CHAPTER III
METHOD OF INVESTIGATION

Research method is a way doing something to collect and analyze of data which is improve to get quality knowledge with using a procedure that have well planned and organized. The procedure is designed systematically to get the data. As we know, to get the actual result, research has some requirements. These requirements are needed in order to get the accuracy, truth, and knowledge of data. To understand these requirements of research as mentioned, in this chapter, method of investigation will discuss many things to support in analysis of data. It included research design, research setting, population and sample of research, variables and indicators of research, technique of data collection, and technique of data analysis.

A. Research Design

This research is quantitative in nature, because the result of the students' achievement in pretest and post test expressed in the language of mathematic, evaluated consequently and also interpreted by appropriate statistical procedures. In this term, quantitative data refers to the use of T-test.

Experimental research is an attempt which is conducted by researcher to maintain control over all factors that may affect the result of an experiment. In doing this, the researcher attempted to determine or predict what may occur. An experimental research involved two groups: the experimental group and the control group. The experimental group received a new treatment while the control group received a usual treatment. According to Nunan, experiment is designed to collect data in such a way that threats to the reliability and validity of the research are minimised.[1]

Referring to this research, both experimental and control classes consist of second grade of MTS Darul Ulum Wates Semarang. The

[1] David Nunan, *Research Method in Language Learning*, (Cambridge: Cambridge University Press, 1992), p.47.

experimental class received a new treatment by using animated film while the control class was treated conventionally. This study used pre-test and post-test to measure both classes' changes in the period before and after receiving a treatment.

The design of the experiment could be described as follows:[2]

Pattern:

R_1	O_1	X	O_2
R_2	O_3		O_4

Figure 3.1 Research Design

Where:

R_1 : Experimental class

R_2 : Control class

O_1 : Pre-test for the experimental class

O_2 : Post-test for the experiment class

O_3 : Pre-test for the control class

O_4 : Post-test for the control class

X : Treatment with *Animated film*

Based on the pattern above, the subjects were classified into an experimental class (top line) and a control class (bottom line). Their vocabulary of the subject was first checked by pre-testing them (O1 an O3). The experimental class was taught English verbs with using *Animated film*, this treatment was symbolized as **"X".** Meanwhile, the condition of the control class was taught English verbs without using *Animated film*. The test was held in the written form. Then, the results of post-test (O2 and O4) were computed statistically.

B. Research Setting

1. Subject and Place of the Research

The researcher did this research at MTS Darul Ulum Wates Semarang located at Jl. Raya Anyar Gondoriyo Ngaliyan Semarang. The

[2]Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif and R & D,* (Bandung : Alfabeta Bandung, 2008), p.112

subject of this study was the second grade of MTS Darul Ulum Semarang in the academic year of 2014/2015.

2. Time of the Research

This research was conducted from 4th August to 7th September 2014 on the first semester in the academic year 2014/2015, counted since the proposal submitted until the end of the research.

Table 1
List of Time of Study

No.	Activity	Month/ Week						
		August-September						
		18th	21th	28th	29th	30th	1st	5th
1.	**Try-Out Class**	√						
2.	**Experimental Class**							
	a. Pre-Test		√					
	b. Treatment				√		√	
	c. Post-Test							√
3.	**Control Class**							
	a. Pre-Test		√					
	b. Explaining			√		√		
	c. Post-Test							√

C. Source of Data

1. Population

Population is "the whole subject of research".[3] Population is generally area which consists of object/subject which has certain quality and characteristic which decided by the researcher to study and then collected the summary.[4]

In this case, the subject of the research was the second grade students of MTs Darul Ulum Wates Semarang in the academic year

[3] Suharsimi Arikunto, *Prosedur Penelitian : Suatu Pendekatan Praktik*, (Jakarta: Rineka Cipta, 2010), 14th Ed., p. 173.

[4] Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, (Bandung: CV. Alfabeta, 2009), 8th., p. 80.

