CHAPTER IV

RESEARCH FINDINGS AND DISCUSSIONS

In this chapter, the researcher presents the data which had been collected from the research in the field of study. The data were the result of pre test of experimental and control group the result of post test of experimental and control group, result of data analysis, and discussion.

A. Presentation of the data

Table 4.1 the Comparison of Pre-test and Post-test Score of Experimental Group

NO	CODE	SCORE				
		PRE-TEST	CATEGORY	POST-TEST	CATEGORY	DIFFERENCE
1	E-01	9,5	Fair	11,5	Good	2
2	E-02	8	Fair	10,5	Good	2,5
3	E-03	8	Fair	10	Good	2
4	E-04	10,5	Good	12	Good	1,5
5	E-05	6	Fair	8,5	Fair	2,5
6	E-06	7	Fair	8,5	Fair	1,5
7	E-07	11,5	Good	14	Good	2,5
8	E-08	6	Fair	9,5	Good	3,5
9	E-09	10,5	Good	11,5	Good	1
10	E-10	10	Fair	12	Good	2
11	E-11	10,5	Good	12	Good	2,5
12	E-12	10	Fair	12	Good	2
13	E-13	10	Fair	13	Good	3
14	E-14	10,5	Good	12	Good	1,5
15	E-15	9,5	Fair	12	Good	2,5
16	E-16	10,5	Good	12	Good	1,5
17	E-17	10,5	Good	13	Good	2,5
18	E-18	11	Good	14	Good	3
TOTAL		169,5		208		39,5

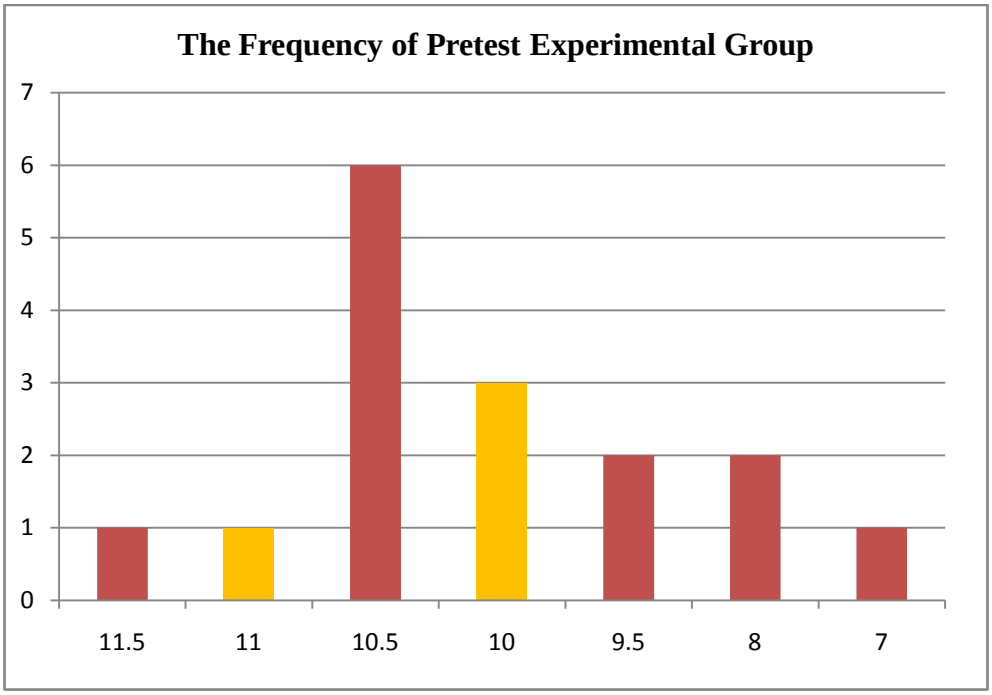
MEAN	9,41667		11,5556		2,19444
LOWEST	6		8		1,5
HIGHEST	11,5		15,5		4,5

From the table above it can be concluded that the highest score of pre test experiment group was 11,5, the lowest score was 6. The highest score of post test experiment group was 14. And the highest different score between pretest aon posttest was 3,5, the lowest different score between pre test and post test was 1. The were 8 students who got good category, there were 10 students who got fair category in pre test. Then there were two students who got fair category, there were 16 students who got good category.

