CHAPTER IV

RESEARCH FINDING

This chapter presents the result and discussion of the research. it is divided into the calculation of trying out of instruments, the data description, the data analysis, and the data interpretation.

4.1 The Calculation of Trying Out Instruments

Trying out of instrument was used to find out the validity and reliability of the instruments.

4.1.1 The Validity of Trying Out Instruments

Formula:

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{N\sum X^2 - (\sum X)^2\}\{N\sum Y^2 - (\sum Y)^2\}}}$$

The item test is valid if $r_{xy} > r_{table}$

$r_{table} = 0.3961$

Table 4.1

The Result Validity Computation Using Manual Calculation

No	The Value of r_{xy}	Criteria
1.	0,80111	Valid
2	0,464367	Valid
3.	0,58057	Valid
4.	0,4208	Valid
5.	−0,009128	Invalid

6.	−0,52064	Invalid
7.	0,67889	Valid
8.	0,45210	Valid
9.	0,358025	Invalid
10.	0,44865	Valid
11.	0,42042	Valid
12.	0,19726	Invalid
13.	−0,103029	Invalid
14.	0,3825	Invalid
15.	0,18058	Invalid
16.	−0,0561	Invalid
17.	0,61086	Valid
18.	0,0381	Invalid
19.	0,17416	Invalid
20.	0,47192	Valid
21.	0,39987	Valid
22.	0,32532	Invalid
23.	0,85481	Valid
24.	0,71698	Valid
25.	0,383559	Invalid
26.	0,50909	Valid
27.	−0,0359	Invalid

28.	−0,64428	Invalid
29.	0,3645	Invalid
30.	0,723	Valid
31.	0,7528	Valid
32.	0,579	Valid
33.	0,7528	Valid
34.	0,59145	Valid
35.	0,48348	Valid
36.	0,3533	Invalid
37.	0,5949	Valid
38.	0,4704	Valid
39.	−0,2265	Invalid
40.	0,2379	Invalid
41.	0,3411	Invalid
42.	0,3239	Invalid
43.	−0,13808	Invalid
44.	0,1537	Invalid
45.	−0,2051	Invalid

From the manual calculation above, it is showed that there are 22 numbers were valid and 23 numbers were invalid. The researcher also used SPSS that was illustrated in appendix 1.

4.1.2 Reliability of Trying Out Instruments

Formula:

$$r_{11} = \left(\frac{k}{k-1}\right)\left(1 - \frac{M(k-M)}{k\,V_t}\right)$$

The item is reliable if $r_{11} > r_{table}$

r_{table}= 0,3961

$k = 45$

$M = \frac{\sum x}{n} = \frac{507}{25} = 20{,}28$

$V_t = 50{,}71$

$$r_{11} = \left(\frac{k}{k-1}\right)\left(1 - \frac{M(k-M)}{k\,V_t}\right)$$

$$r_{11} = \left(\frac{45}{45-1}\right)\left(1 - \frac{20{,}28(45-20{,}28)}{45.50{,}71}\right)$$

$$r_{11} = \left(\frac{45}{44}\right)\left(1 - \frac{20{,}28(24{,}72)}{2281{,}95}\right)$$

$$r_{11} = (1{,}0227)\left(1 - \frac{501{,}32}{2281{,}95}\right)$$

$$r_{11} = (1{,}0227)(1 - 0{,}219)$$

$$r_{11} = (1{,}0227)(0{,}781)$$

$$r_{11} = 0{,}798$$

From the calculation above, reliability of the instruments was 0,798. With α =5%, N=25, r_{table} =0,3961. It shows that the instrument was reliable. Furthermore, the calculation of reliability test was also using SPSS. It can be seen as follows:

Table 4.2

The Reliability Computation Using SPSS Calculation

Case Processing Summary

		N	%
Cases	Valid	25	100.0
	Excluded[a]	0	0.0
	Total	25	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistic

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.720	.845	46

From the SPSS calculation above showed that in Cronbach's Alpha was 0,720. It is different from the result using manual formula, which gets 0,798. But, the difference just at the digit behind comma. The item test is reliable when $r_{11} > r_{table}$. So, the instrument of the test was reliable.

