CHAPTER III
RESEARCH METHOD

A. Design of the Study

In this researches the writer used true experimental design. The trus experimental is kinds of good experiment because there any experiment and controll class.

The Design of true experimental

E O1 X O2

K O3 X O4

E = Experiment group

K = Controll group

B. Setting and time

The writer did research at SMPN 23 Semarang in the second semester of the academic year of 2009/2010. He conducted this research from 26th of April 2010 to 11st of Mei 2010.

Table 1

List of time of the study

Number	Activity	Month/Date					
		26th	27th	28th	4th	5th	11st
1.	Try out	-					
2.	Pre test		-				
3.	Treatment 1			-			
4.	Treatment 2				-		
5.	Treatment 3					-	
6.	Post test						-

C. Variable of the Research

Variable is the object of research or something that becomes the concern of research.[1] In this study there are two variables. They are Independent Variable (x) and Dependent Variable (y).

1. Independent Variable (x)

   Independent variable is variable that influences or those to cause of change or emergence the dependent variable.[2]

   Independent variable in this research is the use of *think pair share* in teaching quantifier.

2. Dependent Variable (y)

   Dependent variable is variable that was affected or that be the result because of the existence of the independent variable.[3] Dependent variable in this study is the students' score of grammar test on quantifiers.

D. Research Method

In this research, the writer conducted an experimental study. An experimental is "defined as a situation in which one observes the relationship between two variables by deliberately producing a change in one and looking to see whether this alteration produces a change in the other (Anderson 1969)".[4] In other words, experiment is the way to find the causal relationship between two factors which are raised by the researcher in purpose by reducing or eliminating any distracting factors.

The subjects of this research were divided into two groups: experimental class which was taught using think pair share and control class which was taught without using think pair share.

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[1] Suharsimi Arikunto, *Prosedur Penelitian: Suatu Pendekatan Praktik*, (Jakarta: PT Rineka Cipta, 2006), 13th Ed., p. 118.

[2] Mohammad Ali, *Strategi Penelitian Pendidikan*, (Bandung: Angkasa, 1993), 10th Ed, p. 26

[3] *Ibid*, p. 27

[4] Rodgers and Brown, *Doing Second Language Research,* (Cambridge: Oxford Press 2002), p. 211.

In this study, the approach used by writer was quantitative approach. It is quantitative because the data that was gained were numeric and was analyzed by using statistical computation. Quantitative approach stressed the analysis to the numerical data that is processed by statistical method.[5] It will explain the result of pre - test and post – test.

E. Population and Sample

1. Population

Population is "the whole subject of research".[6] Population of this research is the second year students of SMPN 23 Semarang in the academic year 2009/2010. The second year Students of SMPN 23 Semarang is divided into two classes. There are class VIII D and VIII E. There are 30 students in each class. The total number of the population is 60 students.

Table 2

List of population

Class	Male	Female	Total
VIII D	13	17	30
VIII E	14	16	30
Total			60

2. Sample

Sample is taking of a part population using certain procedure. So, that can be expected to represent its population. In this connection, Arikunto states that sample is "a part of research population"[7] The writer took sample in this research because the respondents are more than 100. The respondents are less than 100, it is better to take them all as sample.[8]

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[5] M. Burhan Bungin, *Metodologi Penelitian Kuantitatif : Komunikasi, Ekonomi dan Kebijakan Publik Serta Ilmu-Ilmu Social Lainnya* (Jakarta: Kencana, 2006), p. 50.

[6] Suharsimi Arikunto, *op.cit,* p. 130.

[7] Sutrisno Hadi, *Statistik* (Yogyakarta: Andi, 2004) 2 *nd* Vol, 2 *nd* Ed, p. 182.

[8] Suharsimi Arikunto, *op cit*, p. 134.

Sample in this research is class VIII D is as experimental class; VIII E is as control class.

F. Technique of Data Collection

Instruments that are used to collect the date as follows:

1. Test

Test is a question which is used to measure competence, knowledge, intelligence, and ability of talent which is possessed by individual or group to collect data.[9] In this research, the test was given to tryout class, control class and experimental class.

