

CHAPTER III

METHOD OF INVESTIGATION

This chapter discusses about sources of data, research design, research setting, population and sample of research, variables and indicators of research, methods of data collection, and methods of data analysis.

A. Type and Approach of the Research

Brain gym method is a series of enjoyable movements. This skill is related to organization, feeling and expressing one's emotions, a sense of personal space, and responding rationally¹. So, in this research the researcher used psychological approach. Psychology is an academic and applied discipline that involves the scientific study of mental functions and behaviors.²

One of the methodologies of psychological approach is experimental research. Experimental psychological research is conducted in a laboratory under controlled conditions. This method of research relies on the application of the scientific method to understand behavior.³ With this design, the subject of the research is divided into two groups. The first is experiment group and the second is control group. To know if the experiment group and control group have same level, pre- test is conducted. Treatment has been given to the experiment group. At the end of meeting posttest administered to both experiment group and control group to know the difference English achievement of two groups. The role of the researcher was additional teacher to practice Brain Gym method.

¹ Wagner Mary Jo, "Three Brain Gym Movements to Help You Lower Stress, Calm Down, and Learn Anything Easily",.

² <http://id.wikipedia.org/wiki/psychology>, (accessed on 12/09/2014)

³ <http://id.wikipedia.org/wiki/psychology>, (accessed on 12/09/2014)

The design of the experiment could be described as follows: ⁴

Pattern:

E	0₁	X	0₂
C	0₃	Y	0₄

Figure 3.1 Research Design

Where:

E = experimental group

C = control group

0₁ = pre-test for experimental group

0₂ = post test for experimental group

0₃ = pre-test for control group

0₄ = post test for control group

X = treatment using *Brain gym method*

Y = treatment without using *Brain gym method*

Based on the above pattern, the subjects of research were classified into an experimental group (top line) and a control group (bottom line). The quality of subjects was first checked by pre-testing them (0₁ and 0₃). Then, the experimental treatment (taught by using *brain gym method*) was applied to the experimental group. This treatment was symbolized as “X”. While, the control group was taught without using *brain gym method*. This treatment was symbolized as “Y”. The test was held in the form of spoken. Then, the results of post-test (0₂ and 0₄) were computed statistically.

B. Research Setting

1. Subject and Place of the Research

This study was conducted at SMP N 1 Dawe located at jl. Colo-Muria, Lau, Dawe, Kudus. The subject of this study is the students of seventh grade of SMP N 1 Dawe in the academic year of 2014/2015.

⁴ Suharsimi Arikunto, *Prosedur Penelitian ...*, p. 86.

2. Time of the Research

This research was conducted from September 24th to October 30th 2014 on the first semester in the academic year 2014/2015, counted since the proposal is submitted until the end of the research.

Table 1
List of Time of Study

No.	Activity	Month/ Week			
		September-October			
		1 st	2 nd	3 rd	4 th
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. Population and Sample of Research

1. Population

According to Sukardi, population is all members of well defined class of people, events and objects. Population can be divided into two kinds, target of population and access of population. Target of population is population that has been planned in the research planning. And access of population is population that can be accessed when the researcher determines the number of population.⁵

The population of this research is all students of 7th grade of SMP N 1 Dawe in the Academic Year 2014/2015 which consist of 131 students in five classes with twenty four to thirty students in each class.

⁵ Sukardi, *Metodologi Penelitian Pendidikan*, (Yogyakarta: Bumi Aksara ,2010), p.53-54

2. Sample and Sampling Technique

Sample means apart of population that will be observed, whose characteristic can represent and describe the real population.⁶ Sample was done by taking the subject/sample which is not based on strata, random, or area but it is based on the consideration of a certain purpose.

Some reasons for using *sample*:

- a. The large amount of population.
- b. The observation that done for all unit of population may damage.
- c. Saving time, money, power.
- d. Be able to give the comprehensive output.

In this research, the researcher uses cluster random sampling in choosing the sample, because it is one of the techniques that all individual of population may have the same opportunity and have been chosen as the sample.⁷ The researcher took two classes, VII A and VII C as the sample. VII A has 24 students and VII C has 26 students. The two classes have been given the same material but with different way. VII A as the experimental class has been taught by using brain gym method and VII C as controlled class has been taught without using brain gym method.