4.2 Data Description

To know the result of the test (pre-test and post-test), the researcher displayed the table of students' scores in both the experimental and control class. It is showed the students' achievement in pre-test and pos-test scores.

4.2.1 Pre-test Scores

Table 4.3 below showed the pre-test scores of the experimental class and control class.

Table 4.3

The Students' Pre-test Scores

Students	Experimental Class	Control Class
1	50	65
2	70	65
3	50	60
4	60	65
5	75	75
6	45	50
7	50	45
8	75	80
9	60	50
10	55	80
11	60	65
12	60	50
13	70	50
14	50	65
15	65	70
16	55	50
17	50	55
18	60	60
19	40	75
20	60	75
21	75	65
22	55	65
23	50	70
24	65	50
25	65	65
26	60	50
27	65	60
28	65	65
29	55	60
30	75	50

∑	**1790**	**1850**
Mean	**59.66666667**	**61.66666667**

The table above showed the students' pre-test score in the experimental class and control class. The pre-test was given to the students before they given the treatment. The mean score of the experimental class was 59,6 and the control class was 61,6.

4.2.2 Post-test Scores

Table 4.5 below showed the post-test scores of the experimental class and control class.

Table 4.5

The Students' Post-test Scores

Students	Experimental Class	Control Class
1	50	70
2	85	60
3	75	60
4	90	55
5	100	80
6	60	40
7	45	50
8	85	90
9	85	60
10	80	85
11	60	80
12	70	50
13	80	45
14	85	80
15	75	75
16	70	65
17	60	60

18	85	85
19	70	70
20	85	90
21	95	60
22	60	70
23	70	80
24	80	60
25	75	55
26	75	65
27	65	60
28	75	55
29	50	85
30	95	70
∑	**2235**	**2010**
Mean	**74.5**	**67**

The table above showed the students' post-test score in the experimental class and control class. The post-test was given to the students in the last meeting after the treatment was given. The mean score of the experimental class was 74,5 and the control class was 67.

4.2.3 Gained Scores

The gained score was used to differentiate the improvement of the experimental class and control class. Table 4.5 below described the gained scores of the experimental class and control class. Both of classes had 30 students.

Table 4.5

The Gained Scores of the Experimental and Control Class

Students	Experimental Class	Control Class
1	10	5

2	15	-5
3	25	0
4	30	-5
5	35	5
6	15	-10
7	-5	5
8	10	10
9	25	10
10	25	5
11	0	15
12	10	0
13	10	-5
14	35	15
15	10	5
16	15	15
17	10	5
18	25	25
19	30	-5
20	25	15
21	25	-5
22	5	5
23	20	10
24	15	10
25	10	-10
26	15	15
27	0	0
28	10	-10
29	-5	25
30	20	20
∑	**470**	**165**
Mean	**15.6**	**5.5**

The table above showed that the gained score of the experimental class was higher than the control class. The mean gained score of the experimental class was 15,6 and the control class was 5,5.

4.3 Data Analysis

The data analysis was used to answer the research question whether Crossword Puzzle was effective to improve the students' vocabulary mastery of the seventh graders of SMP N 1 Batealit Jepara or not. In this research, the researcher was used T-test in both classes (experimental class and control class) by manual calculation as follows:

Table 4.6

The Comparison Scores of Each Student in the Experimental Class and the Control Class

Students	X	Y	X-MX	Y-MY	$(X-MX)^2$	$(Y-MY)^2$
1	10	5	-5.6	-0.5	31.36	0.25
2	15	-5	-0.6	-10.5	0.36	110.25
3	25	0	9.4	-5.5	88.36	30.25
4	30	-5	14.4	-10.5	207.36	110.25
5	35	5	19.4	-0.5	376.36	0.25
6	15	-10	-0.6	-15.5	0.36	240.25
7	-5	5	-20.6	-0.5	424.36	0.25
8	10	10	-5.6	4.5	31.36	20.25
9	25	10	9.4	4.5	88.36	20.25
10	25	5	9.4	-0.5	88.36	0.25
11	0	15	-15.6	9.5	243.36	90.25
12	10	0	-5.6	-5.5	31.36	30.25
13	10	-5	-5.6	-10.5	31.36	110.25
14	35	15	19.4	9.5	376.36	90.25
15	10	5	-5.6	-0.5	31.36	0.25
16	15	15	-0.6	9.5	0.36	90.25
17	10	5	-5.6	-0.5	31.36	0.25
18	25	25	9.4	19.5	88.36	380.25
19	30	-5	14.4	-10.5	207.36	110.25
20	25	15	9.4	9.5	88.36	90.25
21	25	-5	9.4	-10.5	88.36	110.25