The instrument of the test in this research is objective test. Objective test is frequently criticized on the grounds that they are simpler to answer than subjective test. Objective tests are divided into transformation, completion, combination, addition, rearrangement, matching, correct and incorrect (true/false) and multiple choice.[10] The writer used multiple choice forms and matching items form. The choice of the test type is based on the consideration that multiple choice test are**:**

a. The technique of scoring is easy.
b. It was easy to compute and determine the reliability of the test.
c. It was more practical for the students to answer

In this research, the writer used pre test and post test, they are:

a. Pre-test

Before the teacher taught new material by *think pair share*, the teacher gave grammar test to the students. Pre-test was given to the experimental and control classes in same way. This test was given before the experiment was run.

b. Post-test

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

[10] J.B Heaton, *Writing English Language Tests* (London: Longman, 1975), p. 12-13.

Post-test was given to the experiment class and control class. It was given in order to know the score of students' achievement after they were taught *think pair shrae* (experimental class) and without *think pair shrae* (control class).

The score of students' achievement can be calculated by using this following formula:[11]

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

G. Technique of Data Analysis

1. Try-out instrument of the test

The writer prepared 25 items as the instrument of the test. Before the items were given to the students, the writer gave tryout test to analyze validity, reliability, difficulty level and also the discrimination power of each item. The tryout test was given to VIII F of the students of SMPN 23 Semarang. After finishing the test, the answer sheets were collected in order to be scored. An analysis was made based on the result of test by using the formula of validity, reliability, the degree of test difficulty and discriminating power.

From 25 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.

a. The 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 its purpose to be measured.[12]

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[11] Suharsimi arikunto, *op, cit*., p. 235.
[12] Suharsimi Arikunto, *op cit*, p. 65.

Does measurement show the validity of instrument? The validity of an item can be known by doing item analysis. It is counted using product – moment correlation formula:

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

r_{xy} : The correlation coefficient between X variable and Y variable

N : The number of students

X : The number of each item score

Y : The number of total score

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.[13]

b. Reliability

It means "consistent".[14] Reliability 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.

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

Where:

r_{11} : The reliability coefficient of items

k : 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

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

[14] J.B. Heaton, *op cit,* p. 155.

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.[15]

c. Degree of Test Difficulty

A good question is a question that is not really difficult and not really easy. Formula for degree of test difficulty is.

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

Where:

P : The difficulty's index

B : The number of students who has right answer

JS : The number of students[16]

The criteria are:

P = $0{,}00 \leq p \leq 0{,}30$ Difficult question

P= $0{,}30 \leq p \leq 0{,}70$ Sufficient

P= $0{,}70 \leq p \leq 1{,}00$ Easy.

d. Discriminating Power

It is used to know how accurate the question differs higher subject and lower subject. The formula for discriminating power is Split Half:

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

Where:

D : The degree of question distinctive

J_A : The number of participant the upper group

J_B : The number of participant in the lower group

[15] Suharsimi Arikunto, *op cit*., p. 100.
[16] *Ibid*, p. 207-208.

B_A : The number of participants in the upper group who answered the item correctly

B_B : The number of participants in the lower group who answered the item correctly

PA : The proportion of participants in upper group that answered true

PB : The proportion of participants in lower group that answered true.[17]

The criteria are:

$0{,}00 \leq p \leq 0{,}20$ Less

$0{,}20 \leq p \leq 0{,}40$ Enough

$0{,}40 \leq p \leq 0{,}70$ Good

$0{,}70 \leq p \leq 1{,}00$ Excellent

2. The Data Analysis of Try-out Finding

This discussion covers validity, reliability, level of difficulty and discriminating power.

1) Validity of Instrument

As mentioned in chapter III, validity refers to the precise measurement of the test. In this study, item validity is used to know the index validity of the test. To know the validity of instrument, the writer used the Pearson product moment formula to analyze each item.

