

## CHAPTER III

### METHODS OF INVESTIGATION

This chapter discusses method of investigation concerning research design, data source, procedure of experimentation, technique of data collection, and technique of data analysis.

#### A. Research Design

This study uses true experimental type. According to Sugiyono in this type of research the researcher controls all of variable which influence of way experiment.<sup>1</sup> An experimental study typically involves two groups: an experimental group and control group with receives the different treatment. This study uses control group design pre-test- post-test.

The design of the experiment can be described as follows:

$E$	01	$X$	02
$C$	03	$Y$	04

<sup>2</sup>

Where:

$E$  = Experimental Group

$C$  = Control Group

01 = Pre-test for the Experimental Group

02 = Post-test for the Experimental Group

03 = Pre-test for the Control Group

04 = Post-test for the Control Group

$X$  = Treatment with Direct Method

$Y$  = Treatment with non Direct Method

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<sup>1</sup> Sugiyono, *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif dan R&D*, (Bandung: Alfa beta, 2008), hlm.112.

<sup>2</sup> Suharsimi Arikunto, *Prosedur Penelitian: Suatu Pendekatan Praktik*, (Jakarta: Rineka Cipta, 2006), Ed. 6, Cet. 13, hlm 86.

In the design above, subjects were grouped into an experimental group (top line) and control group (bottom line). Their language proficiency of the subjects was first checked by pre testing them (01 and 03). Then the treatment (taught with Direct Method) was applied to the experimental group, while the control group was taught with non Direct Method. The test type was completion. The results of which (02 and 04) were then computed statistically.

## **B. Data Source**

Arikunto states that source of data are subjects where the data come from<sup>3</sup>. In this study the researcher uses the research procedure in order to get the required data. The researcher taught two groups of students. The first group was the experimental group, which was taught by using Direct Method. The other one was the control group, which was taught by using non Direct Method that is vocabulary drills that is Recognition of the right word. At the beginning of the experiment, the two groups were given the same pre test. At the end of the experiment, both groups were also given same post test.

### **1. Variables**

Variable refers to the object of research that becomes research focus. In order to conduct this research for teaching concrete nouns which have 2 variables; they are independent variable and dependent variable. The independent variable is the method in teaching concrete nouns for both groups. The dependent variable is the students achievement in the test score.

### **2. Place**

The study was conducted at SD Patukangan 2 Kendal in Jl. Gembyang No.22 Patukangan Kendal. Before conducting this study, the researcher consulted with the headmaster of SD Patukangan 2 Kendal to have permission in order that the students of third grade were allowed to be used as participant of the study.

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<sup>3</sup> Suharsimi Arikunto, *ibid*, hlm. 129.

### C. Subject of the Research

“The data researched were data sample where taken from that population”.<sup>4</sup> In this study, the researcher used the third year’s students of SD Patukangan 2 Kendal as the subjects of the study, because in teaching concrete nouns using Direct Method is for beginner students. So, the researcher chooses 3A and 3B to be observed. The study was conducted at the second semester in academic year of 2008/2009.

#### 1. Population

“Population is generality areas which consist of object/subject which has certain quality and characteristic which decided by the researcher to study and than collected the summary”.<sup>5</sup> The population of this research is all the students of SD Patukangan 2 Kendal in academic year of 2008/2009. There are 10 classes of all on this school.

#### 2. Sample

“Sample is part of population”.<sup>6</sup> In this research, the researcher took the subject of research by cluster sampling. The researcher used third grade as the sample, which is consisting of two classes of 80 students for conducting this research. The subjects two classes 3A and 3B were appointed because this school just has two classes at the third grade.

Two classes were chosen randomly, in which each class consist of 40 students. Class 3A was appointed as the experimental group which was taught by Direct Method technique while class 3B was appointed as the control group which was taught by non Direct Method technique.

### D. Technique of Data Collection

In the research, an instrument plays important role because it means collecting data. The instrument that used to find out the result of students

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<sup>4</sup> Sugiyono, *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif dan R&D*, (Bandung: Alfa beta, 2008), hlm.19.

<sup>5</sup> *Ibid*, hlm.117.

<sup>6</sup> *Ibid*, hlm.118.

achievement was by using test. In this study the researcher used two methods for collecting the data. They are test and observation.