2014/2015. Total number of the second grade students of MTs Darul Ulum Wates Semarang was 61 students and they were divided into three classes. There were class VIII A, VIII B, and VIII C. Because of the students' characteristics , the researcher chose class VIII A and VIII B to her research

2. Sample and Sampling Technique

Sample is parts of all subjects which will be researched as a source of information. It represents all of population, and will be taken by using certain method.[5] Sample is used to facilitate the researcher to process the data. According to Arikunto, sample is a part of the subject or population that should be researched.[6]

In this research, the researcher used cluster random sampling toward class of sample, because it is the technique in which all person of population may have the same opportunity to be chosen as the sample. Cluster random technique is also a technique to choose sample by random each class (population) and it is based on lottery. In this case, the researcher took two classes, VIII A and VIII B as the sample. Each class has 21 students. The two classes were given the same material but with different way. VIII A as the experimental class was taught by using animated film and VIII B as control class was taught without using animated film.

D. Variables and Indicators of Research

Variable is a certain attribute, characteristic, value of human, object, or activity that has specific variation which has been determined by the researcher to be observed and concluded.[7]

There are two types of variables based on the term of causation:[8]

---

[5]Koentjaraningrat, *Metode-metode Penelitian Masyarakat,* (Jakarta: PT. Gramedia, 1986), p. 89.

[6] Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*, p.174.

[7] Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D,* p. 38.

[8] Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D,* p. 39.

1. Independent variable (x)

   Sugiyono said that, independent variable can be called *stimulus, predictor,* or *antecedent.* Independent variable is a variable which has influence or cause change or make the existence of dependent variable. So, the independent variable in this research is *the use of Finding Nemo animated film to teach English verbs*.

   The indicators of using animated film to teach vocabularyin this research are:

   a. The teacher explains the objective of learning using animated film.
   b. The teacher ask the students to find some of English verbs from the animated film that presented.
   c. The teacher gives questions about materials of verbs that have explained to check students' understanding.

2. Dependent Variable (y)

   Dependent variable is a variable which is influenced or became effect of the independent variable.[9]According to the definition above, the dependent variable of this study is *teaching English verbs*.

   The indicators of students' English verbs power are:

   a. Students can mention the vocabulary and its meaning, especially English verbs suitable with animated film presented.
   b. Students can use English verbs for expressing their ideas.
   c. Students' English verbs achievement with the minimum standard of score (KKM).

E. Technique Of Data Collection

Instrument has an important role in the research. But in the collect data an instrumen is more important. To get the accurate data, in this study the researcher used two ways to collect the data, they were:

[9] Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, p. 39.

1. Test

Test is a set of question and exercises used to measure the achievement or capability of the individual or group.[10] This method is used to get data about score of the pre-test and post-test given for both of groups. The experimental class and control class. The instrument of the test in this research is objective test (multiple choice), because multiple choice tests are popular way of testing in which teachers will easily score and a design. Moreover, the multiple choice format can be used with isolated words, words in a sentence context, or words in whole text.[11] In multiple choice test of vocabulary, the student was given four choices (a, b, c or d) to freedom chance to think as much as possible. They can freely choose their ideas as a correct answer. The score of students' achievement of vocabulary especially about English verb can be calculated by using this following formula:

$$Score = \frac{The\ number\ of\ \ rigth\ answer}{The\ number\ of\ \ questions}\ x100\,\%$$

Which:

S : Score

R : The number of right answers

T : The number of question

100 : The highest score

2. Documentation

Documentation is one of data collection technique used in the research. Documentation is tool that aims to identify documents or to the field of study devoted and to the study of document.[12] The documentation is one of method that used to help collecting the needed data.

---

[10] Suharsimi Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*, p.193.

[11] Scout Thornbury, *How To Teach Vocabulary*, (England: Longman, 2004), p. 132.

[12]Wikipedia,"Documentation", http://en.wikipediaorg/wiki/documentation, accessed 11 December 2013

The researcher will function the document to know data of the students and teachers in the school and to get the values data of daily test. So, the researcher can get the groups to be experimental class and control class. Using this method, the researcher would get the list of teachers and student's name and the students' vocabulary score. In this study, documentation used to support collecting the data about students' condition reflected on their activity in the class.

F. Technique of Data Analysis

In quantitative research, data analysis is the grouped of data based on variable and kind of respondent. Data analysis also is defined as a process to find and arrange data systematically that acquired by technique data of collection.

In this study, there are three kinds of tests that will be held in experimental research, they are try-out test, pre-requisite test and hypothesis test. So there must be three processes of analyzing the data collected from test.