a. The Result of Pretest Score of Experimental Group

Table 4.2 The Result of Pretest Score of Experimental Group

No	**Score (X)**	**F**	
1	11,5	1	5,5%
2	11	1	5,5%
3	10,5	6	33%
4	10	3	16,5%
5	9,5	2	11%
6	8	2	11%
7	7	1	5,5%
8	6	2	11%
Total		18	100%



The table and the figure shows, the students' pretest scores in experimental group. There were on student who got score 11,5. There Was one student who got 11 score . There were six students who got score 10,5. There were three students who got score 10. There were two students who got score 9,5 . there were 2 students who got 8. There was 1 student who got 7, there were two students who got 6

The next step, the researcher tabulated the scores into the table for the calculation of mean, median, and modus as follows:

Table 4.3 the Table for Calculating Mean of Pretest Score of the Experimental Group

No	Score (X)	F	f.x
1	11,5	1	11,5
2	11	1	11
3	10,5	6	63
4	10	3	30
5	9,5	2	19
6	8	2	16

7	7	1	7
8	6	2	12
Total		18	169,5

a. Mean

$$Mx = \frac{\sum fX}{N}$$

$$= \frac{169,5}{18}$$

= 9,416666666 or 9,417

b. Median

Me = 10

Modus

Mo = 10,5

The calculation above shows the mean value 9,417, median value 10, and modus value, 10,5.

The last step, the researcher tabulated the scores of pre test of experimental group into the table for the calculation of standard deviation and the standard error as follows:

Table 4.4 The Table for Calculating Standard Deviation and Standard Error of the Pretest Score.

No	Score (X)	F	f.x	x2	f.x2
1	11,5	1	11,5	132,25	132,25
2	11	1	11	121	121
3	10,5	6	63	110,25	661,5
4	10	3	30	100	300
5	9,5	2	19	90,25	180,5
6	8	2	16	64	128
7	7	1	7	49	49
8	6	2	12	36	72
Total		18	169,5	702,75	1644,25

a. Standard Deviation

$$SD_1 = \sqrt{\frac{n\sum fx^2-(\sum fx)^2}{n(n-1)}}$$

$$SD_1 = \sqrt{\frac{18.1644,5-(28730,5)}{18(18-1)}}$$

$$SD_1 = \sqrt{\frac{29601-28730,5}{306}}$$

$$SD_1 = \sqrt{\frac{870,5}{306}}$$

$$SD_1 = \sqrt{2,8447712418}$$

$$SD_1 = 1,6866449661 = 1,687$$

Standard Error

$$SEm_1 = \frac{SD}{\sqrt{N_1 - 1}}$$

$$SEm_1 = \frac{1,687}{\sqrt{17}}$$

$$SEm_1 = \frac{1,687}{4,123}$$

$SEm_1 = 0, 409$

The result of calculation shows that the standard deviation of pre test score of experimental group was 1,687 and the standard error of pre test score of experimental group was = 0,409

b. The Result of Post test Score of experimental Group

Table 4.5 The Result of Post test Score of experimental Group

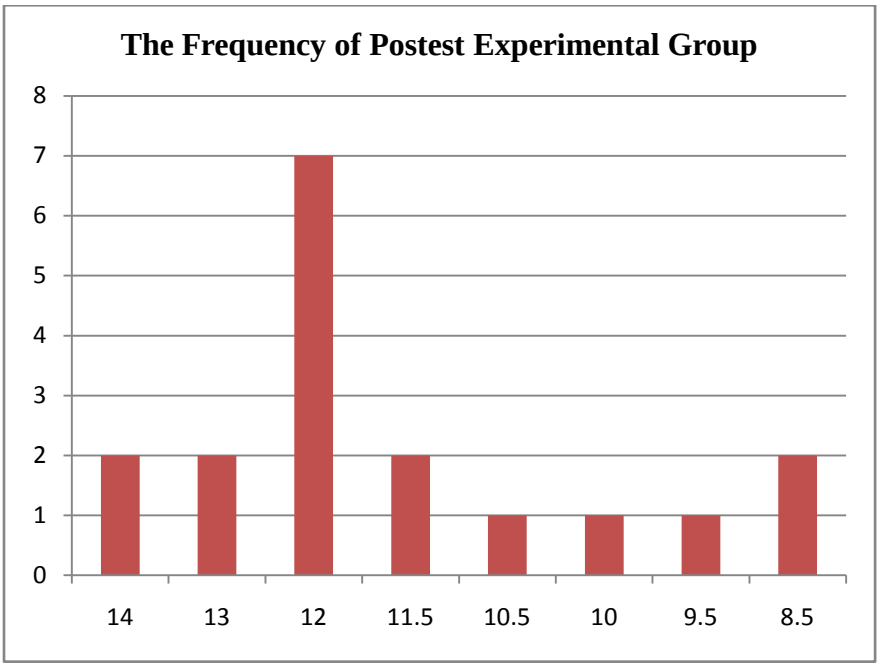
No	Code	Score
1	E-01	11,5
2	E-02	10,5
3	E-03	10
4	E-04	12
5	E-05	8,5
6	E-06	8,5
7	E-07	14
8	E-08	9,5
9	E-09	11,5
10	E-10	12
11	E-11	12
12	E-12	12
13	E-13	13
14	E-14	12
15	E-15	12
16	E-16	12
17	E-17	13
18	E-18	14