### 1. Test

Data of the students' achievement can be collected by test. Therefore, to measure the achievement researched was used test. Arikunto states "to measure there or not large achievement object where researched was used test".<sup>7</sup> The researcher conducted the achievement test in this research. The test were used made of researcher with procedure contently. It was based on the consideration that it measured concrete nouns mastery of third grade students of SD Patukangan 2 Kendal in academic year of 2008/2009. Test given secondly those are pre-test and post-test. Pre-test has given at 2-3 February 2009 and the last post-test has given at 23-24 February 2009 after having a special treatment using Direct Method.

### 2. Observation

The data will collect through observation. "In using observation the most effective way is to complete format or form observation as instrument."<sup>8</sup> The observation conducted by two people. They were Kurniyah, she is my friend who graduated of Walisongo state institute for Islamic studies at 2009 and which one the English teacher at this school she is Mrs. Sri Fitri Rejeki, S. Pd. The observers were to filling in the observation form.

## E. Research Procedure

The steps of research includes preliminary visit, contact the headmaster, ask the data about the students as participants, give pre-test, give the treatments, give the post-test, and conduct the observation. The procedures of research could be seen in the following table.

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<sup>7</sup> Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*, (Jakarta: Rineka Cipta, 2006), Cet.13, hlm.223.

<sup>8</sup> *Op. Cit.*, 6 Ed., hlm. 229.

<b>No.</b>	<b>Task</b>	<b>What to prepare</b>	<b>Date</b>
1.	Preliminary visit (meet the administration officer)	-	Wednesday, 21 of January 2009
2.	Contact the headmaster	Research permission letter	Friday, 23 of January 2009
3.	Contact the English teacher to ask data of students as participants		Tuesday, 27 January 2009
4.	Give pre-test	Pre-test	Monday-Tuesday, 2-3 February 2009
5.	Give treatment	Lesson plan, handbook, observation checklist	1. Monday-Tuesday, 9-10 February 2009 2. Monday-Tuesday, 16-17 February 2009
6.	Give post-test	Post-test	Monday-Tuesday, 23-24 February 2009

1. Preliminary Visit

The researcher visited the school to get information about the students' subject as participants. To gain the information, the researcher asked the administration staff whether the school possibly became the setting of research or not by describing the researcher's intention and asked for information about setting and participants.

2. Contact the Headmaster

Having got the information about setting and participant, the researcher did the second visit to meet the headmaster of the school by asking the permission letter.

3. Contact the English Teacher

After receiving research permission from the headmaster of the school, the researcher met the English teacher and asked for the data of students what the class should become the participants that were the control and experimental groups.

4. Pre-test

In this session, the researcher gave the pre-test both experimental and control groups same the multiple choice tests were given. This test was to ensure that both two groups were the same in score. In addition, the results or score of the test were used to determine the students.

5. Treatment

In this session, the experimental group was given the treatment and taught by researcher as the experimenter while the control group was taught also by the researcher. Both groups teaches in same material, but was different in teaching method that was by Direct Method and non Direct Method. During the treatment, the observation was also conducted to observer.

6. Post-test

Having administered the treatment for secondly, the post-test was given to both groups to test their understanding on English concrete nouns.

So, the procedure of treatment could be seen in the following below:

### 1. The Activities of Experimental Group

#### a) Pre-test

Pre test was given before the treatment. First, the researcher came to the chosen class and then explained to the students about what they were going to do. The researcher distributed the instruments and asked them to do a pre-test. This pre test was conducted on 2 February 2009.

#### b) Activities in the classroom

In conducting the treatment, the students were taught using Direct Method. The steps of researcher in teaching concrete nouns using Direct Method:

Time and Date	Activity
9 February 2009	<ul style="list-style-type: none"> <li>Teacher opened the class by greeting students</li> </ul>
	<ul style="list-style-type: none"> <li>Teacher checked students' attendance by calling the roll</li> </ul>
	<ul style="list-style-type: none"> <li>Teacher asked students about things in the classroom</li> </ul>
	<ul style="list-style-type: none"> <li>Teacher pointed some objects in the class</li> </ul>
	<ul style="list-style-type: none"> <li>Teacher told and pronounced some words of object in the classroom, such as: table, chair, blackboard, cupboard, floor, wall, door, window, book, bag, etc.</li> </ul>
	<ul style="list-style-type: none"> <li>Teacher asked students to repeat after her.</li> </ul>
	<ul style="list-style-type: none"> <li>Teacher asked students using simple question and demonstrated point the object in the class. Example:</li> </ul>