1. Try-Out Instrument

Try out test analysis is meant to get the validity, reliability, index difficulty and discriminating power. The tryout was given to the students VIII C of MTS Darul Ulum. After finishing the test, the answer sheets were collected in order to be scored. From 30 items test of tryout, some items were chosen as the instrument of the test. The choosing of the instrument had been done by considering: validity, reliability, the degree of test difficulty and discriminating power as follows:

a. Validity

The validity is an important quality of any test. It is a condition in which a test can measure what is supposed to be measured. According to Arikunto, "A test is valid if it measures what it purpose

to be measured".[13] The validity of an item can be known by doing item analysis. It is counted using product – moment correlation formula:

$$r_{xy} = \frac{N\sum xy - \left(\sum x\right)\left(\sum y\right)}{\sqrt{\left\{N\sum x^2 - \left(\sum x\right)^2\right\}\left\{N\sum y^2 - \left(\sum y\right)^2\right\}}}$$

Where:

r_{xy} = the correlation of the scores on two halves of the test
N = the number of students in group
X = the score of each component of test
Y = the total score of correct answers
$\sum X$ = the sum of total X score in each group
$\sum Y$ = the sum of total score from each student in the group
$\sum XY$ = the sum of multiple score from each student with the total score
$\sum X^2$ = the sum of the square score in each component of test
$\sum Y^2$ = the sum square of total score from each student in the group.

Calculation result of r_{xy} is compared with r_{table} of product moment by 5% degree of significance. If r_{xy} is higher than r_{table}, the item of question is valid.[14]

b. Reliability

Reliability means "consistent".[15] It refers to the consistency of test scores. According to Arikunto "A reliable measure in one that provides consistent and stable indication of the characteristic being investigated.[16] Besides having high validity, a good test should have high reliability too. Alpha formula is used to know reliability of test is K - R. 20. [17]

[13]Suharsimi Arikunto, *Dasar –Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007), 7th Ed, p. 65.

[14] Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan*, p. 78.

[15]J.B Heaton, *Writing English Language Tests* (London: Longman, 1975), p. 155.

[16] Suharsimi Arikunto"*Dasar-Dasar Evaluasi Pendidikan*, (Jakarta: Bumi Aksara, 2011) 12th Ed, p.87.

[17] Suharsimi Arikunto"*Dasar-Dasar Evaluasi ...",* p. 100-101

$$r_{11} = \left(\frac{n}{n-1}\right)\left(\frac{S - \sum pq}{S^2}\right)$$

Where:

r_{11} = The reliability coefficient of items.

p = The proportion of students who give the right answer.

q = The proportion of students who give the wrong answer. (q = 1-p)

$\sum pq$ = The total result of multiplication between p and q

n = The number of item in the test.

S^2 = The standard deviation of the test.

It will be conducted to both control and experimental classes to evaluate students' vocabulary before and after the treatment. In this research, the researcher used test, the first, to know the students' learning outcome and to measure and know the improving of students' vocabulary after using puppet in their lesson. In other that, test is used to know that they will answer the test independently. After that, it seems the differences are very significant between before and after treatment.

Calculation result of r_{11} is compared with r_{table} of product moment by 5% degree of significance. If r_{11} is higher than r_{table}, the item of question is reliable.[18]

c. Degree of Test Difficulty

According to Arikunto, good question is not very easy and is not very difficult. The easy question will not stimulate the students to heighten their power in solving problem. Conversely, the difficult question will make the students be give up easily to solve the problem of the question. Because they think that the question is beyond the reach of their brain.

[18] Suharsimi Arikunto, *Dasar-Dasar Evaluasi …*, p. 100.

Item analysis is carried out to find out the effectiveness of the items. It is mean to check whether each item meet the requirement of good test item or not.

To know the item difficulty, the researcher used the formula:[19]

$$P = \frac{B}{JS}$$

Where:

P = index of difficulty.
B = the number of students who answer an item correctly.
JS = the total number of students.