22	5	5	-10.6	-0.5	112.36	0.25
23	20	10	4.4	4.5	19.36	20.25
24	15	10	-0.6	4.5	0.36	20.25
25	10	-10	-5.6	-15.5	31.36	240.25
26	15	15	-0.6	9.5	0.36	90.25
27	0	0	-15.6	-5.5	243.36	30.25
28	10	-10	-5.6	-15.5	31.36	240.25
29	-5	25	-20.6	19.5	424.36	380.25
30	20	20	4.4	14.5	19.36	210.25
∑	**470**	**165**	**2**	**0**	**3436.8**	**2867.5**
Mean	**15,6**	**5.5**	**0.06667**	**0**	**114.56**	**95.5833**

The procedures of calculation are as follow:

a. Determining Mean of variable X, with formula:

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

$$= \frac{470}{30}$$

$$= 15{,}6$$

b. Determining Mean of variable Y, with formula:

$$My = \frac{\sum y}{N}$$

$$= \frac{165}{30}$$

$$= 5{,}5$$

c. Determining Standard Deviation Score of Variable X, with formula:

$$SDx = \sqrt{\frac{\sum x^2}{N}}$$

$$= \sqrt{\frac{3436{,}8}{30}}$$

$$= \sqrt{114,56}$$

$$= 10,7$$

d. Determining Standard Deviation Score of Variable Y, with formula:

$$SDy = \sqrt{\frac{\sum y^2}{N}}$$

$$= \sqrt{\frac{2867,5}{30}}$$

$$= \sqrt{95,58}$$

$$= 9,77$$

e. Determining standard error mean of variable X, with formula:

$$\mathrm{SE_{Mx}} = \frac{\mathrm{SD}x}{\sqrt{\mathrm{N}-1}}$$

$$= \frac{10,7}{\sqrt{30-1}}$$

$$= \frac{10,7}{\sqrt{29}}$$

$$= \frac{10,7}{5,3}$$

$$= 2,01$$

f. Determining standard error mean of variable Y, with formula:

$$\mathrm{SE_{My}} = \frac{\mathrm{SD}y}{\sqrt{\mathrm{N}-1}}$$

$$= \frac{9,77}{\sqrt{30-1}}$$

$$= \frac{9,77}{\sqrt{29}}$$

$$= \frac{9,77}{5,3}$$

$$= 1,84$$

g. Determining standard error mean of difference mean of variable X and mean of variable Y, with formula:

$$SE_{Mx-My} = \sqrt{\mathrm{SE_{Mx}}^2 + \mathrm{SE_{My}}^2}$$

$$= \sqrt{(2,01)^2 + (1,84)^2}$$

$$= \sqrt{4,0401 + 3,3856}$$

$$= \sqrt{7,4257}$$

$$= 2,72$$

h. Determining t_0 with formula:

$$t_0 = \frac{Mx - My}{SE_{Mx-My}}$$

$$= \frac{15,6 - 5,5}{2,72}$$

$$= \frac{10,1}{2,72}$$

$$= 3,713$$

i. Determining t-table in significant level 5% with *df*.

df = (Nx+Ny)-2

= (30+30)-2

= 60-2

= 58

From the manual calculation above, the degree of freedom (*df*) was 58 and the critical value of *df* 58 by using the degree of significance 5% was 2,000 and the $t_{observe}$ was 3,713. Shortly, it can be conclude that the post-test score of the experimental class was higher than the score of the control class. The comparison between $t_{observe}$ and t_{table} is 3,731 > 2,000 = $t_{observe}$ > t_{table}..