	<p>Teacher = “What is this?”          (Using demonstrated point the object of chair).          Students = “This is a chair”          Students are supposed to answer based on the object by simple sentence.</p>
16 February 2009	<ul style="list-style-type: none"> <li>• Teacher opened the class by greeting students</li> </ul>
	<ul style="list-style-type: none"> <li>• Teacher checked students attendance by calling the roll</li> </ul>
	<ul style="list-style-type: none"> <li>• Teacher asked students about the last lesson (things in the classroom)</li> </ul>
	<ul style="list-style-type: none"> <li>• Teacher asked students to tell things in the classroom</li> </ul>
	<ul style="list-style-type: none"> <li>• Teacher showed picture and pronounced about object in the classroom</li> </ul>
	<ul style="list-style-type: none"> <li>• Teacher asked students using simple question and point the picture where chosen.            Example:            Teacher = “What is this?”            (Using demonstrated point the picture of bag).            Students = “This is a bag”            Students are supposed to answer based on the picture by simple sentence.</li> </ul>

c) Post-test

Post-test was given after conducting all the activities above. The test was given to measure the students’ achievement after the treatment. It was conducted on 23 February 2009. Then the result was analyzed.

## 2. The Activities of Control Group

### a) Pre-test

Pre test was given before the treatment. First, the researcher came to the chosen class and then explained to the students about what they were going to do. The researcher distributed the instruments and asked them to do a pre-test. This pre test was conducted on 3 February 2009.

### b) Activities in the classroom

In conducting the treatment, the students of control group were taught using non Direct Method; it is vocabulary drill recognition of the right word.

The steps of researcher in teaching concrete nouns using non Direct Method:

Time and Date	Activity
10 February 2009	<ul style="list-style-type: none"> <li>▪ Teacher opened the class by greeting students.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher checked students attendance by calling the roll</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher asked students about things in the classroom.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher told and wrote the vocabulary of things in the classroom on the blackboard.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher asked students about the meaning who known.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher wrote the meaning on the blackboard.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher pronounced the vocabulary.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher asked students to repeat after her.</li> </ul>
17 February 2009	<ul style="list-style-type: none"> <li>▪ Teacher opened the class by greeting students.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Teacher checked students attendance by calling the roll</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Teacher asked students about the last lesson (things in the classroom)</li> </ul>																																								
	<ul style="list-style-type: none"> <li>▪ Teacher told some words of things in the classroom</li> </ul>																																								
	<ul style="list-style-type: none"> <li>▪ Teacher asked students to repeat after her</li> </ul>																																								
	<ul style="list-style-type: none"> <li>▪ Teacher gave vocabulary drills <i>Recognition of the Right Word</i> <ul style="list-style-type: none"> <li>- Students looked at the following word list.</li> <li>- Students read as fast as they can and underlined the word which is the same as the test word.<sup>9</sup></li> </ul> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td>blackball</td> <td>blackbird</td> <td><u>blackboard</u></td> <td>belabor</td> </tr> <tr> <td>cap board</td> <td><u>cupboard</u></td> <td>cupbaord</td> <td>cupbard</td> </tr> <tr> <td>tablet</td> <td><u>table</u></td> <td>tabel</td> <td>tebal</td> </tr> <tr> <td><u>chair</u></td> <td>cair</td> <td>cheer</td> <td>choir</td> </tr> <tr> <td>flour</td> <td><u>floor</u></td> <td>blood</td> <td>flours</td> </tr> <tr> <td>wals</td> <td>awal</td> <td>wol</td> <td><u>wall</u></td> </tr> <tr> <td>dor</td> <td><u>door</u></td> <td>dour</td> <td>doer</td> </tr> <tr> <td><u>window</u></td> <td>widow</td> <td>windu</td> <td>wind</td> </tr> <tr> <td>bulk</td> <td>bauk</td> <td><u>book</u></td> <td>bout</td> </tr> <tr> <td>panci</td> <td><u>pencil</u></td> <td>pinsil</td> <td>pence</td> </tr> </table> </li> </ul>	blackball	blackbird	<u>blackboard</u>	belabor	cap board	<u>cupboard</u>	cupbaord	cupbard	tablet	<u>table</u>	tabel	tebal	<u>chair</u>	cair	cheer	choir	flour	<u>floor</u>	blood	flours	wals	awal	wol	<u>wall</u>	dor	<u>door</u>	dour	doer	<u>window</u>	widow	windu	wind	bulk	bauk	<u>book</u>	bout	panci	<u>pencil</u>	pinsil	pence
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flour	<u>floor</u>	blood	flours																																						
wals	awal	wol	<u>wall</u>																																						
dor	<u>door</u>	dour	doer																																						
<u>window</u>	widow	windu	wind																																						
bulk	bauk	<u>book</u>	bout																																						
panci	<u>pencil</u>	pinsil	pence																																						

#### c) Post-test

Post-test was given after conducting all the activities above. The test was given to measure the students' achievement after the treatment. It was conducted on 24 February 2009. Then the result was analyzed.