Where the criterion of computation is:

Table 1.1 Criteria of Difficulty Test

P =0,00	Is very difficult
0,00 < P ≤ 0,30	Is difficult
0,30 < P ≤ 0,70	Is medium
0,70 < P ≤ 1,00	Is easy
P = 1,00	Is very easy

d. Discrimination Power

Item of discrimination power tells how well the item performs in separating the better students from the poorer ones. If the good students tend to do well on an item and the poor students do badly on the same item, then the item is a good one because it distinguishes the good students from the bad students. To calculate the index of discriminating power, the researcher used the formula: [20]

$$D = \frac{B_A}{J_A} - \frac{B_B}{J_B} = P_A - P_B$$

Where:

J_A = Number of all students in the upper group
J_B = Number of all students in the lower group

[19] Suharsimi Arikunto, *Dasar-Dasar Evaluasi* ..., p. 208.

[20] Suharsimi Arikunto, *Dasar-Dasar Evaluasi* ..., p. 213-214.

B_A = Number of students in the upper group who answered the item correctly

B_B = Number of students in the lower group who answered the item correctly

P_A = The proportion of the upper group who answered the item correctly

P_B = The proportion of the upper group who answered the item correctly

The criteria of discrimination index are classified into four levels as follows:

Table 1.2 Criteria of Discrimination Index

Criteria	
D≤0,00	Very Poor
0,00<D<0,20	Poor
0,20<D<0,40	Enough
0,40 D 0,70	Good
0,70<D ≤ 1,00	Excellent

2. Pre-Requisite Test

Before the researcher had determined the statistical analysis technique used, she examined the normality and homogeneity test of the data. To get the normality and homogeneity, the researcher used *pre test* score.

Pre-test was given before the treatments. The researcher determined the statically analysis technique whether both classes had normal distribution. If the data have normal and homogenous distribution, the treatment and teaching can be conducted to both classes.

a. 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 normality test with Chi-square is done to find out the distribution of data. Step by step Chi-square test is as follows:

1) Determine the range (R); the largest data reduced the smallest.
2) Determine the many class interval (K) with formula:

K = 1+ (3, 3) log n

3) Determine the length of the class, using the formula:

$$P = \frac{range}{number\ of\ class}$$

4) Make a frequency distribution table

5) Determines the class boundaries (bc) of each class interval

6) Calculating the average Xi ($\overline{X}$), with the formula:

$$\overline{X} = \frac{\sum f_i x_i}{\sum f_i}$$

7) Calculate variants, with the formula:

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

8) Calculate the value of Z, with the formula:

$$Z = \frac{x - \bar{x}}{s}$$

x = limit class

$\bar{x}$ = Average

S = Standard deviation

9) Define the wide area of each interval

10) Calculate the frequency expository (Ei), with formula:

Ei = n x wide area with the n number of sample

11) Make a list of the frequency of observation (Oi), with the frequency expository as follows:

Class	Bc	Z	P	L	Ei	Oi	$\frac{Oi - Ei}{Ei}$

12) Calculate the chi-square (X^2), with the formula:

$$X^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i}$$

13) Determine dk = k-3, where k is the number of class intervals and α = 5%

14) Determining the value of X^2 table

15) Determining the distribution normality with test criteria: If $X^2_{count} > X^2_{table}$ so the data is not normal distribution and the other way if the $X^2_{count} < X^2_{table}$ so the data is normal distribution.[21]

b. Homogeneity test

It was meant to get the assumption that sample of research came from a same condition or homogenous. It is used to know whether experimental class and control class, that are taken from population have same variant or not. The hyphothesis used in the homogenity test are:

H_0 : $\sigma_1^2 = \sigma_2^2$

H_1 : $\sigma_1^2 \neq \sigma_2^2$

H_0 = the distribution of normal data

H_1 = abnormal distributed data

Where:

σ_1 = Variance value of beginning data with animated film.

σ_2 = Variance value of beginning data is subjected to conventional learning classes.

$$F_{count} = \frac{\text{BiggestVariance}}{\text{SmallestVariance}}$$

$F_{table} = F_{[1/2\ \alpha\ (v1.v2)]}$

F_{count} = F distribution

Where:

S_1^2 : Variant of experimental class

S_2^2 : Variant ofcontrol class

n_1 : The number of students in experimental class

[21] Sudjana., *Metode Statistika*, (Bandung: Tarsito, 2001), 6th Ed, p. 272

v_2 : The number of students in contol class

v_1 : Degrees of freedom of the biggest variance

v_2 : Degrees of freedom of the smallest variance

The steps as follows:

1) Calculate variants both classes (experimental and control classes), with the formula:

$$S_1^2 = \frac{\sum (x - \bar{x})^2}{n_1 - 1} \text{ And } S_2^2 = \frac{\sum (x - \bar{x})^2}{n_2 - 1}$$

2) Determine $F = \frac{Vb}{Vk}$

Where:

Vb : Bigger Variant

Vk : Smaller Variant

Determine dk = $(n_1 - 1) : (n_2 - 1)$

3) Determine F_{table} with $\alpha = 5\%$

4) Determining the distribution homogeneity with test

Testing criteria:

H_0 accepted if $F_{count} < F_{[1/2\ \alpha\ (v1.v2)]}$ with $\alpha = 5\%$

If $F_{count} > F_{table}$, the data is not homogeneous and the other way if the $F_{count} < F_{table}$, the data is homogeneous.[22]

c. Test of the Average

It is used to examine average whether experiment group and control group have been decided having different average. [23] To analyze the data of this research is used t-test. A t-test would be the

[22] Sugiyono, Statistika *Untuk Penelitian*, (Bandung: Alfabeta, 2007), p. 140.

[23]Anas Sudijono, *Pengantar Statistik Pendidikan* (Jakarta: PT. Raja Grafindo Persada, 1995) 6th Ed., p. 326-327.

measure you would use to compare the mean scores of the two groups.[24]

The t-test is represented with the symbol. It is very useful measurement because it can be used with very large or very small groups. The adjustment for group size is made by using atable that shows different values for various group size.[25]

If $\sigma_1^2 = \sigma_2^2$ (has same variant), the formula is:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

With

$$S = \sqrt{\frac{(n_1-1)S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}}$$

Where:

$\overline{X}_1$ = The mean score of the experimental class

$\overline{X}_2$ = The mean of the control class

n_1 = The number of experimental class

n_2 = The number of control class

S_1^2 = The standard deviation of experimental class

S_2^2 = The standard deviation of both class

If = $\sigma_1^2 \neq \sigma_2^2$ (has no same variant) the formula is:

$$t = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

The hypotheses are:

Ho = $\mu_1 = \mu_2$

Ha = $\mu_1 \neq \mu_2$

---

[24]H. Douglas Brown, *Language Assessment: Principles and Classroom Practices,* (San Fransisco: Longman, 2004), p. 205.

[25] Rodgers and Brown, *Doing Second Language Research*, (Cambridge : Oxford University Press 2002), p. 205

μ_1 = average data of experiment class

μ_2 = average data of control class

Criteria test is: If $t_{count} > t_{table}$ so Ho is rejected and there is no difference of average value from both of groups. Moreover, the other way if the $t_{count} < t_{table}$ so Ho is accepted and there is significant difference of average value from both of groups.[26]

3. Post-Test

Post-test was held after all treatments had been conducted. This test was used to measure students' achievement after the experimental and the control classes were given treatments and explanations. The result of test was analyzed statistically. There are types of post-test, as follow:

a. Normality Test

First step is the same as the normality test on the initial data.

b. Homogeneity Test

Second step is the same as the homogeneity test on the initial data.

c. Test Average (Right-hand Test)

This test proposed that hypothesis test in average similarity with the right test as the steps right-hand test the initial data is as follow:

Ho = $\mu_1 \leq \mu_2$

Ha = $\mu_1 > \mu_2$

If = $\sigma_1^2 = \sigma_2^2$ (has same variant) the formula is:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

With

$$S = \sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}}$$

Where:

[26]Anas Sudijono, *Pengantar Statistik Pendidikan* ,.... p.272-273.

$\overline{X}_1$ = The mean score of the experimental class

$\overline{X}_2$ = The mean of the control class

n_1 = The number of experimental class

n_2 = The number of control class

S_1^2 = The standard deviation of experimental class

S_2^2 = The standard deviation of both class

If = $\sigma_1^2 \neq \sigma_2^2$ (has no same variant) the formula is:

$$t^1 = \frac{X_1 - X_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

testing criteria that apply H_0 is accepted if $t_{count} < t_{table}$ with determine dk = (n1 + n2 - 2) and α = 5% with opportunities (1 - α). Values for other t H_0 rejected.[27]

[27] Sudjana, *Metode Statistika...*, p.239