93 \times 58 \]
\[ = 112.38 \]

\[ X_{\text{observed}}^2 = (\log 10) \times (B - \sum(dk)\text{log } S) \]
\[ = (2.3) \times (112.38-112.23) \]
\[(2,3) \times 0,15 = 0,34\]

\[(dk) = 2-1= 1\]

\[X^2_{\text{table}} = 3,841\]

\[X^2_{\text{observed}} \leq X^2_{\text{table}} = \text{Homogen}\]

\[0,34 \leq 3,841 = \text{Homogen}\]

By the calculation above, the researcher compare \(X^2_{\text{observed}} and\) \(X^2_{\text{table}} for \alpha = 0,05 and (dk) = k-1 = 2-1 = 1, and got the score \(X^2_{\text{table}} = 3,841 and X^2_{\text{test}} smaller than X^2_{\text{table}} (0,34 \leq 3,841). The result of pretest was homogen.\]

2. **The Result of Post-Test Score**

a. **The Result of Post-test Score of Experiment Class**

Based on the data above, it was known the highest score was 93,3 and the lowest score was 60,0. To determine the range of score, the class interval, and interval of temporary, the researcher calculated using formula as follows:

The Highest Score (H) \[= 93,3\]

The Lowest Score (L) \[= 60,0\]

The Range of Score (R) \[= 93,3 - 60,0 + 1\]

\[= 34,3\]

The Class Interval (K) \[= 1 + (3.3) \times \log n\]

\[= 1 + (3.3) \times \log 30\]

\[= 1 + (3.3) \times 1,48 = 1 + 4,88 = 5.87 = 6\]
Interval of Temporary (I)  \[ \frac{R}{K} = \frac{34.3}{6} = 5.71 \approx 5 \text{ or } 6 \]

So, the range of score was 34.3, the class interval was 6, and interval of temporary was 5 or 6. Then, it was presented using frequency distribution in the following table:

**Table 4.7**

<table>
<thead>
<tr>
<th>Class (K)</th>
<th>Interval (I)</th>
<th>Frequency (F)</th>
<th>Mid Point (x)</th>
<th>The Limitation of each group</th>
<th>Frequency Relative (%)</th>
<th>Frequency Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60 – 65</td>
<td>2</td>
<td>62.5</td>
<td>59.5 – 65.5</td>
<td>6.667</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>66 – 71</td>
<td>6</td>
<td>68.5</td>
<td>65.5 – 71.5</td>
<td>20.000</td>
<td>93,333</td>
</tr>
<tr>
<td>3</td>
<td>72 – 77</td>
<td>6</td>
<td>74.5</td>
<td>71.5 – 77.5</td>
<td>20.000</td>
<td>73,333</td>
</tr>
<tr>
<td>4</td>
<td>78 – 83</td>
<td>7</td>
<td>80.5</td>
<td>77.5 – 83.5</td>
<td>23.333</td>
<td>53,333</td>
</tr>
<tr>
<td>5</td>
<td>84 – 89</td>
<td>3</td>
<td>86.5</td>
<td>83.5 – 89.5</td>
<td>10.000</td>
<td>30,000</td>
</tr>
<tr>
<td>6</td>
<td>90 – 95</td>
<td>6</td>
<td>92.5</td>
<td>89.5 – 95.5</td>
<td>20.000</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>( \sum F = 30 )</td>
<td></td>
</tr>
</tbody>
</table>

The Distribution Of Students’ Postest Score Can Also Be Seen In The Following Figure.
It can be seen from the figure above about the students’ post-test score. There was two students who got score between 60-65. There were six students who got score between 66-71. There were six students who got score between 72-77. There were seven students who got score between 78-83. There were three students who got score between 84-89. There were six students who got score between 90-95.

The next step, the researcher tabulated the scores into the table for the calculation of mean, Standard deviation, and standard error as follows:
Table 4.8

The Table for Calculating mean, Standard deviation, and standard error of Post-test Score.