#### F. Technique of Data Analysis

As stated in the hypothesis in this research, the researcher wanted to know whether the Direct Method is more effective than non Direct Method in teaching concrete nouns at third grade students of elementary school. The researcher made 20 items of multiple choice test, each item had one

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<sup>9</sup> Paul Nation, *New Ways in Teaching Vocabulary*, (USA: Library of Congress Catalog, 1994), p.209.

score. So the students would get score of 20 if all the answers were correct.

A certain technique to score was used, it is:

$$S = \frac{R}{N} \times 100$$

Where:

$S$  = Score

$R$  = Total number of correct answer

$N$  = Total number of item

The researcher was used technique analysis statistic to correct sample that is normality and homogeneity test.

#### 1. Normality Test

Normality test were used to find out the data distribution normal or not. To find out data distribution used normality test using chi-square, the steps of chi- square test as follow:

a) To determining span ( $R$ ) that is the bigger score is lessened the smaller score.

b) To determining many class interval ( $P$ ) using formula,  $P = \frac{\text{span}(R)}{\text{manyclass}}$

c) Making table of distribution frequency

d) To determining class boundary ( $B_k$ ) from each class interval

e) To determining means  $\bar{X}$ , using formula,  $\bar{X} = \frac{\sum f_i \cdot X_i}{\sum f_i}$

f) To determining variants, using formula  $S^2 = \frac{n \sum f_i X_i^2 - (\sum f_i X_i)^2}{n(n-1)}$

g) To determining Z score, using formula  $Z = \frac{x - \bar{x}}{s}$

$x$  = class boundary

$\bar{x}$  = mean

$s$  = standard deviation

- h) To determining chi-square ( $\chi^2$ ) using formula  $\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$
- i) To determining  $\chi^2$  table
- j) To determining distribution normality with criteria: if  $\chi^2$  value  $>$   $\chi^2$  table, so data is not in normal distribution and if  $\chi^2$  value  $<$   $\chi^2$  table, so data is normal distribution.

## 2. Homogeneity Test

Homogeneity is used to determine that data homogen or not. The steps as follows:

- a) to determining means ( $\bar{x}$ )
- b) to determining variants ( $S^2$ ) using formula  $S^2 = \frac{n \sum x_1^2 - (\sum x_1)^2}{n(n-1)}$
- c) To determining  $F$  using formula  $F = \frac{\text{BiggerVariants}}{\text{SmallerVariants}}$
- d) To compare  $F_{\text{value}}$  with  $F_{\text{table}} \frac{1}{2} \alpha (nb-1)(nk-1)$  and  $dk = (k-1)$  if  $F_{\text{value}} < F_{\text{table}}$  so, that data is homogen distribution.

## 3. t- test

Technique statistic where used to determine significant compares (to compare mean score of a group with mean score other group) is using t-test.<sup>10</sup>

Hypothesis Ho and Ha

$$H_o : \mu_1 \leq \mu_2$$

$$H_a : \mu_1 > \mu_2$$

Formula where used in t-test:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \quad \text{and} \quad S^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

<sup>10</sup> Ibnu Hajar, *Dasar-dasar Metodologi Penelitian Kwantitatif dalam Pendidikan*, (Jakarta: PT Grafindo, 1996), Cet.1, hlm.251.

Where:

$t$  = statistic

$\overline{X_1}$  = the mean score of the experimental group

$\overline{X_2}$  = the mean score of the control group

$S_1^2$  = the variants of experimental group

$S_2^2$  = the variants of control group

$n_1$  = the total of the students of experimental group

$n_2$  = the total of the students of control group

### **G. The Data Analyzing**

However, before testing the hypothesis that is to find out the difference of students' academic achievement, the researcher would like to carry out pre requisite test, they are normality and homogeneity test. In support to the measurement of students achievement result, the observation concerning to the students understanding during the experiment was interpreted as well.

#### **1. Data of Students Pre-Test Scores for the Experimental Group (Class 3A) and the Control Group (Class 3B)**

Based on the test given to the class 3A and 3B, the pre test scores was gained from the students before the experiment was administered. The average score reached by class 3A was 77.125 while the class 3B reached 77.25 as their average score. The students' scores in detail can be looked at the attachment.

The result shown by the two groups might be interpreted that the students' competence level or their understanding on concrete nouns was equivalent. It could be seen from the mean score of each group which was not far differed.

