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## CHAPTER III

### RESEARCH METHODOLOGY

#### III.1 Research Design

The design of the research is a comparative study with a comparative quasi-experimental design. The quasiexperimental design involves selecting two groups or more differences on some variables and comparing them to some dependent variables (Gay, 2000:364). McGowan (2011:1) states comparative experiment plays a role in each phase of an educational research program, from studies of initial efficacy in larger trials that confirm or optimize the effects of educational interventions. The comparative experiment is usually one of three types (Gay and Airasan, 2000:367).

1. Comparison of two different approaches (A versus no A);
2. Comparison of a new approach and the existing approach (A versus no A)
3. Comparison of different number of a single approach (A little of A versus a lot of A)

In this research type 1 (comparison of two different approaches) is used. Three variables. NHT and STAD are independent variables, while the students' vocabulary mastery is a dependent variable. Therefore, the experimental classes would be provided with a pre-test, treatment and a post-test. They can be seen in the following table:

**Table III.1 Research Design**

Group	Pre-test	Treatment	Post test
E1	01	X1	02
E2	03	X2	04

Figure (Gay, 2000: 353)

E1: Experimental Group1

E2 : Experimental Group2

X1: Independent variable 1 (NHT)

X2 : Independent variable 2 (STAD)

01,03 : pre-test

02,04 : post-test

Gay (2000: 354) states, defining and selecting of comparison group are very important parts of the quasi-experimental design procedure. The independent variable differentiating the groups must be clearly and operationally defined, since each group represents a different population. The way of the group defines effect on the generalized ability of the results.

### III.2 The Location and the Time of the Research

This research was conducted at SD Annamiroh 4 which is located at No.168 Kualu from January to March 2017.

### III.3 The Population and Sample of the Research

#### III.3.1 Population

The population of this research was the second grade students of SD Annamiroh 4 in 2016-2017 academic year. The total number of the students was 90 students. It consisted of 3 classes. Two classes were used as a samples in this research by using cluster sampling. Gay (2000:129) states that cluster sampling randomly selects groups (not individuals) that have similar characteristics.

**Table III.2**  
**Population of the second grade students at SD Annamiroh 4 Pekanbaru**

Class	Male	Female	Total of Students
2 al quddus	17	13	30
2 as salam	16	14	30
2 al mukmin	15	15	30
<b>Total Population</b>	<b>48</b>	<b>42</b>	<b>90</b>

#### III.3.2 Sample

Cluster sampling technique was used to determine the sample of this research which means that one class is appointed to be the sample respondent to this research. According to Cresswell (2006), cluster sampling refers to randomly-selected groups, not individual and all the members of selected groups have similar characteristics. The total number of the population of the second year students at SD Annamiroh 4 Pekanbaru in academic 2016 – 2017 is 90