<table>
<thead>
<tr>
<th>Class (K)</th>
<th>Interval (I)</th>
<th>Frequency (F)</th>
<th>Mid Point (x)</th>
<th>$X^2$</th>
<th>F.X</th>
<th>F.X$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60 – 65</td>
<td>2</td>
<td>62.5</td>
<td>3906.25</td>
<td>125</td>
<td>75812.5</td>
</tr>
<tr>
<td>2</td>
<td>66 – 71</td>
<td>6</td>
<td>68.5</td>
<td>4692.25</td>
<td>411</td>
<td>28153.5</td>
</tr>
<tr>
<td>3</td>
<td>72 – 77</td>
<td>6</td>
<td>74.5</td>
<td>5550.25</td>
<td>447</td>
<td>33301.5</td>
</tr>
<tr>
<td>4</td>
<td>78 – 83</td>
<td>7</td>
<td>80.5</td>
<td>6840.25</td>
<td>563</td>
<td>45361.5</td>
</tr>
<tr>
<td>5</td>
<td>84 – 89</td>
<td>3</td>
<td>86.5</td>
<td>7482.25</td>
<td>259</td>
<td>22446.5</td>
</tr>
<tr>
<td>6</td>
<td>90 – 95</td>
<td>6</td>
<td>92.5</td>
<td>8556.25</td>
<td>555</td>
<td>51337.5</td>
</tr>
</tbody>
</table>

$\sum F=30 \quad \sum=2361 \quad \sum=188413.5$

1. Calculating Mean

$$M_x = \frac{\sum FX_i}{n} = \frac{2361}{30} = 78.7$$

2. Standard Deviation

$$S = \sqrt{\frac{n\sum X_i^2 - (\sum X_i)^2}{n(n-1)}}$$

$$S = \sqrt{\frac{30 \cdot 188413.5 - (2361)^2}{30(30-1)}}$$

$$S = \sqrt{\frac{5652405 - 5574321}{30.29}}$$

$$S = \sqrt{\frac{78084}{870}} = \sqrt{89.75} = 9.47$$

3. Standard Error

$$SE_{md} = \frac{S}{\sqrt{n-1}} = \frac{9.47}{\sqrt{30-1}} = \frac{9.47}{\sqrt{29}} = \frac{9.47}{5.38} = 1.76$$

After Calculating, it was found that the standard deviation and the standard error of pretest score were 9.47 and 1.76.
4. Normality test

It is used to know the normality of the data that is going to be analyzed whether both groups have normal distribution or not. The steps of normality test are:

I. Decide the limitation of upper group, from the class interval with 59.5; 65.5; 71.5; 77.5; 83.5; 89.5; 95.5

II. Find the $Z$-score for the limitation of interval class by using the formula:

$$Z_i = \frac{\text{the limitation of upper group} - \mu_i}{\sigma_i}$$

$$Z_1 = \frac{59.5 - 78.7}{9.47} = -2.02$$

$$Z_2 = \frac{65.5 - 78.7}{9.47} = -1.39$$

$$Z_3 = \frac{71.5 - 78.7}{9.47} = -0.76$$

$$Z_4 = \frac{77.5 - 78.7}{9.47} = -0.12$$

$$Z_5 = \frac{83.5 - 78.7}{9.47} = 0.50$$

$$Z_6 = \frac{89.5 - 78.7}{9.47} = 1.14$$

$$Z_7 = \frac{95.5 - 78.7}{9.47} = 1.77$$

III. Find the score of o-Z normal kurve table by using the score of the limitation of upper group until it was gotten the scores: 0.4783; 0.4177; 0.2763; 0.0478; 0.1915; 0.3729; 0.4616

IV. Find the score of each class interval by decrease the score of o-Z which first class minus the second class, the second class minus the
third class, etc. except the score of o-Z is in the middle, it should be
increased with the next score.

0.4783 - 0.4177 = 0.0606
0.4177 - 0.2763 = 0.1414
0.2763 + 0.0478 = 0.3241
0.0478 - 0.1915 = -0.1437
0.1915 - 0.3729 = -0.1814
0.3729 - 0.4616 = -0.0887
0.4616

V. Find the expected frequency (fe) by crossing the score of every
interval with the total of the students (n=31)

0.0606 x 30 = 1.816
0.1414 x 30 = 4.242
0.3241 x 30 = 9.723
-0.1437 x 30 = -4.311
-0.1814 x 30 = -5.442
-0.0887 x 30 = -2.661
Table 4.9

The Expected Frequency (Fe) From Observation Frequency (Fo) For The Experiment Class