Based on the data above, it shows that the students' highest score was 14 and the student's lowest score was 8,5.

Table 4.6 the Frequency Distribution of the Post Test Score of the Experimental Group

Class (k)	skor (x)	Frequency (F)	f.x
1	14	2	28
2	13	2	26
3	12	7	84
4	11,5	2	23
5	10,5	1	10,5

6	10	1	10
7	9,5	1	9,5
8	8,5	2	17
Total		**18**	**208**



It can be seen from the data above, the students' posttest score in experimental group. There were two students who got score 14. There were two students who got score 13. There were seven students who got score12. There were two students who got score 11,5. There was one student who got score 10,5. There was one student who get score 10. There was one student who get score 9,5.. And there were two student who got score 8,5.

The next step, the researcher tabulated the scores into the table for the calculation of mean, median, and modus as follows:

Table 4.6 The Table for Calculating Mean, Median and Modus of Post test Score of the Experimental Group

Class (k)	skor (x)	Frequency (F)	f.x
1	14	2	28
2	13	2	26
3	12	7	84
4	11,5	2	23
5	10,5	1	10,5
6	10	1	10
7	9,5	1	9,5
8	8,5	2	17
Total		**18**	**208**

a. Mean

$$Mx = \frac{\sum fX}{N}$$

= 208/18

= 11.555555556 or 11,56

b. Median

Me = 12

c. Modus

Mo= 12

The calculation above shows the mean value 11.56, median value 12, and modus value 12.The last step, the researcher tabulated the scores of pre test of experimental group into the table for the calculation of standard deviation and the standard error as follows:

Table 4.7 the Table for Calculating Standard Deviation and Standard Error of the Posttest Score

Class (k)	skor (x)	Frequency (F)	f.x	x2	f.x2
1	14	2	28	196	392
2	13	2	26	169	338
3	12	7	84	144	1008
4	11,5	2	23	132,25	264,5
5	10,5	1	10,5	110,25	110,25
6	10	1	10	100	100
7	9,5	1	9,5	90,25	90,25
8	8,5	2	17	72,25	144,5
Total		**18**	**208**	**1014**	**2447,5**

a. Standard Deviation

SD1 = $\sqrt{\frac{n\sum fx^2-(\sum fx)^2}{n(n-1)}}$

SD1 = $\sqrt{\frac{18.2447,5-(43262)}{18(18-1)}}$

SD1 = $\sqrt{\frac{44055-43262}{306}}$

SD1 = $\sqrt{\frac{793}{306}}$

SD1 = $\sqrt{2,591503268}$

SD1 = 1,6098146688 or 1,609

b. Standard Error

$$SEM_1 = \frac{SD_1}{\sqrt{N_1 - 1}}$$

$$SEM1 = \frac{1{,}609}{\sqrt{18-1}}$$

$$= \frac{1{,}609}{4{,}123}$$

SEM1 = 0,3902498181 = 0,390

The result of calculation showes that the standard deviation of post test score of experimental group was 1,609 and the standard error of post test score of experimental group was 0,390.

Table 4.8 the Comparison of Pre-test and Post-test Score of Control Group.