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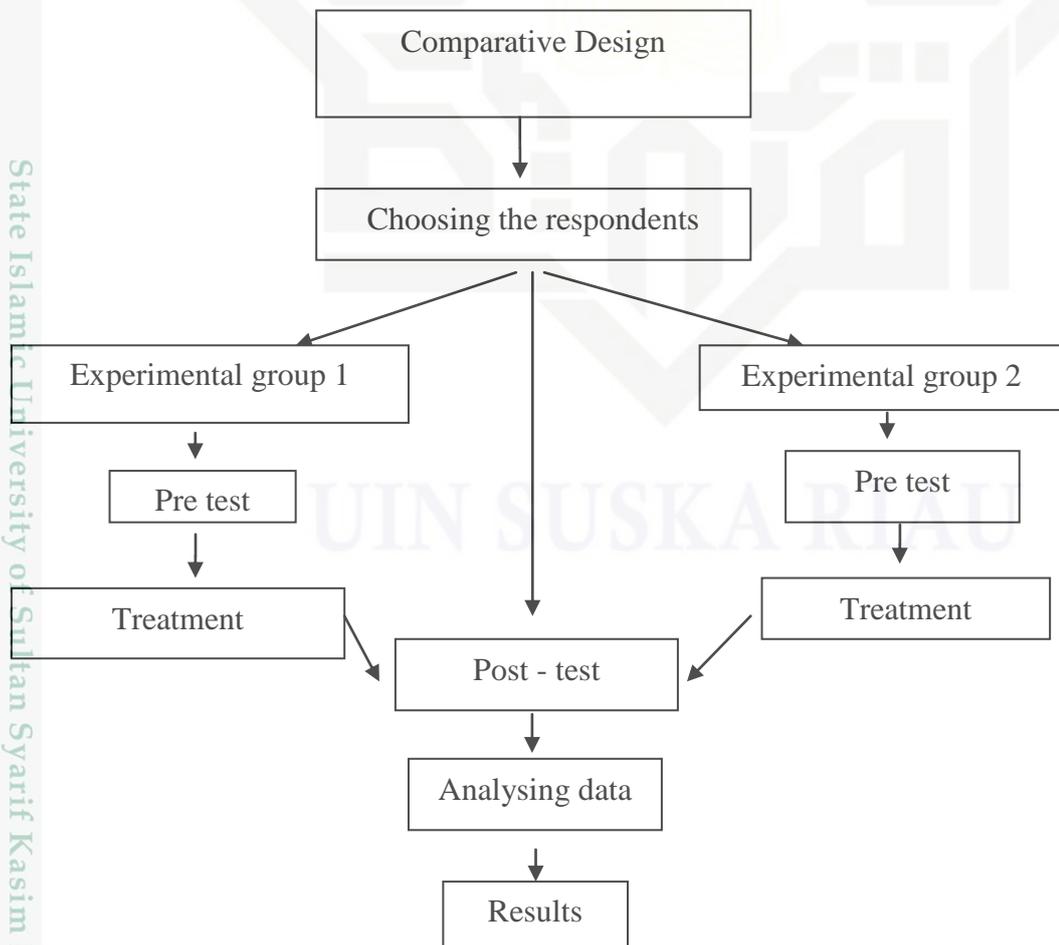
students. In this research, the samples are 60 students which are 2 Assalam and 2 Al Qudus as experimental classes.

**Table III.3**  
**Sample of the second grade students at SD Annamiroh 4 Pekanbaru**

Class	Male	Female	Total
2 As Salam	16	14	30
2 Al Qudus	15	15	30
<b>Total Sample</b>	<b>31</b>	<b>29</b>	<b>60</b>

### III.4 Research Procedure

**Figure III.1**



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### III.5. Research Instruments

An instrument plays an important role in a research in order to collect data required in an experiment. The instrument which used in this research was a vocabulary test. Heaton (1975: 5) explains that a vocabulary test measures the students knowledge of the meaning certain words or word groups. The test was given before and after the students being taught using NHT in the experimental group 1 and STAD in the experimental group 2.

### III.6 Data Collection Technique

To analyze the data about the significant difference before and after of students' vocabulary mastery between those that have been taught by using NHT for experimental class 1 and STAD for experimental group 2 at SD An namiroh 4 Pekanbaru, the data were analyzed statistically. The independent sample t-test used through using SPSS 20 version (Statistic package for the Social Sciences).

### III.7 Validity and Reliability Test

#### III.7.1 The validity of instrument

According to Brown (2001:387), Validity is the degree to which the test actually measures what it is intended to measure. Gay (200:162) says that there are three kinds of validity: content validity, criterion – related validity, and construct validity. Content validity is the degree to which a test measures as intended content area. Criterion-related validity consist of two kinds, the first is concurrent validity that means scores on one test correlate to score on another

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test. The second is predictive validity that means the degree to which a test can predict how well individuals will do in a future situation. Construct validity is very important for validity that answers what is this test really measuring. Before collecting the data, items will be tested in order to be ideally to try out. The purpose of the try out is to find out the quality of the test items. The points of difficulty level and discrimination index will be analyzed by using formula (Heaton, 1975 : 178).

$$FV = \frac{R}{N} \times 100\%$$

Where :

FV: The index of difficulty

R: The number of correct answer

N : The number of respondents

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**Table III.4 Instrument Validity Before Try Out**