<table>
<thead>
<tr>
<th>No</th>
<th>The limitation of each group</th>
<th>Z</th>
<th>score o-Z</th>
<th>score of every class interval</th>
<th>fe</th>
<th>fo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59.5</td>
<td>-2.02</td>
<td>0.4783</td>
<td>0.0606</td>
<td>1,816</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>65.5</td>
<td>-1.39</td>
<td>0.4177</td>
<td>0.1414</td>
<td>4,242</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>71.5</td>
<td>-0.76</td>
<td>0.2763</td>
<td>0.3241</td>
<td>9,723</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>77.5</td>
<td>-0.12</td>
<td>0.0478</td>
<td>-0.1437</td>
<td>-4,311</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>83.5</td>
<td>0.50</td>
<td>0.1915</td>
<td>-0.1814</td>
<td>-5,442</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>89.5</td>
<td>1.14</td>
<td>0.3729</td>
<td>-0.0887</td>
<td>-2,661</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>95.5</td>
<td>1.77</td>
<td>4616</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

∑Fo=30

VI. Chi-quadrat test \(X^2_{\text{test}}\)

\[
X^2_{\text{observed}} = \sum_{i=1}^{k} \frac{(f_o - f_e)^2}{f_e}
\]

\[
= \frac{(2 - 1.816)^2}{1.816} + \frac{(6 - 4.242)^2}{4.242} + \frac{(6 - 9.723)^2}{9.723} + \frac{(7 - (-4.311))^2}{-4.311} + \frac{(3 - (-5.442))^2}{-5.442} + \frac{(6 - (-2.661))^2}{-2.661}
\]

\[
= 0.018 + 0.728 - 1.425 - 29.67 - 13.09 - 28.18
\]

\[\alpha = 0.05\]

\((dk) = k - 1\)

\[= 6 - 1\]

\[= 5\]
$X^2_{\text{table}} = 11,070$

$X^2_{\text{observed}} \leq X^2_{\text{table}} = \text{Normal}$

$-71.61 \leq 11,070 = \text{Normal}$

By the calculation above, the researcher compare $X^2_{\text{observed}}$ and $X^2_{\text{table}}$ for $\alpha = 0.05$ and $(dk) = k-1 = 6-1 = 5$, and got the score $X^2_{\text{table}} = 11,070$ and $X^2_{\text{observed}}$ smaller than $X^2_{\text{table}} (-71.61 \leq 11,070)$. The result of postest of experiment class was normal.

b. The Result of Post-test Score of Control Group

Based on the data above, it was known the highest score was 93.3 and the lowest score was 60.0. To determine the range of score, the class interval, and interval of temporary, the researcher calculated using formula as follows:

The Highest Score (H) $= 83.3$

The Lowest Score (L) $= 50.0$

The Range of Score (R) $= 83.3 - 50.0 + 1$

$= 34.3$

The Class Interval (K) $= 1 + (3.3) \times \log n$

$= 1 + (3.3) \times \log 30$

$= 1 + (3.3) \times 1.48$

$= 1 + 4.88 = 5.87 = 6$

Interval of Temporary (I) $= \frac{R}{K} = \frac{34.3}{6} = 5.71 = 5$ or 6
So, the range of score was 34,3, the class interval was 6, and interval of temporary was 5 or 6. Then, it was presented using frequency distribution in the following table:

**Table 4.10**

**Frequency Distribution of the Post-test Score**

<table>
<thead>
<tr>
<th>Class (K)</th>
<th>Interval (I)</th>
<th>Frequency (F)</th>
<th>Mid Point (x)</th>
<th>The Limitation of each group</th>
<th>Frequency Relative (%)</th>
<th>Frequency Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 – 55</td>
<td>1</td>
<td>52,5</td>
<td>49,5 – 55,5</td>
<td>3,333</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>56 – 61</td>
<td>0</td>
<td>58,5</td>
<td>55,5 – 61,5</td>
<td>0,000</td>
<td>96,667</td>
</tr>
<tr>
<td>3</td>
<td>62 – 67</td>
<td>5</td>
<td>64,5</td>
<td>61,5 – 67,5</td>
<td>16,667</td>
<td>96,667</td>
</tr>
<tr>
<td>4</td>
<td>68 – 73</td>
<td>3</td>
<td>70,5</td>
<td>67,5 – 73,5</td>
<td>10,000</td>
<td>80,000</td>
</tr>
<tr>
<td>5</td>
<td>74 – 79</td>
<td>8</td>
<td>76,5</td>
<td>73,5 – 79,5</td>
<td>26,667</td>
<td>70,000</td>
</tr>
<tr>
<td>6</td>
<td>80 – 85</td>
<td>13</td>
<td>82,5</td>
<td>79,5 – 8,5</td>
<td>43,333</td>
<td>43,333</td>
</tr>
<tr>
<td></td>
<td>∑F=30</td>
<td></td>
<td></td>
<td></td>
<td>∑P=100</td>
<td></td>
</tr>
</tbody>
</table>