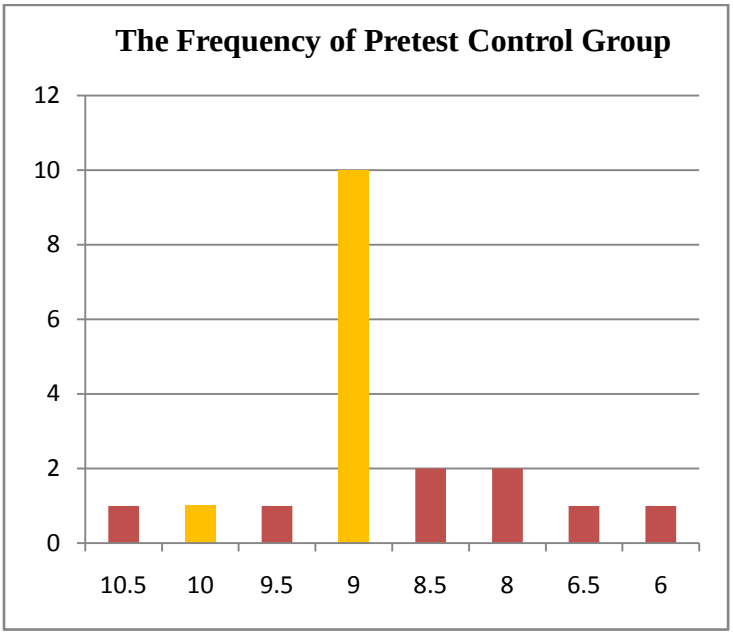
CONTROL CLASS						
		SCORE				
NO	CODE	PRE-TEST	CATEGORY	POST-TEST	CATEGORY	DIFFERENCE
1	C-01	10,5	Good	12	Good	1,5
2	C-02	9	Fair	11	Good	2
3	C-03	9	Fair	9,5	Fair	0,5
4	C-04	9	Fair	9,5	Fair	0,5
5	C-05	9	Fair	9,5	Fair	0,5
6	C-06	9	Fair	10	Fair	1
7	C-07	6,5	Fair	9	Fair	2,5
8	C-08	9	Fair	11,5	Good	2,5
9	C-09	9,5	Fair	11,5	Good	2
10	C-10	9	Fair	11	Good	2
11	C-11	9	Fair	9,5	Fair	0,5
12	C-12	8	Fair	9	Fair	1
13	C-13	9	Fair	9,5	Fair	0,5
14	C-14	8	Fair	8	Fair	0
15	C-15	6	Fair	9	Fair	3
16	C-16	10	Fair	11	Good	1
17	C-17	8,5	Fair	9,5	Fair	1
18	C-18	9	Fair	9,5	Fair	0,5
19	C-19	8,5	Fair	10	Fair	1,5
TOTAL		165,5		189,5		24
MEAN		8,71		9,97		1,26316
LOWEST		6		8,5		0,5
HIGHEST		11		12		2,5

From the table above it shows that the highest score of pre test control group was 10,5 the lowest score was 6. The highest score of post test control group was 12. And the highest different score between pretest and posttest was 2 the lowest different score between pre test and post test was 0,5. There was one students who got good category, and there were 18 students who got fair category from the pre test. And there were five students who got good category and there were 14 students who got fair category from the post test result.

a. The Result of Pretest Score of Control Group

Table 4.9 The Result of Pretest Score of Control Group

class	Skor	Frequency	F (%)
1	10,5	1	5,26%
2	10	1	5,26%
3	9,5	1	5,26%
4	9	10	52,6%
5	8,5	2	10,52%
6	8	2	10,52%
7	6,5	1	5,26%
8	6	1	5,26%
Total		**19**	**100%**



It shows from the data above, the students' pretest score in control group. There were one student who got score 10,5. There was one students who got 10. There was one student who got score 9,5. There were ten students who got score 9.There were two students who got score 8,5. There were two students who got 8. There was one student who got 6.5. And there was one student who got 6.