	Corrected Item- Total Correlation	R Table $\alpha = 0,05 ; n= 20$	Categories
ITEM1	,260	< 0,422	Invalid
ITEM2	,075	< 0,422.	Invalid
ITEM3	,378	< 0,422.	Invalid
ITEM4	,759	> 0,422.	Valid
ITEM5	,334	< 0,422.	Invalid
ITEM6	,378	< 0,422	Invalid
ITEM7	,337	< 0,422.	Invalid
ITEM8	,483	> 0,422.	Valid
ITEM9	,613	> 0,422.	Valid
ITEM10	,378	< 0,422.	Invalid
ITEM11	,475	> 0,422	Valid
ITEM12	,082	< 0,422.	Invalid
ITEM13	,724	> 0,422.	Valid
ITEM14	,130	< 0,422.	Invalid
ITEM15	,230	< 0,422.	Invalid
ITEM16	,264	< 0,422	Invalid
ITEM17	,475	> 0,422.	Valid
ITEM18	1	> 0,422.	Valid
ITEM19	,264	< 0,422.	Invalid
ITEM20	,886	> 0,422.	Valid

From the result of calculation by using SPSS, it is clear and concluded that 8 items are valid; item 4, item 8, item 9, item 11, item 13, item17, item 18, item 20 and 12 items are invalid; item 1, item 2, item 3, item 5, item 6, item 7, item 10, item 12, item 14, item 14, item 16, and item 19. So, the invalid items were removed by the writer, and the result of validity after the invalid items were changed can be shown below:

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Table III.5 Instrument Validity after Try Out

	Corrected Item-Total Correlation	R Table $\alpha = 0,05 ; n= 25$	Categories
ITEM1	,424	> 0,422	Valid
ITEM2	,424	> 0,422.	Valid
ITEM3	,424	> 0,422.	Valid
ITEM4	,450	> 0,422.	Valid
ITEM5	,550	> 0,422.	Valid
ITEM6	,424	> 0,422	Valid
ITEM7	,459	> 0,422.	Valid
ITEM8	,459	> 0,422.	Valid
ITEM9	,424	> 0,422.	Valid
ITEM10	,550	> 0,422.	Valid
ITEM11	,424	> 0,422	Valid
ITEM12	,520	> 0,422.	Valid
ITEM13	,520	> 0,422.	Valid
ITEM14	,459	> 0,422.	Valid
ITEM15	,274	> 0,422.	Valid
ITEM16	,511	> 0,422	Valid
ITEM17	,459	> 0,422.	Valid
ITEM18	,511	> 0,422.	Valid
ITEM19	,761	> 0,422.	Valid
ITEM20	,454	> 0,422.	Valid

It is apparent and recognized after removed the invalid items, the result of all items' calculation were valid. So, in this research, the item for the test was 20 questions.

### III.7.2 The reliability of Instrument

A reliability is an important characteristic of a good test. In order to calculate the reliability of the test, the mean of the students' scores the standard deviation will be sought. Harmer (2001:322) says that reliability is a test should give consistent results. Brown (2001:386) adds a reliability test is consistent and dependable. Gay (2001: 169) also explains that reliability is the

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degree to which a test consistently measures whatever it is measuring. So, reliability of the test means that if the test is done, the result of the students score would be rather similar although the test is done in two different times. To find out the reliability of the test the following formula is used; the discrimination index of an item indicates the extent to which the item discriminates between the students, separating the more able students from the less able. The following formula is taken from Heaton (1975: 164) as follow :

$$r_{ii} = \frac{N}{N-1} \left( 1 - \frac{m(N-m)}{N(X)^2} \right)$$

$$\text{Where } : M = \frac{\sum x}{N} \text{ and } S^2 = \frac{\sum x^2 - \frac{(\sum x_i)^2}{N}}{N}$$

$r_{ii}$  :Reliability of the test

N :The number of item in the test

M :The mean score of all the test

$S^2$ : The standard deviation of all the test score

**Table III.6 Criteria Coefisien of Reliability**

Coefisien Reliability	Criteria
$0,80 \leq r_{11} \leq 1,00$	Highest reliability
$0,60 \leq r_{11} \leq 0,79$	High reliability
$0,40 \leq r_{11} \leq 0,59$	Middle reliability
$0,20 \leq r_{11} \leq 0,39$	Low reliability
$0,00 \leq r_{11} \leq 0,19$	Lowest reliability

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The result of test reliability can be showed as follow:

**Table III.7 Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,765	,765	20

From the results of calculation by using SPSS, it is obvious that the value of Cronbach's Alpha Based on Standardized Items ( $r_{11}$ ) for test is 0,765. So,  $0,80 \leq 0,765 \leq 1,00$ . It means that the instrument is highest reliability.