The Distribution Of Students’ Postest Score Can Also Be Seen In The Following Figure.
It can be seen from the figure above about the students’ post-test score. There was a student who got score between 50-55. There was no student who got score between 56-61. There were five students who got score between 62-67. There were three students who got score between 68-73. There were eight students who got score between 74-79. There were thirteen students who got score between 80-85.

The next step, the researcher tabulated the scores into the table for the calculation of mean, Standard deviation, and standard error as follows:

### Table 4.11

**The Table for Calculating mean, Standard deviation, and standard error of Post-test Score.**

<table>
<thead>
<tr>
<th>Class (K)</th>
<th>Interval (I)</th>
<th>Frequency (F)</th>
<th>Mid Point (x)</th>
<th>(X^2)</th>
<th>F.X</th>
<th>F.X²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 – 55</td>
<td>1</td>
<td>52.5</td>
<td>2756.25</td>
<td>52.5</td>
<td>2756.25</td>
</tr>
<tr>
<td>2</td>
<td>56 – 61</td>
<td>0</td>
<td>58.5</td>
<td>3422.25</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>62 – 67</td>
<td>5</td>
<td>64.5</td>
<td>4160.25</td>
<td>322.5</td>
<td>20801.25</td>
</tr>
<tr>
<td>4</td>
<td>68 – 73</td>
<td>3</td>
<td>70.5</td>
<td>4970.25</td>
<td>211.5</td>
<td>14910.75</td>
</tr>
<tr>
<td>5</td>
<td>74 – 79</td>
<td>8</td>
<td>76.5</td>
<td>5852.25</td>
<td>612</td>
<td>46818</td>
</tr>
<tr>
<td>6</td>
<td>80 – 85</td>
<td>13</td>
<td>82.5</td>
<td>6806.25</td>
<td>1072.5</td>
<td>88481.25</td>
</tr>
<tr>
<td>∑F=30</td>
<td></td>
<td></td>
<td></td>
<td>∑FX=2271</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Calculating Mean

\[
M_x = \frac{\sum F_x}{n} = \frac{2271}{30} = 75.7
\]

2. Standard Deviation

\[
S = \sqrt{\frac{n \sum F_x^2 - (\sum F_x)^2}{n(n-1)}}
\]
\[ S = \sqrt{\frac{30.173762-(2271)^2}{30(30-1)}} \]

\[ S = \sqrt{\frac{5213025-5157441}{30.29}} \]

\[ S = \sqrt{\frac{55584}{870}} = \sqrt{63.88} = 7.99 \]

3. Standard Error

\[ SE_{md} = \frac{S}{\sqrt{N-1}} = \frac{7.99}{\sqrt{30-1}} = \frac{7.99}{\sqrt{29}} = \frac{7.99}{5.38} = 1.48 \]

After Calculating, it was found that the standard deviation and the standard error of pretest score were 7.99 and 1.48.

4. Normality test

It is used to know the normality of the data that is going to be analyzed whether both groups have normal distribution or not. The steps of normality test are:

I. Decide the limitation of upper group, from the class interval with

49.5; 55.5; 61.5; 67.5; 73.5; 79.5; 85.5

II. Find the Z-score for the limitation of interval class by using the formula:

\[ Z = \frac{\text{the limitation of upper group} - M_x}{s} \]

\[ Z_1 = \frac{49.5-75.5}{7.99} = -3.25 \]

\[ Z_2 = \frac{55.5-75.5}{7.99} = -2.50 \]

\[ Z_3 = \frac{61.5-75.5}{7.99} = -1.75 \]

\[ Z_4 = \frac{67.5-75.5}{7.99} = -1.00 \]
\[
Z_5 = \frac{73.5 - 75.5}{7.99} = -0.25 \\
Z_6 = \frac{79.5 - 75.5}{7.99} = 0.50 \\
Z_7 = \frac{85.5 - 75.5}{7.99} = 1.25
\]