The next step, the researcher tabulated the scores into the table for the calculation of mean, median, and modus as follows:

Table 4.10 the Table for Calculating Mean, Median and Modus of Pre Test
Score of the Control Group

Class	Skor	Frequency	f.x
1	10,5	1	10,5
2	10	1	10
3	9,5	1	9,5
4	9	10	90
5	8,5	2	17
6	8	2	16
7	6,5	1	6,5

8	6	1	6
Total		**19**	**165,5**

a. Mean

$$Mx = \frac{\sum fX}{N}$$

$$= \frac{165,5}{19}$$

$$= 8,71$$

a. Median

Me = 9

b. Modus

Mo = 9

The calculation above shows the mean value 8,71, median value 9 and modus value 9.

The last step, the researcher tabulated the scores of pre test of experimental group into the table for the calculation of standard deviation and the standard error as follows:

Table 4.11 the Table for Calculating Standard Deviation and Standard Error of the Pre Test Score

Class	Skor	Frequency	f.x	x2	f.x2
1	10,5	1	10,5	110,25	110,25
2	10	1	10	100	100
3	9,5	1	9,5	90,25	90,25
4	9	10	90	81	810
5	8,5	2	17	72,25	144,5
6	8	2	16	64	128
7	6,5	1	6,5	42,25	42,25
8	6	1	6	36	36
Total		**19**	**165,5**	**596**	**1461,25**

a. Standard Deviation

$$SD_2 = \sqrt{\frac{n\sum fx^2 - (\sum fx)^2}{n(n-1)}}$$

$$SD_2 = \sqrt{\frac{19.1461{,}25 - (27390{,}5)}{19(19-1)}}$$

$$SD_2 = \sqrt{\frac{19.1461{,}25 - (27390{,}5)}{19(19-1)}}$$

$$SD_2 = \sqrt{\frac{373{,}5}{342}}$$

$$SD_2 = \sqrt{1{,}0906432749}$$

$$SD_2 = 1{,}044$$

b. Standard Error

$$SEm_2 = \frac{SD_1}{\sqrt{N_1 - 1}}$$

$$SEm_2 = \frac{1{,}044}{\sqrt{19-1}}$$

$$SEm_2 = \frac{1{,}044}{\sqrt{18}}$$

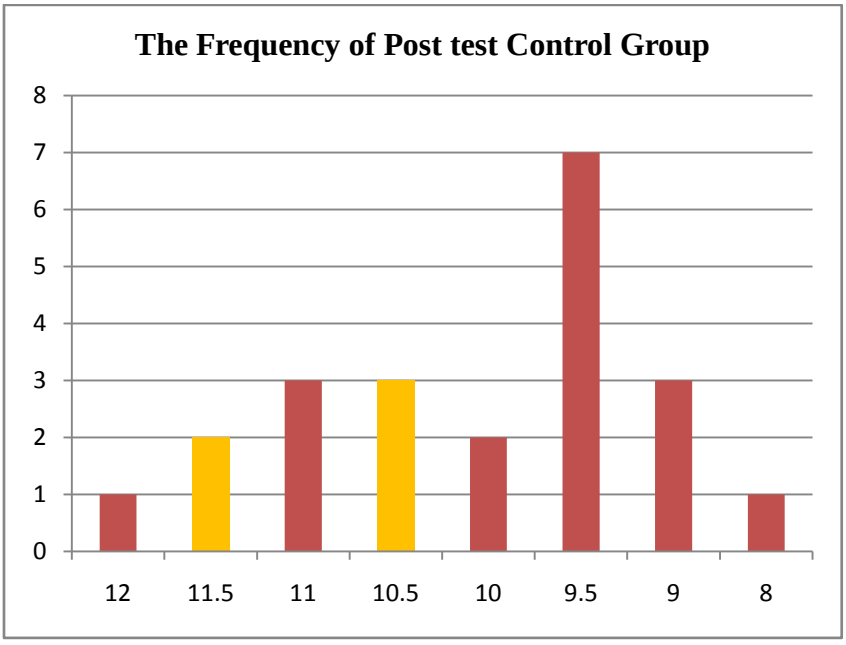
$$SEm_2 = \frac{1{,}044}{4{,}24}$$

$$SEm_2 = 0{,}246$$

The result of calculation shows that the standard deviation of pre test score of control group, 1,044 and the standard error of pre test score of control group, 0,246.

Table 4.12 Frequency Distribution of the Post test Score of the Control Group.

