CHAPTER III
METHOD OF INVESTIGSTION

A. Design of the Study

This research was conducted as 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).[1] Sugiyono said that experimental study is research method used to investigate the affect of certain treatment toward that on controlled condition. Because of that, there is a treatment and control group on this study.[2] 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 (IV B) which was taught using Bingo game and control class (IV A) which was taught without Bingo game.

In this study, the approach used by the writer was quantitative approach. It is quantitative because the data that was gained was numeric and was analyzed by using statistical computation. The kind of this experimental is True Experimental Design in form of Pretest-Posttest Control Group Design. Here, there are two groups which have been chosen randomly. Both groups are given pretest to know the first condition whether there is a significant difference of competence level, proficiency level between the sample or not. The pretest result is said be good if there is no significant difference between both groups. It means that the sample of experimental and control group has same or equal condition of competence level and proficiency level. After being gives a pretest, the experimental group is given a certain treatment while

[1] Rodgers and Brown, *Doing Second Language Research*, (New York: Oxford University Press, 2002), p. 211.

[2] Sugiyono, *Metode Penelitian Kuantitaif, Kualitatif Dan R&D*, (Bandung: Alfa Beta, 2006), p. 50

the control one is not. Quantitative approach stressed the analysis to the numerical data that is processed by statistical method. It will explain the result of pre - test and post – test.

Here, the treatment refers to the teaching by means of card game.[3] The design of experimental research can be figured out as follows:

R	O_1	X	O_2
R	O_3		O_4

In which: O_1 = Pretest value of experimental group.
O_2 = Posttest value of experimental group.
O_3 = Pretest value of control group.
O_4 = Posttest value of control group.
X = Treatment.
R = Random sample.

B. Setting of the Study

The writer did research at SDN 1 Plawangan-Rembang. She conducted this research from 18th of January to 12th of February 2010.

C. Objective of the Study

The objectives of the study as follow:

To find out the effectiveness of using Bingo game for teaching English concrete noun to elementary students at grade 4th of SDN 1 Plawangan-Rembang and to find out is the students' respond to the use of Bingo game in teaching English concrete noun.

D. Variable of the Study

Variable is the object of research or something that becomes the concern of research.[4] In this study there are two variables. They are Independent Variable (x) and Dependent Variable (y).

[3] *Ibid.*, p. 76.

a. Independent Variable (X)

Independent variable is variable that influences or those to cause of change or emergence the dependent variable.[5]Independent variable in this research is the use of Bingo game in teaching English concrete noun, and the indicator is the students are able to comprehend the concrete noun.

b. Dependent Variable (Y)

Dependent variable is variable that was affected or that be the result because of the existence of the independent variable.[6] Dependent variable in this study is the students' score of English concrete noun test.

E. Subject of the Study

1. Population

Population is "the whole subject of research".[7] In this research, population of this research is fourth grade of SDN I Plawangan-Rembang in the academic year of 2009/2010. The fourth grade of SDN I Plawangan is divided into three classes. There are 20 students in each class. The total number of population is 60 students.

Table 1

List of population

Class	Male	Female	Total
IV A	8	12	20
IV B	9	11	20
IV C	11	9	20
Total	25	35	60

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

[5] Hadeli,*Metode Penelitian Kependidikan*, (Jakarta:Quantum Teaching, 2006), p.33.

[6] Suharsimi Arikunto, *op.cit*, p. 119

[7]*Ibid*, p. 130.

2. Sample

Sample is taking of a part population using certain procedure. So, it can be expected to represent its population. In this connection, Arikunto states that sample is "a part of research population".[8] The writer took all of students as sample in this research because the respondents are less than 100, it is better to take all as sample.[9] Sample in this research is class IV A is as control class, IV B is as experimental class.

F. Technique of Data Collection

Instruments that are used to collect the data as follows:

1. Test

Test is questions that used to measure personality competence, knowledge, intelligence, and ability of talent which is possessed by individual or group to collect data.[10] 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 test are divided into transformation, completion, combination, addition, rearrangement, matching, correct and incorrect (true/false) and multiple choice.[11] 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, there are:

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[8] Sutrisno Hadi, *Statistik* (Yogyakarta: Andi, 2004) 2 *nd* Vol, 2 *nd* Ed, p. 182.
[9] Suharsimi Arikunto, *op.cit*, p. 134.
[10] M. Chabib Thoha, *Teknik Evaluasi Pendidikan* (Jakarta: PT. Raja GrafindoPersada, 2003), p.43
[11] J.Bheaton, *Writing English Language Tests* (London: Longman 1975), p. 12-13.

a. Pre test

Before the teacher taught new material by using Bingo game, the teacher gave vocabulary 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

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 using Bingo game (experimental class) and without using Bingo game (control class).

2. Questionnaire

Questionnaires can be useful for collecting data. They have the advantage of being easier and quicker to administer and the responses of far more inform can be gathered. Data is more amenable to analysis and quantification, because the information is controlled by the questions".[12]

"The questionnaire is answered by reading the questions and then ticking responses".[13] It means that, the writer used questionnaire which consists of ten questions and to answer each question, the respondent only gives cross sign on A, B, or C as the answer. This questionnaire was given to the experiment class and used to know the students' response to the used of Bingo game in teaching concrete noun.