It is obtained that from 25 test items; there are 21 test items which are valid and 4 test items which are invalid. They are on number 10,12,16,24. They are to invalid with the reason the computation result of their r_{xy} value (the correlation of score each item) is lower than their r_{table} value.

The following is the example of item validity computation for item number 1 and for the other items would use the same formula.

[17] *Ibid*., p. 213.

N = 36 $\sum Y = 545$

$\sum XY = 438$ $\sum X^2 = 26$

$\sum X = 26$ $\sum Y^2 = 9397$

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

$$r_{xy} = \frac{36(438) - 26(545)}{\sqrt{\left\{36(26) - (26)^2\right\}\left\{36(9397) - (545)^2\right\}}}$$

$$r_{xy} = \frac{15768 - 14170}{\sqrt{(936 - 676)(338292 - 297025)}}$$

$$r_{xy} = \frac{1598}{\sqrt{(268)(41267)}}$$

$$r_{xy} = \frac{1598}{3325{,}59}$$

$$r_{xy} = 0{,}480$$

From the computation above, the result of computing validity of the item number 1 is 0,480. After that, the writer consulted the result to the table of r Product Moment with the number of subject (N) = 36 and significance level 5% it is 0,329. Since the result of the computation is higher than r in table, the index of validity of the item number 1 is considered to be valid. The list of the validity of each item can be seen in appendix 6.

2) Reliability of Instrument

A good test must be valid and reliable. Besides the index of validity, the writer calculated the reliability of the test using Kuder-Richardson formula 20(K-R 20).

Before computing the reliability, the writer had to compute Varian (S^2) with the formula below:

N = 25 $\sum Y = 545$

$\sum Y^2 = 9397 \quad \sum pq = 5{,}2029$

$$S^2 = \frac{\sum y^2 - \frac{(\sum y)^2}{N}}{N}$$

$$S^2 = \frac{9397 - \frac{(545)^2}{25}}{25}$$

$$S^2 = \frac{9397 - 11881}{25}$$

$$S^2 = \frac{-24846}{25}$$

$S^2 = -99.360$

The computation of the Varian (S^2) is -99,360. After finding the Varian (S^2) the writer computed the reliability of the test as follows:

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

$$r_{11} = \left(\frac{25}{25-1}\right)\left(\frac{-99.360 - 5.203}{-99.360}\right)$$

$r_{11} = 1.096$

From the computation above, it is found out that r_{11} (the total of reliability test) is 1,096 whereas the number of subjects is 25 and the critical value for r-table with significance level 5% is 0,361. Thus, the value resulted from the computation is higher than its critical value. It could be concluded that the instrument used in this research is reliable. The list of the reliable of each item can be seen in appendix 6.

3) The level of Difficulty

The following is the computation of the level difficulty for item number 1 and for the other items would use the same formula.

B=15+11=26

JS= 36

$$P = \frac{B}{JS} \qquad P = \frac{26}{36}$$

$$P = 0{,}72$$

It is proper to say that the index difficulty of the item number 1 above can be said as the easy category, because the calculation result of the item number 1 is in the interval $0{,}72 \leq p \leq 1{,}00$.

After computing 25 items of the try-out test, there are 8 items are considered to be easy, 15 items are enough, 1 items are difficult. The whole computation result of difficulty level can be seen in appendix 6.

4) The Discriminating Power

The discrimination power of an item indicated the extent to which the item discriminated between the tastes, separating the more able tastes from the less able. The index of discriminating power told us whether those students who performed well on the whole test tended to do well or badly on each item in the test. To do this analysis, the number of try-out subjects was divided into two groups, upper and lower groups.

The following is the computation of the discriminating power for item number 1, and for other items would use the same formula.

BA= 15 BB = 11

JA = 168 JB = 18

$$\text{D} = \frac{BA}{JA} - \frac{BB}{JB}$$

$$D = \frac{15}{18} - \frac{11}{18}$$

D = 0, 22

According to the criteria, the item number 1 above is enough category, because the calculation result of the item number 1 is in the interval $0,22 \leq D \leq 0,40$.