D. Variables and Indicators of Research

Every research requires variable since it roles is the fundamental elements to support the study. The existences of variable determine the outcome of the research itself. In quantitative research, where variable are central and knowing the right variable ought to be based on its appropriate definition. As variable refers to Suharsimi Arikunto, it simply means the object in which the research is focused.⁸

According to Sugiyono, research variable is an attribute, characteristic, and value of person, object, or the variation of activity which has been

⁶ Sugiharto, *Teknik Sampling*, (Jakarta: Gramedia Pustaka Utama, 2003), 2nd Ed, p. 2

⁷ Sukardi, *Metodologi Penelitian Pendidikan*, p.58

⁸ Suharsimi Arikunto, *Prosedur Penelitian ...*, p. 118.

determined by researcher to observe and take the conclusion. There are two types of variables based on the term of causation:⁹

1. Independent Variable (X)

Sugiyono said that, independent variable can be called *stimulus*, *predictor*, or *antecedent*. Independent variable is variable which has the influence or the cause of change or make the existence of dependent variable. So, the independent variable in this research is the use of *brain gym method in teaching learning process*, and the movements as treatments that will be used for experimental group are:

- a. Positive points movement
- b. The thinking cap movement
- c. The elephant movement
- d. Neck rolls movement
- e. Belly breathing movement
- f. The energizer movement
- g. The owl movement
- h. Arm activation movement
- i. The footlex movement

2. Dependent Variable (Y)

Dependent variable is variable which is influenced or became effect of the independent variable.¹⁰ Dependent variable in this study is students' speaking skill. The researcher can measure it based on students' score from the test, and the indicators are:

- a. Students' pronunciation
- b. Students' grammar
- c. Students' fluency
- d. Students' vocabulary
- e. Students' comprehension

⁹ Sugiyono, *Metode Penelitian*,p.61

¹⁰ Sugiyono, *Metode Penelitian*,p.61

E. Methods of Data Collection

Method of data collections is very important in a research. According to Arikunto data source in a research is basically source of which a researcher gets data, depends on the necessity and kind of information which is needed.¹¹ In this research, data of this study was collected through test to collect the data.

“Test is an instrument to collect the data that gives response about the question in the instrument, and the students have to show their ability”.¹² In another word, test means a question which is used to measure competence, knowledge, intelligence, and ability of talent which is possessed by individual or group to collect data.¹³

The researcher gathered the data by analyzing the test. The researcher gave the test twice (pre-test and post-test) in both experimental and controlled class. The researcher gave a test that consists of oral test.

1. Pre test

Before the teacher explains material by using brain gym method, the teacher gave pre-test to experimental and controlled class in same way. It has been given before the experiment was run.

2. Post test

Post-test has been given to the experimental class and the controlled class. The test has been given in order to know students' understanding and score on speaking after they are taught using brain gym method (experiment class) and without using brain gym method (controlled class).

F. Methods of Data Analysis

The data analysis method which used in this research is quantitative analysis. Quantitative is concerned with the amount of number.

¹¹Suharsimi Arikunto, *Prosedur Penelitian: Suatu Pendekatan Praktek*, p. 149.

¹²Purwanto, *Evaluasi Hasil Belajar*, (Yogyakarta: Pustaka Belajar, 2009), p. 65.

¹³M. Chabib Thoha, *Teknik Evaluasi Pendidikan* (Jakarta: PT Raja Grafindo Persada, 2001), p. 43.

1. Try-Out Test

Try out test analysis is meant to get the validity, reliability, index difficulty and discriminating power. The tryout was given to VIII D of the students of MTS SMP N 1 Dawe. From 15 questions of tryout test, some questions 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”.¹⁴ The validity of an item can be known by doing item analysis. It is counted using product – moment correlation formula:

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

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.

¹⁴Suharsimi Arikunto, *op cit*, p. 65.

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.¹⁵

b. Reliability

Reliability means “consistent”.¹⁶ It refers to the consistency of test scores. 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

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

Where:

r_{11} : The reliability coefficient of items

n : The number of item in the test

P : The proportion of students who give the right answer

q : The proportion of students who give the wrong answer

S^2 : The standard deviation of the test

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. Index of 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 solve problem. Conversely, the difficult question will make the students be giving easily up and have not spirit

¹⁵ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 78.

¹⁶J.B Heaton, *Writing English Language Tests* (London: Longman, 1975), p. 155.

¹⁷Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, (Bandung: Alfa Beta, 2008), p. 132.