III. Find the score of o-Z normal kurve table by using the score of the limitation of upper group until it was gotten the scores: 0.4994; 0.4938; 0.4599; 0.3413; 0.0987; 0.1915; 0.3944

IV. Find the score of each class interval by decrease the score of o-Z which first class minus the second class, the second class minus the third class, etc. except the score of o-Z is in the middle, it should be increased with the next score.

\[
\begin{align*}
0.4994 - 0.4938 &= 0.0056 \\
0.4938 - 0.4599 &= 0.0339 \\
0.4599 + 0.3413 &= 0.8012 \\
0.3413 - 0.0987 &= 0.2426 \\
0.0987 - 0.1915 &= -0.0928 \\
0.1915 - 0.3944 &= -0.2029 \\
0.3944, \\
\end{align*}
\]

V. Find the expected frequency (fe) by crossing the score of every interval with the total of the students (n=30)

\[
\begin{align*}
0.0056 \times 30 &= 0.168 \\
0.0339 \times 30 &= 1.017 \\
0.8012 \times 30 &= 10.239 \\
\end{align*}
\]
0,2426 x 30 = 7,278
-0,0928 x 30 = -2,784
-0,2029 x 30 = -6,087

**Table 4.12**
The Expected Frequency (Fe) From Observation Frequency (Fo) For The Experiment Class

<table>
<thead>
<tr>
<th>No</th>
<th>The limitation of each group</th>
<th>Z</th>
<th>score of every class interval</th>
<th>fe</th>
<th>fo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49,5</td>
<td>-3,25</td>
<td>0,4994</td>
<td>0,0056</td>
<td>0,168</td>
</tr>
<tr>
<td>2</td>
<td>55,5</td>
<td>-2,50</td>
<td>0,4938</td>
<td>0,0339</td>
<td>1,071</td>
</tr>
<tr>
<td>3</td>
<td>61,5</td>
<td>-1,75</td>
<td>0,4599</td>
<td>0,8012</td>
<td>10,239</td>
</tr>
<tr>
<td>4</td>
<td>67,5</td>
<td>-1,00</td>
<td>0,3413</td>
<td>0,2426</td>
<td>7,278</td>
</tr>
<tr>
<td>5</td>
<td>73,5</td>
<td>-0,25</td>
<td>0,0987</td>
<td>-0,0928</td>
<td>-2,784</td>
</tr>
<tr>
<td>6</td>
<td>79,5</td>
<td>1,50</td>
<td>0,1915</td>
<td>-0,2029</td>
<td>-6,087</td>
</tr>
<tr>
<td>7</td>
<td>85,5</td>
<td>1,25</td>
<td>0,3944</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

∑Fo=30

VI. Chi-quadrat test ($X^2_{\text{test}}$)

$$X^2_{\text{observed}} = \sum_{i=1}^{k} \frac{(fo-fe)^2}{fe}$$

$$= \frac{(1-0,168)^2}{0,168} + \frac{(0-1,071)^2}{1,071} + \frac{(5-10,239)^2}{10,239} +$$

$$\frac{(3-7,278)^2}{7,278} + \frac{(8-(-2,784))^2}{-2,784} + \frac{(13-(-6,087))^2}{-6,087}$$

$$= 4,12 - 1,017 - 2,68 - 2,51 - 41,77 - 59,85$$

$$= -103,707$$

$$\alpha = 0,05$$

$$(dk) = k-1$$

$$= 6-1 = 5$$
\[ X^2_{\text{table}} = 11,070 \]

\[ X^2_{\text{observed}} \leq X^2_{\text{table}} = \text{Normal} \]

\[ -103,707 \leq 11,070 = \text{Normal} \]

By the calculation above, the researcher compare \( X^2_{\text{observed}} \) and \( X^2_{\text{table}} \) for \( \alpha = 0.05 \) and \((dk) = k-1 = 6-1 = 5\), and got the score \( X^2_{\text{table}} = 11,070 \) and \( X^2_{\text{observed}} \) smaller than \( X^2_{\text{table}} \) \((-103,707 \leq 11,070\). The result of postest of experiment class was normal.