**Table 1. Data Pre-Test and Post-Test Score  
For Experimental Group and Control Group**

Experimental Group					Control Group				
No	X <sub>1</sub>	X <sub>1</sub> <sup>2</sup>	Y <sub>1</sub>	Y <sub>1</sub> <sup>2</sup>	No	X <sub>2</sub>	X <sub>2</sub> <sup>2</sup>	Y <sub>2</sub>	Y <sub>2</sub> <sup>2</sup>
1	35	1225	65	4225	1	60	3600	55	3025
2	70	4900	80	6400	2	80	6400	85	7225
3	80	6400	90	8100	3	75	5625	75	5625
4	90	8100	85	7225	4	80	6400	80	6400
5	75	5625	85	7225	5	70	4900	85	7225
6	80	6400	90	8100	6	80	6400	75	5625
7	80	6400	85	7225	7	85	7225	90	8100
8	70	4900	70	4900	8	75	5625	80	6400
9	100	10000	100	10000	9	75	5625	80	6400
10	50	2500	80	6400	10	80	6400	80	6400
11	70	4900	80	6400	11	95	9025	95	9025
12	85	7225	90	8100	12	70	4900	80	6400
13	90	8100	100	10000	13	90	8100	90	8100
14	80	6400	85	7225	14	85	7225	90	8100
15	75	5625	90	8100	15	95	9025	90	8100
16	90	8100	95	9025	16	65	4225	80	6400
17	75	5625	80	6400	17	90	8100	75	5625
18	80	6400	95	9025	18	70	4900	70	4900
19	70	4900	90	8100	19	85	7225	90	8100
20	60	3600	75	5625	20	70	4900	80	6400
21	100	10000	90	8100	21	70	4900	70	4900
22	80	6400	85	7225	22	70	4900	75	5625
23	85	7225	95	9025	23	95	9025	80	6400
24	95	9025	90	8100	24	60	3600	70	4900
25	65	4225	85	7225	25	45	2025	60	3600
26	80	6400	90	8100	26	60	3600	70	4900
27	65	4225	80	6400	27	80	6400	75	5625
28	85	7225	95	9025	28	100	10000	95	9025
29	100	10000	100	10000	29	60	3600	70	4900
30	75	5625	85	7225	30	80	6400	90	8100
31	80	6400	85	7225	31	65	4225	75	5625
32	95	9025	90	8100	32	85	7225	75	5625
33	65	4225	80	6400	33	90	8100	85	7225
34	90	8100	90	8100	34	85	7225	90	8100
35	55	3025	75	5625	35	100	10000	90	8100
36	65	4225	75	5625	36	65	4225	75	5625
37	80	6400	80	6400	37	90	8100	90	8100
38	70	4900	90	8100	38	45	2025	55	3025
39	75	5625	80	6400	39	70	4900	75	5625
40	75	5625	85	7225	40	100	10000	100	10000
<b>Σ</b>	<b>3085</b>	<b>245225</b>	<b>3435</b>	<b>297425</b>		<b>3090</b>	<b>246300</b>	<b>3190</b>	<b>258600</b>
<b>N</b>	<b>40</b>					<b>40</b>			

$\bar{X}$	77.125		85.875			77.25		79.75	
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Based on the table above were analyzed as follow:

**a. Normality Pre-Test of Experimental Group**

Data normality test of Experimental Group:

$$\text{Max. score} = 100$$

$$\text{Min. score} = 35$$

$$R = 100 - 35 = 65$$

$$K = 1 + 3.3 \log 40 = 6.29 \text{ or } 6$$

$$\text{Class length} = 65/6 = 10.8 \text{ or } 11$$

**Table 2**

**Distribution score for Pre-test Experimental Group**

<i>Class</i>	<i>f<sub>i</sub></i>	<i>X<sub>i</sub></i>	<i>X<sub>i</sub><sup>2</sup></i>	<i>f<sub>i</sub>.X<sub>i</sub></i>	<i>f<sub>i</sub>.X<sub>i</sub><sup>2</sup></i>
<b>35 – 45</b>	1	40	1600	40	1600
<b>46 – 56</b>	2	51	2601	102	5202
<b>57 – 67</b>	5	62	3844	310	19220
<b>68 – 78</b>	11	73	5329	803	58619
<b>79 – 89</b>	12	84	7056	1008	84672
<b>90 – 100</b>	9	95	9025	855	81225
	<b>40</b>			<b>3118</b>	<b>250538</b>