### III.8 Data Analysis Technique

To analyze the data about the significant difference before and after of students' vocabulary mastery between those taught by using NHT and STAD to the second grade students of SD Annamiroh 4 Pekanbaru, the data analyzed statistically. The independent sample t-test and paired sample t-test used through using SPSS 20 version (Statistic package for the Social Sciences).

In analyzing the data, the researcher used scores of pre-test and post-test of experimental and control groups. This score was analyzed statistically for both descriptive and inferential statistics. In this research, the researcher used these following formulas:

#### III.8.1 T-test

**T-test is used** to find out the difference between scores of pre-test and post test taken from the experimental group 1 using NHT and the difference

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between scores of pre-test and post-test taken from the experimental group 2 and the difference between the scores of both pre-test and post test of the experimental group 1 and experimental group 2. The formula is presented as follows:

### 1. Independent sample t-test

Parmjit et. Al (2006:160) says that independent sample t-test is used to find the significance of the difference between the means of two samples. Gay (2000:484) adds that the t-test for independent sample is used to determine whether there is a probably significant difference between the means of independent sample t-test and dependent sample t-test is used to find out the result of the first and second hypotheses.

To analyze the final-test scores of the experimental group 1 and experimental group 2, the following formula used:

$$t = \frac{M_X - M_Y}{\sqrt{\frac{(SD_X)^2}{N_1 - 1} + \frac{(SD_Y)^2}{N_2 - 1}}}$$

Where:

t = The value of comparing two means

$M_X$  = Mean of the score in pre-test

$M_Y$  = Mean of the score in post-test

$SD_X$  = Standard deviation of experimental group

$SD_Y$  = Standard deviation of control group

$N_1$  = Number of the sample in pre-test

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$N_2$  = Number of the sample in post-test

1 = the constant number

The t-table has the function to see if there is a significant difference among the mean of the score of both experimental and control group. The t-obtained value is consult with the value of t-table at the degree of freedom ( $df = (N_1+N_2)-2$ ) which is hypothesized

$H_a$ :  $t_o > t\text{-table}$

$H_o$ :  $t_o < t\text{-table}$

$H_a$  is accept if  $t_o > t\text{-table}$  or there is effect after giving the treatment NHT and STAD on students' vocabulary mastery.

$H_o$  is accept if  $t_o < t\text{-table}$  or there is no effect after giving the treatment NHT and STAD on students' vocabulary mastery.

## 2. Paired Sample t-Test

Paired Sample t-Test is known also as Non-independent sample t-test. Gay ( 2000: 488) states that t-test for non independent samples is used to compare groups that are formed by some type of matching or to compare a single group's performance on a pre- and post-test or on two different treatments. In this time, the writer used to find out whether there is significant effect before and after using NHT and STAD toward students' vocabulary mastery by using the pre-test and post-test score of experimental group 1 and experimental group 2. They are as follow:

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$$t = \frac{\bar{D}}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{N}}{N(N-1)}}$$

$D$ : Gain Score ( $D=X_2-X_1$ )

The t-table has the function to see if there is a significant difference among the mean of the score of both pretest and posttest. The t-obtained value is consulted with the value of t-table at the degree of freedom (df) $N-1$  which is statistically hypotheses:

$H_0$ :  $t_o < t\text{-table}$

$H_a$ :  $t_o > t\text{-table}$

$H_0$  is accepted if  $t_o < t\text{-table}$  or there is no significant effect after using NHT and STAD toward students' vocabulary mastery.  $H_a$  is accepted if  $t_o > t\text{-table}$  or there is significant effect after using NHT and STAD towards students' vocabulary mastery. Afterward, it is better to find the effect size of T-test by following formula<sup>1</sup>:

$$\tilde{\eta}^2 = \frac{t^2}{t^2 + n - 1}$$

$$\text{eta squared} = \tilde{\eta}^2 \times 100\%$$

Where:

*eta squared* : Coefficient effect       $\tilde{\eta}^2$  : Coefficient