In addition, the researcher also calculate using SPSS calculation. The researcher took t-test measurement of gained score in both of classes. It was needed to know whether there was significance difference between the experimental class and control class to answer whether the alternative hypothesis (H_a) was accepted or rejected. The t-test calculation can be seen as following table 4.7:

Table 4.7

The t-test of Gained Score in the Experimental Class and Control Class

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Gained	Experimental Class	30	15.67	10.886	1.988
	Control Class	30	5.50	9.944	1.815

Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Gained	Equal variances assumed	.312	.578	3.777	58	.000	10.167	2.692	4.778	15.555
	Equal variances not assumed			3.777	57.531	.000	10.167	2.692	4.777	15.556

Based on the tables above, there was a different significance score of the experimental class and control class. The significance was 0,578 and $t_{observe}$ was 3,777 with *df* 58. The value of *df* 58 by using degree of freedom 5% was 2,000. So, $t_{observe} > t_{table}$ = 3,777 > 2,000.

In this research, the researcher also took t-test measurement of pre-test and post-test scores. It is used to see the differences of the mean score of pre-test and post-test in the experimental and control class. The t-test can be seen as following table 4.8 and 4.9.

Table 4.8

The t-test of Pre-test Scores in the Experimental Class and Control Class

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Pretest Scores	Experimental	30	59.67	9.371	1.711
	Control	30	61.67	9.942	1.815

Independent Samples Test

		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
Pretest Scores	Equal variances assumed	.338	.563	-.802	58	.426	-2	2.494	-6.993	2.993
	Equal variances not assumed			-.802	57.798	.426	-2	2.494	-6.994	2.994

Based on the tables above, the mean sore of control class was 61,6 while experimental class was 59,6. It means that the mean sore of control class was higher than experimental class.

Table 4.9

The t-test of Post-test Scores in the Experimental Class and Control Class

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Posttest Scores	Experimental	30	74.50	13.856	2.530
	Control	30	67.00	13.620	2.487

Independent Samples Test

		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
Posttest Scores	Equal variances assumed	.072	.789	2.114	58	.039	7.5	3.547	.399	14.601

	Equal variances not assumed			2.114	57.983	.039	7.5	3.547	.399	14.601

From the tables above, the mean sore of experimental class was 74,5 while control class was 67. The significance was 0,789. It means that there was significance difference between experimental class and control class.

4.4 Data Interpretation

This research was held to answer the question whether the use of Crossword Puzzle was effective to improve the students' vocabulary mastery of the seventh graders of SMP N 01 Batealit Jepara or not. In order to answer the question, the researcher writes the Null Hypothesis (H_o) and the Alternative Hypothesis (H_a) as follows:

a. The Null Hypothesis (H_o): There is no a significant difference in students' vocabulary mastery between the students who are taught by using crossword puzzle and those who are not using crossword puzzle.
b. The Alternative Hypothesis (H_a): There is a significant difference in students' vocabulary mastery between the students who are taught by using crossword puzzle and those who are not using crossword puzzle.

To prove the hypothesis, the researcher calculated the obtained data in experimental class and control class by using *t-test* formula with the assumption as follows:

a. If $t_o > t_{table}$ the Null Hypothesis (H_o) was rejected and the Alternative Hypothesis (H_a) was accepted. It was proven that Crossword Puzzle was effective to improve the students' vocabulary mastery.
b. If $t_o < t_{table}$ the Null Hypothesis (H_o) was accepted and the Alternative Hypothesis (H_a) was rejected. It was proven that Crossword Puzzle was not effective to improve the students' vocabulary mastery.

Based on the analysis of the results above, there was difference significance between the gained score in experimental class and control class. The t-test results by using manual calculation and also SPSS were same, despite there was little difference in any digit behind the comma. The analysis of the results above showed that the experimental class had the gained score higher than the control class. Furthermore, there was a significance score in the experimental class and control class. From manual calculation t_o was 3,713 while by using SPSS t_o was 3,777.

From the results above, it can be seen that the t-test was higher than t-table (3,777 > 2,000). It can be conclude that Crossword Puzzle was effective to improve the students' vocabulary mastery since H_a was accepted and H_o was rejected. It can be drawn a conclusion that Crossword Puzzle can impact significantly the students' vocabulary mastery of the seventh graders in SMP N 1 Batealit Jepara.