$$\bar{x} = \frac{\sum f_i \cdot x_i}{\sum f_i} = \frac{3118}{40} = 77.95$$

$$\begin{aligned}
 S^2 &= \frac{n \cdot \sum f_i \cdot x_i^2 - (\sum f_i \cdot x_i)^2}{n(n-1)} \\
 &= \frac{40 \times 250538 - (3118)^2}{40 \times 39} \\
 &= \frac{10021520 - 9721924}{1560}
 \end{aligned}$$

$$= \frac{299596}{1560}$$

$$= 192.0487$$

$$S = 13.858$$

**Table 3****List of frequency score Experimental Group**

Class	$B_k$	$Z_i$	$P(Z_i)$	Wide Area	$E_i$	$O_i$	$\frac{(O_i - E_i)^2}{E_i}$
	34.5	-3.74	0.4992				
<b>35 – 45</b>				0.0088	0.36	1	1.1378
	45.5	-2.34	0.4904				
<b>46 – 56</b>				0.051	2.04	2	0.0078
	56.5	-1.55	0.4394				
<b>57 – 67</b>				0.166	6.64	5	0.4051
	67.5	-0.75	0.2734				
<b>68 – 78</b>				0.289	11.56	11	0.0271
	78.5	0.04	0.0160				
<b>79 – 89</b>				0.281	11.24	12	0.0514
	89.5	0.83	0.2967				
<b>99 – 100</b>				0.152	6.08	9	1.4024
	100.5	1.63	0.4484				
							$X^2 = 3.0316$

Based on the computation above, experimental group by means  $X^2_{\text{value}} 3.03$  that result then consulted with  $X^2_{\text{tabel}}$  where  $\alpha = 5\%$  and  $dk = 6-3 = 3$  by means  $X^2_{\text{tabel}} = 7.81$  if  $X^2_{\text{value}} < X^2_{\text{tabel}}$  so, the data where examined for experimental group is normal distribution.

**b. Normality Pre-Test of Control Group**

Data normality test of Control Group:

Max. score	= 100	
Min. score	= 45	
$R$	= 100-45	= 55
$K$	= 1+3.3 log 40	= 6.29 or 6
Class length	= 55/6	= 9.17 or 10

**Table 4**  
**Distribution score for Pre-test Control Group**

Class	$f_i$	$X_i$	$X_i^2$	$f_i.X_i$	$f_i.X_i^2$
<b>45 – 54</b>	2	49.5	2450.25	99	4900.5
<b>55 – 64</b>	4	59.5	3540.25	238	14161
<b>65 – 74</b>	10	69.5	4830.25	695	48302.5
<b>75 – 84</b>	9	79.5	6320.25	715.5	56882.25
<b>85 – 94</b>	9	89.5	8010.25	805.5	72092.25
<b>95 – 104</b>	6	99.5	9900.25	597	59401.5
	<b>40</b>			<b>3150</b>	<b>255740</b>

$$\bar{x} = \frac{\sum f_i.x_i}{\sum f_i} = \frac{3150}{40} = 78.75$$

$$S^2 = \frac{n \cdot \sum f_i.x_i^2 - (\sum f_i.x_i)^2}{n(n-1)}$$

$$= \frac{40 \times 255740 - (3150)^2}{40 \times 39}$$

$$= \frac{10229600 - 9922500}{1560}$$

$$= \frac{307100}{1560}$$

$$= 196.8589$$

$$S = 14.031$$

**Table 5**  
**List of Observation Frequency Score Control Group**

Class	$B_k$	$Z_i$	$P(Z_i)$	Wide Area	$E_i$	$O_i$	$\frac{(O_i - E_i)^2}{E_i}$
	44.5	-2.44	0.4927				
<b>45 - 54</b>				0.035	1.4	2	0.2571
	54.5	-1.73	0.4582				
<b>55 - 64</b>				0.112	4.48	4	0.0514
	64.5	-1.02	0.3461				
<b>65 - 74</b>				0.228	9.12	10	0.0849
	74.5	-0.30	0.1179				
<b>75 - 84</b>				0.277	11.08	9	0.3905
	84.5	0.41	0.1591				
<b>85 - 94</b>				0.209	8.36	9	0.0489
	94.5	1.12	0.3686				
<b>95 - 104</b>				0.098	3.94	6	1.0771
	104.5	1.84	0.4671				
$X^2 = 1.9099$							

Based on the computation above, control group by means  $X^2_{\text{value}}$  1.90 that result then consulted with  $X^2_{\text{table}}$  where  $\alpha = 5\%$  and  $dk = 6-3 = 3$  by means  $X^2_{\text{table}} = 7.81$  if  $X^2_{\text{value}} < X^2_{\text{table}}$ . So, the data where examined for control group is normal distribution.