After computing 25 items of try –out test, there are 2 item is considered to be good, 9 items are good, 11 items are enough, 4 items are poor and 2 items are very poor. The result of the discriminating power of each item could be seen appendix 6.

Based on the analysis of validity, reliability, difficulty level, and discriminating power, finally 20 items are accepted. They are number 1 2 3 4 5 6 7 8 9 11 13 14 15 17 18 19 20 21 22 23.

3. Pre-request Test

Before the writer determines the statistical analysis technique used, He examined the normality and homogeneity test of the data.

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 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	$\frac{Oi - Ei}{Ei}$

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 $X^2_{count} > X^2_{table}$, the data is not normal distribution and the other way if the $X^2_{count} < X^2_{table}$, the data is normal distribution. [18]

b. Homogeneity Test

It is used to know whether experiment class and control class, that are taken from population have same variant or not. According to Nunan, a test should be given to both classes of students before the experiment just to make sure that the both classes really are the same.[19]

The steps are follows:

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

$$S^2 = \frac{\sum (n_i - 1) Si^2}{\sum (n_i - 1)}$$

2) Calculate B with the formula

B = (Log S^2) S (n_i -1)

3) Determine X^2_{count} = (Ln 10) { B - S(ni-1) log Si^2 }

Determine dk = (K-1)

4) Determine X^2_{table} with α = 5%

5) Determining the distribution homogeneity with test criteria:

If $X^2_{count} > X^2_{table}$, the data is not homogeneous and the other way if the $X^2_{count} < X^2_{table}$, the data is homogeneous.[20]

c. Test of the Average

It is used to examine average whether experiment group and control group have been decided having different average. [21]

T-test is used to analyze the data of this research. A t-test would measured comparison the mean scores of the two groups.[22]

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[18] Sudjana, *Metode Statistika*, (Bandung: Tarsito, 1996), p. 273.

[19] David Nunan, *Research Method in Language Learning* (Cambridge: University Press, 1992) p. 27.

[20] Sudjana, *op cit*, p. 263.

[21] Anas Sudijono, *Pengantar Statistik Pendidikan* (Jakarta: PT. Raja Grafindo Persada, 1995) 6th Ed, p. 264.

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 group

$\overline{X}_2$: The mean of the control group

n_1 : The number of experiment group

n_2 : The number of control group

S_1^2 : The standard deviation of experiment group

S_2^2 : The standard deviation of both groups

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

$$t^1 = \frac{\overline{X} - \overline{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_1^2}{n_2}}}$$

The hypotheses are:

Ho = $\mu_1 = \mu_2$

Ha = $\mu_1 \neq \mu_2$

μ_1 : average data of experiment group

μ_2 : average data of control group

[22] Rodgers and Brown, *op cit,* p. 205.

Criteria test is: Ho is accepted if $-t_{\left(1-\frac{1}{2}\alpha\right)} < t < t_{\left(1-\frac{1}{2}\alpha\right)}$, where $t_{\left(1-\frac{1}{2}\alpha\right)}$ obtained from the distribution list t with $dk = (n_1 + n_2 - 2)$ and opportunities $\left(1-\frac{1}{2}\alpha\right)$. Values for other t Ho rejected.[23]

4. Analysis Phase End

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)

Proposed hypothesis test in average similarity with the right test is as follows:

Ho = $\mu_1 = \mu_2$

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:

$\overline{X}_1$: The mean score of the experimental group

$\overline{X}_2$: The mean of the control group

n_1 : The number of experiment group

[23] Sudjana., *op.cit* p. 239.

n_2 : The number of control group

S_1^2 : The standard deviation of experiment group

S_2^2 : The standard deviation of both groups

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

$$t^1 = \frac{\overline{X} - \overline{X_2}}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_1^2}{n_2}}}$$

Testing criteria that apply Ho is accepted if $t_{count} > t_{table}$ with determine dk = ($n_1 + n_2$ - 2) and α = 5% with opportunities (1 - α) Values for other t Ho rejected.[24]

[24] Sudjana, *op cit*, p. 243.