¹⁸ Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 100.

try to solve that problem on the question. Because they think that the question is beyond the reach of their brain.¹⁹

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 writer used the formula:

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

Where:

P = index of difficulty

B = the number of students who answer an item correctly

JS = the total number of students

The index of difficulty level can be classified as follows:²⁰

0.0 $P \leq 0.30$ is difficult

0.30 $P \leq 0.70$ is medium

0.70 $P \leq 1.00$ is easy

d. **Discrimination Power**

Item of discrimination power tells how well the item performs in separating the better students from the poorer students. 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 writer will use the formula:²¹

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

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

²⁰ Suharsimi Arikunto, *Dasar-Dasar Evaluasi ...*, p. 210.

²¹ Suharsimi Arikunto, *Dasar-Dasar Evaluasi ...*, p. 213.

Where:

J_A = Number of all students in the upper group

J_B = Number of all students in the lower group

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 lower group who answered the item correctly

The criteria of determining the index of discriminating are below:²²

$D = 0.00 - 0.20$: Poor

$D = 0.21 - 0.40$: Satisfactory

$D = 0.41 - 0.70$: Good

$D = 0.71 - 1.00$: Excellent

2. Hypothesis Test

a. Pre-requisite test

Before the writer determines 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 determines the statically analysis technique whether both groups have normal distribution. If the data have normal and homogeny 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

²² Suharsimi Arikunto, *Dasar-Dasar Evaluasi ...*, p. 218.

normality test with Chi-square is done to find out the distribution 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:

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

- 4) Make a frequency distribution table
- 5) Determines the class boundaries (bc) of each class interval
- 6) Calculating the average Xi (\bar{X}), with the formula:

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

- 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	$\frac{O_i - E_i}{E_i}$

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 $\alpha = 5\%$

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.²³

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 experiment class and control class, that are taken from population have same variant or not.

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 Varian

Vk : Smaller Varian

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

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

4) Determining the distribution homogeneity with test criteria:

²³ Sudjana., *Metode Statistika* (Bandung: Tarsito, 2001), 6thp. 272.

If $F_{count} > F_{table}$, the data is not homogeneous and the other way if the $F_{count} < F_{table}$, the data is homogeneous.²⁴

c. Test of the Average

It is used to examine average whether experiment group and control group have been decided having different average.²⁵

F-test is used to analyze the data of this research. An F-test would be the measure you would use to compare the mean scores of the two groups.²⁶

ANOVA

Score			
	Sum of Squares	Df	Mean Square
Between Groups	$JK_k = \sum \frac{(\sum x_k)^2}{n_k} - \frac{(\sum x_T)^2}{N}$	$db_{k=k-1}$	$MK_k = \frac{JK_k}{db_k}$
Within Groups	$JK_d = JK_T - JK_k$	$db_d = N - K$	$MK_d = \frac{JK_d}{db_d}$
Total	$JK_T = \sum X_T^2 - \frac{(\sum x_T)^2}{N}$	$db_t = N - 1$	

n_k = sum of subjects in the group

k = sum of groups

N = sum of all subjects

$$F_o = \frac{MK_k}{MK_d} \text{ with } db_F = db_d$$

The hypotheses are:

$$H_o = \mu_1 = \mu_2$$

²⁴ Sugiyono, *Statistika Untuk Penelitian*, (Bandung: Alfabeta, 2007), p. 140.

²⁵ Anas Sudijono, *Pengantar Statistik Pendidikan* (Jakarta: PT. Raja Grafindo Persada, 1995) 6th Ed., p. 326-327.

²⁶ H. Douglas Brown, *Language Assessment: Principles and Classroom Practices*, (San Fransisco: Longman, 2004), p. 205.

$$H_a = \mu_1 \neq \mu_2$$

μ_1 : average data of experimental group

μ_2 : average data of control group

If $f_{count} > f_{table}$ so H_0 is rejected and there is significant difference of average value from both of groups. Moreover, the other way if the $f_{count} > f_{table}$ so H_0 is accepted and there is no difference of average value from both of groups.²⁷

b. Post-Test

Post-test was held after all treatments were conducted. This test was used to measure students' achievement after experimental and 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

Steps normality second step is the same as the normality test on the initial data.

b. Homogeneity Test

Steps homogeneity 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 f-test.

²⁷Anas Sudijono, *Pengantar Statistik Pendidikan* (Jakarta: PT. Raja Grafindo Persada, 1995) 6th Ed., p.272-273.