### c. Homogeneity Test

The computation of homogeneity test for the variance of population can be sequenced as follow.

$$S^2_{\text{exp.}} = \frac{n \sum xi^2 - (\sum xi)^2}{n(n-1)}$$

$$\begin{aligned}
&= \frac{40 \times 245225 - (3085)^2}{40 \times 39} \\
&= \frac{9809000 - 9517225}{1560} \\
&= \frac{291775}{1560} \\
&= 187.0353 \\
S &= 13.676 \\
S^2 \text{ con.} &= \frac{n \sum xi^2 - (\sum xi)^2}{n(n-1)} \\
&= \frac{40 \times 246300 - (3090)^2}{40 \times 39} \\
&= \frac{9852000 - 9548100}{1560} \\
&= \frac{303900}{1560} \\
&= 194.8077 \\
S &= 13.957
\end{aligned}$$

Based on the computation above,  $F_{value}$  for pre-test experiment and control group is 1.042 for that result then consulted with  $F_{table}$  where  $\alpha = 5\%$  with dk counter = nb-1 (40-1) and dk denominator = nk-1 (40-1). So, get  $F_{table} = 1.73$  because  $F_{value} < F_{1/2\alpha(nb-1);(nk-1)}$ . so, can be concluded that data for pre-test between experiment and control group is homogeneity or has same variants.

## 2. Data of Students Post-Test Scores for the Experimental Group (Class 3A) and the Control Group (Class 3B)

After both groups were given the treatment then post-test were also given. And the results of score both group in post-test were computation.

**a. Normality Post-Test of Experimental Group**

Data normality post-test experimental group:

$$\text{Max. score} = 100$$

$$\text{Min. score} = 65$$

$$R = 100 - 65 = 35$$

$$K = 1 + 3.3 \log 40 = 6.29 \text{ or } 6$$

$$\text{Class length} = 35/6 = 5.83 \text{ or } 6$$

**Table 6**

**Distribution score for Post-Test Experimental Group**

Class	$f_i$	$X_i$	$X_i^2$	$f_i \cdot X_i$	$f_i \cdot X_i^2$
<b>65 – 70</b>	2	67.5	4556.25	135	9112.5
<b>71 – 76</b>	3	73.5	5402.25	220.5	16206.75
<b>77 – 82</b>	8	79.5	6320.25	636	50562
<b>83 – 88</b>	9	85.5	7310.25	769.5	65792.25
<b>89 – 94</b>	11	91.5	8372.25	1006.5	92094.75
<b>95 – 100</b>	7	97.5	9506.25	682.5	66543.75
	<b>40</b>			<b>3450</b>	<b>300312</b>

$$\bar{x} = \frac{\sum f_i \cdot x_i}{\sum f_i} = \frac{3450}{40} = 86.25$$

$$S^2 = \frac{n \cdot \sum f_i \cdot x_i^2 - (\sum f_i \cdot x_i)^2}{n(n-1)}$$

$$= \frac{40 \times 300312 - (3450)^2}{40 \times 39}$$

$$= \frac{12012480 - 11902500}{1560}$$

$$= \frac{109980}{1560}$$

$$= 70.5$$

$$S = 8.396$$

**Table 7**

**List of Observation frequency score Experimental Group**

Class	$Bk$	$Zi$	$P(Zi)$	Wide Area	$Ei$	$Oi$	$\frac{(Oi - Ei)^2}{Ei}$
	64.5	-2.59	0.4952				
<b>65 – 70</b>				0.025	1	2	1
	70.5	-1.88	0.4699				
<b>71 – 76</b>				0.093	3.72	3	0.139
	76.5	-1.16	0.3770				
<b>77 – 82</b>				0.203	8.14	8	0.002
	82.5	-0.45	0.1736				
<b>83 – 88</b>				0.28	11.2	9	0.432
	88.5	0.27	0.1064				
<b>89 – 94</b>				0.230	9.20	11	0.352
	94.5	0.98	0.3365				
<b>95 – 100</b>				0.12	4.72	7	1.101
	100.5	1.69	0.4545				
							$X^2 = 3.026$

The result from computation above,  $X^2_{\text{value}}$  for experimental group is 3.02 that result consulted with  $X^2_{\text{table}}$  where  $\alpha = 5\%$  and  $dk = 6 - 3$  get  $X^2_{\text{table}} = 7,81$  because  $X^2_{\text{value}} < X^2_{\text{table}}$ . So, could be concluding that data for experimental group is normal distribution.