No	Code	Score
1	C-01	12
2	C-02	11
3	C-03	9,5
4	C-04	9,5
5	C-05	9,5
6	C-06	10
7	C-07	9
8	C-08	11,5
9	C-09	11,5
10	C-10	11
11	C-11	9,5
12	C-12	9
13	C-13	9,5
14	C-14	8
15	C-15	9
16	C-16	11
17	C-17	9,5
18	C-18	9,5
19	C-19	10



It shows that table and figure above, the students' post score in control group. There was one student who got score 12 . There were two students who got score 11,5. There were three students who got score 11. There were two students who got score 10. There were seven students who got score 9,5. There were three students who got score9 . And there was one student who got score 8.

The next step, the writer tabulated the scores into the table for the calculation of mean, median, and modus as follows:

Table 4.13 the Table for Calculating Mean, Median and Modus of Post Test Score of the Control Group

Class	Skor(x)	Frequency(x)	f.x	F (%)
1	12	1	12	5,26%
2	11,5	2	23	10,52%
3	11	3	33	15,78%
4	10	2	20	10,52%
5	9,5	7	66,5	36,82%
6	9	3	27	15,78 %
7	8	1	8	5,26%
		19	**189,5**	

a. Mean

$$Mx = \frac{\sum fX}{N}$$

$$= \frac{189,5}{19}$$

$$= 9,97$$

b. Median

Me = 9,5

c. Modus

Mo = 9,5

The calculation above showed the mean value 9,97, median value 9,5, and modus value 9,5.

The last step, the researcher tabulated the scores of pre test of experimental group into the table for the calculation of standard deviation and the standard error as follows:

Table 4.14 the Table for Calculating Standard Deviation and Standard Error of the Pretest Score

Class	Skor(x)	Frequency(x)	f.x	X2	F.X2
1	12	1	12	144	144
2	11,5	2	23	132,25	264,5
3	11	3	33	121	363
4	10	2	20	100	200
5	9,5	7	66,5	90,25	631,75
6	9	3	27	81	243
7	8	1	8	64	64
		19	**189,5**	**732,5**	**1910,25**

a. Standard Deviation

$$SD_2 = \sqrt{\frac{n\sum fx^2 - (\sum fx)^2}{n(n-1)}}$$

$$SD_2 = \sqrt{\frac{19.1910,25-(35910,25)}{19(19-1)}}$$

$$SD_2 = \sqrt{\frac{36294,25-35910,25}{384,5}}$$

$$SD_2 = \sqrt{\frac{384,5}{342}}$$

$$SD_2 = \sqrt{1,1242690058}$$

$SD_2 = 1,0603$

b. Standard Error

$$SEm_2 = \frac{1,0603}{\sqrt{19-1}}$$

$$SEm_2 = \frac{1,0603}{\sqrt{18}}$$

$$SEm_2 = \frac{1,0603}{4,243}$$

$SEm_2 = 0.249$

The result of calculation shows that the standard deviation of post test score of control group was 0,0603 and the standard error of post test score of control group was 0,249

B. Testing Hypothesis Using T_{test}

1. Testing Hypothesis Using Manual Calculation

To test the hypothesis of the study, the researcher used t-test statistical calculation. Firstly, resercher calculated the

standard deviation and the standard error of X_1 and X_2.It was found the standard deviation and the standard error of post test of X_1 and X_2 at the previous data presentation. It could be seen on this following table:

Table 4.15 the Standard Deviation and the Standard Error of X_1 and X_2

Variable	The Standard Deviation	The Standard Error
X_1	1,609	0,390
X_2	1,0603	0,249

Where:

X_1 = Experimental Group

X_2 = Control Group

The next step, the writer calculated the standard error of the differences mean between X_1 and X_2 as follows:

Standard Error of Mean of Score Difference between Variable I and Variable II:

$$SE_{M1} - SE_{M2} = \sqrt{SEm1^2 + SEm2}^2$$

$$SE_{M1} - SE_{M2} = \sqrt{0{,}390^2 + 0{,}249^2}$$

$$SE_{M1} - SE_{M2} = \sqrt{0{,}1521 + 0{,}062001}$$

$$SE_{M1} - SE_{M2} = \sqrt{0{,}214101}$$

$$SE_{M1} - SE_{M2} = 0{,}4627104926 \text{ or } 0{,}463$$

Then, it was inserted to the t_o formula to get the value of t observe as follows:

$$t_0 = \frac{M_1 - M_2}{SE_{M1} - SE_{M2}}$$

$$t_0 = \frac{11{,}56 - 9{,}97}{0{,}463}$$

$$t_0 = \frac{1{,}59}{0{,}463}$$

t_0 = 3,43412527 or 3,434

With the criteria:

If t-test (t-observed) ≥ t_{table},it means Ha is accepted and Ho is rejected. If t-test (t-observed) <t_{table},it means Ha is rejected and Ho is accepted. Then, the researcher interpreted the result of t- test. Previously, the writer accounted the degree of freedom (df) with the formula:

$$df = (N_1 + N_2 - 2)$$

$$= (18 + 19 - 2)$$

$$= 35$$

t_{table} at df at 5% significant level = 2.015

The calculation above showed the result of t-test calculation as in the table follows:

Table 4.16 the Result of T-test

Variable	t observe	t table		Df/db
		5%	1%	
X_1- X_2	3,434	2,030	2,724	35

Where:

X_1 = Experimental Group

X_2 = Control Group

t observe = The calculated Value

t table = The distribution of t value

df/db = Degree of Freedom

Based on the result of hypothesis test calculation, it was found that the value of $t_{observed}$ was higher than the value of t_{able} at 1% and 5% significance level or 2,030<3,434>2.724. it could be interpreted that alternative hypothesis (H_a) was accepted. It meant there is significant difference between students' ability using BPDS and without using BPDS in critical thinking at third semester students of English education department academic year 2015-2016.. Simply, it could be interpreted that null hyphothesis was rejected.

Teaching or increasing critical thinking using BPDS gave significant effect on the students' critical thinking ability at at third semester students of English education department academic year

2015-2016.. It meant students who were taught by using BPDS had better critical thinking achievement than those taught by non BPDS.

2. Testing Hypothesis Using SPPS Program

The resercher also applied SPSS 16.0 program to calculate t test in testing hypothesis of the study. The result of t test using SPSS 16.0 was used to support the manual calculation of the t test. The result of the t test using SPSS 16.0 program could be seen as follows:

Table 4.17 the Standard Deviation and the Standard Error of X_1 and X_2

Group Statistics

	score	N	Mean	Std. Deviation	Std. Error Mean
Score	1	18	11.39	1.787	.421
	2	19	9.74	1.098	.252

The table showed the result of the standard deviation calculation of $X_1$was 1,787 and the result of the standard error mean calculation was 0,421. The result of the standard deviation calculation of X_2 was 1,098 and the standard error mean calculation was 0,252.

Table 4.18 The calculation of T-test Using SPSS 16.0

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
score	Equal variances assumed	2.973	.093	3.409	35	.002	1.652	.485	.668	2.636
	Equal variances not assumed			3.367	27.952	.002	1.652	.491	.647	2.657

Based on the result of t-value using SPSS 16.0 program. Since the result of post test between experimental and control group had difference score of variance, it found that the result of t observed was 3,409, the result of mean difference between experimental and control group was 1,652.

To examine the truth or the null hypothesis stating that there is no significant difference between students' ability using BPDS and without using BPDS at third semester students of English education state islamic collage of Palangkaraya was rejected, the result of post test was interpreted on the result of degree freedom to get t *table*. The result of degree freedom (df) was 35. The following table was the result of t *observed* and t *table* from 35 df at 5% and 1 % significance level.

Table 4.19 the Result of T-test

Variable	t observe	t table		Df/db
		5%	1%	
X_1- X_2	3,409	2.030	2.742	35

3. Interpretation

The interpretation of the result of t-test using SPSS 16.0 program, it was found the $t_{observe}$ was greater than t_{table}at 1% and 5% significance level 2.030<3,409> 2,724. it could be intepreted based on the result of calculation that Ha stating there is significant difference between students' ability using BPDS and without using BPDS at third semester students of English education state islamic collage of Palangkaraya was accepted and Ho stating that there is no significant difference between students' ability using BPDS and without using BPDS at third semester students of English education state islamic Institute of Palangkaraya was rejected.Teaching critical thinking using BPDS gave significant effect on the students' critical thinking ability third semester students of English education state islamic collage of Palangkaraya. It meant students who are taught by BPDS have better critical thinking achievement achievement than those taught by non using BPDS.