c. **Homogeneity Test**

<table>
<thead>
<tr>
<th>Sample</th>
<th>dk = n-1</th>
<th>( S_i^2 )</th>
<th>Log ( S_i^2 )</th>
<th>((dk) \times \log S_i^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>30-1=29</td>
<td>89,6809</td>
<td>1.95</td>
<td>56.55</td>
</tr>
<tr>
<td>X2</td>
<td>30-1=29</td>
<td>63,8401</td>
<td>1.80</td>
<td>52.34</td>
</tr>
<tr>
<td>Total= 2</td>
<td>29+29=58</td>
<td></td>
<td></td>
<td>( \sum = 108,89 )</td>
</tr>
</tbody>
</table>

\[
S^2 = \frac{(n_1S_1) + (n_2S_2)}{n_1 + n_2}
\]

\[
= \frac{(29.89,6809) + (29.63,8401)}{29 + 29}
\]

\[
= \frac{2600.7461 + 1851.3629}{58} = \frac{4452.109}{58} = 76.76
\]

\[
\log S^2 = \log 76.76 = 1.88
\]

\[
B = (\log S^2) \times \sum(n-1)
\]

\[
= 1.88 \times 58
\]

\[
= 109.337 = 109.34
\]

\[
X^2_{\text{observed}} = (\log 10) \times (B - \sum (dk) \log S)
\]

\[
= (2.3) \times (109.34 - 108.89)
\]

\[
= (2.3) \times 0.45 = 1.035
\]
(dk) = 2-1= 1

\[ X^2_{table} = 3.841 \]

\[ X^2_{observed} \leq X^2_{table} = \text{Homogen} \]

\[ 1.035 \leq 3.841 = \text{Homogen} \]

By the calculation above, the researcher compare \( X^2_{observed} \) and \( X^2_{table} \) for \( \alpha = 0.05 \) and (dk) = k-1 = 2-1 = 1, and got the score \( X^2_{table} = 3.841 \) and \( X^2_{observed} \) Smaller than \( X^2_{table} \) (1.035 \( \leq 3.841 \)). The result of post test was homogen.

**B. Result of the Data Analysis**

To know mean of difference, the writer used formula:

\[ M_D = \frac{\sum D}{N} \]

\[ M_D = \frac{-246.6}{30} \]

\[ M_D = -8.22 \]

To know \( SD_D \) (Standard of Deviation of difference between score variable I and Score variable II), the writer used formula:

\[ SD_D = \sqrt{\frac{\sum D^2}{N} - \left( \frac{\sum D}{N} \right)^2} \]

\[ SD_D = \sqrt{\frac{2931.38}{30} - \left( \frac{-246.6}{30} \right)^2} \]

\[ SD_D = \sqrt{97.71266667 - 67.5684} \]

\[ SD_D = 5.490379465 \]
To Calculate $SE_{MD}$ (Standard Error of Mean of Difference), the writer used formula:

$$SE_{MD} = \frac{SD_D}{\sqrt{N-1}}$$

$$SE_{MD} = \frac{5.490379465}{\sqrt{30-1}}$$

$$SE_{MD} = \frac{5.490379465}{5.385164807}$$

$$SE_{MD} = -0.980836541$$

To know $t_o$ ($t_{observed}$), the writer used formula:

$$t_0 = \frac{M_D}{SE_{MD}}$$

$$t_0 = \frac{-8.22}{0.980836541}$$

$$t_0 = -8.38060131$$

$$t_0 = -8.380$$

To know df (degree of freedom), the writer used formula:

$$df = N - 1$$

$$= 30 - 1$$

$$= 29$$

With the criteria:

If $t_{test} (t_0) > t_{table}$, $H_a$ is accepted and $H_o$ is rejected

If $t_{test} (t_0) < t_{table}$, $H_a$ is rejected and $H_o$ is accepted
Based on the calculation above, it can be known the value from the result of calculation ($t_{\text{observed}}$) was -8.380. Then, it is consulted with $t_{\text{table}}$ ($t_t$) which df =N-1=30-1=29. Significant standard 5% $t_{\text{table}}$ ($t_t$) = 2.04. It can be said that since the value of $t_{\text{observed}}$ (-8.380) was higher than $t_{\text{table}}$ in the 5% (2.04) it could be interpreted that Ha stating that there is a significant difference between who taught using picture crossword and who taught using matching word of seventh grade students of MTsN Katingan Tengah was accepted and Ho stating that there is no significant difference between who taught using picture crossword and who taught using matching word of seventh grade students of MTsN Katingan Tengah was rejected. It meant that there is a significant difference between who taught using picture crossword and who taught using matching word.