**b. Normality Post-Test of Control Group**

Data normality post-test control group:

Max. score = 100

Min. score = 55

$R = 100 - 55 = 45$

$$K = 1 + 3.3 \log 40 = 6.29 \text{ or } 6$$

$$\text{Class length} = 45/6 = 7.5 \text{ or } 8$$

**Table 8**  
**Distribution score for Post-Test Control Group**

Class	$f_i$	$X_i$	$X_i^2$	$f_i.X_i$	$f_i.X_i^2$
<b>55 – 62</b>	3	58.5	3422.25	175.5	10266.75
<b>63 – 70</b>	5	66.5	4422.25	332.5	22111.25
<b>71 – 78</b>	9	74.5	5550.25	670.5	49952.25
<b>79 – 86</b>	11	82.5	6806.25	907.5	74890.75
<b>87 – 94</b>	9	90.5	8190.25	814.5	73712.75
<b>95 – 102</b>	3	98.5	9702.25	295.5	29106.75
$\Sigma$	<b>40</b>			<b>3196</b>	<b>260040</b>

$$\bar{x} = \frac{\sum f_i.x_i}{\sum f_i} = \frac{3196}{40} = 79.9$$

$$S^2 = \frac{n \cdot \sum f_i.x_i^2 - (\sum f_i.x_i)^2}{n(n-1)}$$

$$= \frac{40 \times 260040 - (3196)^2}{40 \times 39}$$

$$= \frac{10401600 - 10214416}{1560}$$

$$= \frac{187184}{1560}$$

$$= 119.989$$

$$S = 10.95$$

**Table 9**  
**List of Observation frequency score Control Group**

Class	$B_k$	$Z_i$	$P(Z_i)$	Wide Area	$E_i$	$O_i$	$\frac{(O_i - E_i)^2}{E_i}$
	54.5	-2.31	0.4896				
<b>55 – 62</b>				0.0467	1.87	3	0.683
	62.5	-1.58	0.4429				
<b>63 – 70</b>				0.1404	5.62	5	0.068
	70.5	-0.85	0.3025				
<b>71 – 78</b>				0.2508	10.03	9	0.106
	78.5	-0.13	0.0517				
<b>79 – 86</b>				0.2775	11.10	11	0.001
	86.5	0.60	0.2258				
<b>87 – 94</b>				0.1824	7.29	9	0.401
	94.5	1.33	0.4082				
<b>95 – 102</b>				0.0721	2.88	3	0.005
	102.5	2.06	0.4803				
							$X^2 = 1.264$

The result from computation above,  $X^2_{\text{value}}$  for control group is 1.26 that result consulted with  $X^2_{\text{table}}$  where  $\alpha = 5\%$  and  $dk = 6-3$  get  $X^2_{\text{table}} = 7.81$  because  $X^2_{\text{value}} < X^2_{\text{table}}$ . So, could be concluded that data for control group is normal distribution.

### c. Homogeneity Test

The computation of homogeneity test for the variance of population can be sequenced as follow.

$$\begin{aligned}
 S^2_{\text{exp.}} &= \frac{n \sum xi^2 - (\sum xi)^2}{n(n-1)} \\
 &= \frac{40 \times 297425 - (3435)^2}{40 \times 39}
 \end{aligned}$$

$$\begin{aligned}
&= \frac{11897000 - 11799225}{1560} \\
&= \frac{97775}{1560} \\
&= 62.6763 \\
\text{S} &= 7.917
\end{aligned}$$

$$\begin{aligned}
\text{S}^2 \text{ con.} &= \frac{n \sum xi^2 - (\sum xi)^2}{n(n-1)} \\
&= \frac{40 \times 258600 - (3190)^2}{40 \times 39} \\
&= \frac{10344000 - 10176100}{1560} \\
&= \frac{167900}{1560} \\
&= 107.6282 \\
\text{S} &= 10.3744
\end{aligned}$$

Based on the computation above,  $F_{\text{value}}$  for pre-test experiment and control group is 1.72 for that result then consulted with  $F_{\text{table}}$  where  $\alpha = 5\%$  with dk counter = nb-1 (40-1) and dk denominator = nk-1 (40-1). So, get  $F_{\text{table}} = 1.73$  because  $F_{\text{value}} < F_{1/2\alpha(nb-1):(nk-1)}$ . so, can be concluded that data for pre-test between experiment and control group is homogeneity or has same variants.