G. Instrument of the Study

The instrument of the study refers to a tool for researcher in collecting the data needed. The quality of the research instrument determines the quality of the data that is collected. However the instruments of this study are as follow:

[12] Ken Hyland, *Teaching and Researching Writing*, (Britain: Pearson Education Limited, 2002), p. 166.

[13] Michael J. Wallace, *op.cit.*, p. 124.

1. Questionnaire

In this research, questionnaire is used to get the data from students of they respond the Bingo game. The questionnaire guideline was used as the instrument in obtaining a good questionnaire that dealing with the topic of this research was made. The questionnaire was given to the experimental class.

2. Test

The instrument of this study consists of some multiple-choice items. Before the test was used as an instrument to collect the data on the sample class, it had been tried out first to the student in try out class to know the validity, reliability, difficulty level and the discrimination power of each item. The writer prepared 20 items as the instrument of the test. Before the items were given to the students, The tryout was given to IV C of the students of SDN I Plawangan-Rembang. After finishing the test, the answer sheets were collected in order to be scored. The procedures that were done in determining the instrument of test are as follows:

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 it purposes to be measured.[14]

The validity of an item can be known by doing item analysis. It is counted using product – moment correlation formula:

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

In which,

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

N : The number of students

[14] Suharsimi Arikunto, *op cit*, p. 168.

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.[15]

Based on the result of validity computation, it is obtained that from 20 test items; there are 15 test items which are valid and 5 test items which are 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.

Table 2

The result of Item Validity Computation

No	Criteria	r_{tabel}	Item No.	Amount
1	Valid	0.445	1, 2, 3, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16, 18, 20	15
2	Invalid	0.445	4, 10, 11, 17, 19	5

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

$N = 20$ $\quad \sum Y = 223$

$\sum XY = 179$ $\quad \sum X^2 = 13$

$\sum X = 13$ $\quad \sum Y^2 = 2995$

$$r_{xy} = \frac{20(179) - (13)(223)}{\sqrt{\{20(13) - (13)^2\}\{20(2995) - (223)^2\}}}$$

[15] Suharsimi Arikunto, *Dasar-Dasar Evaluasi Pendidikan* (Jakarta: Bumi Aksara, 2007) 7th Ed, p. 73.

$$r_{xy} = \frac{3580 - 2899}{\sqrt{(260-169)(59900-49729)}}$$

$$r_{xy} = \frac{681}{\sqrt{(91)(10171)}}$$

$$r_{xy} = \frac{681}{925561}$$

$$r_{xy} = 0.708$$

From the computation above, the result of computing validity of the item number 1 is 0.708. After that, the writer consulted the result to the table of r Product Moment with the number of subject (N) = 20 and significance level 5% it is 0. 445. 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.

b. The Reliability

It means consistent**.**[16] Reliability refers to the consistency of test scores. Besides having high validity, a good test should have high reliability too. The formula is used to know reliability of test is K R-20 (Kuder Richardson).[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.

[16]J.B. Heaton, *op.cit*, P. 155.

[17] Suharsimi Arikunto, *op.cit*, p. 100

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 test question is reliable.

The following is the reliability computation of test. Before computing the reliability, the writer had to compute Varian (S^2) with the formula below:

N = 20 $\quad\quad$ $\sum Y$ =223

$\sum Y^2$ =2995 $\quad\quad$ $\sum pq$ = 4. 1525

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

$$S^2 = \frac{2995 - \frac{(223)^2}{20}}{20}$$

$$S^2 = \frac{2995 - 2486.45}{20}$$

$$S^2 = \frac{508.55}{20}$$

$S^2 = 25.428$

The computation of the Varian (S^2) is 25.428. After finding the Varian (S^2) the writer computed the reliability of the test as follows:

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

$$r_{11} = \left(\frac{20}{20-1}\right)\left(\frac{25.428 - 4.153}{25.428}\right)$$

$$r_{11} = 1.052\left(\frac{21.275}{25.428}\right)$$

$$r_{11} = 0.881$$

From the computation above, it is found out that r_{11} (the total of reliability test) is 0.881, where as the number of subjects are 20 and the

critical value for r-table with significance level 5% is 0.445. 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.

c. The Difficulty Level Analysis.

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

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

Where:

P : The difficulty's index

B : The number of students who has right answer

JS : The number of students[18]

However, the criteria used are as follow: [19]

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

$0{,}30 \leq p \leq 0{,}70$: Medium

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

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

B=10+3=13

JS= 20

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

$$P = \frac{13}{20}$$

$$P = 0.65$$

It is proper to say that the index difficulty of the item number 1 above can be said as the medium category, because the calculation result of the item number 1 is in the interval $0{,}30 \leq p \leq 0{,}70$.

[18] *Ibid.,* p. 207-208.
[19] *Ibid.* p.. 210.

After computing 20 items of the try-out test, there are 7 items that are categorized into easy, 9 items are medium and 4 items are difficult.

Table 3

The Result of Item Difficulty Level Computation

No	Criteria	Item No.	Amount
1	Easy	1, 2, 4, 6, 9, 15, 19	7
2	Medium	3, 5, 7, 8, 12, 13, 14, 18, 20	9
3	Difficult	10, 11, 16, 17	4

d. The Discriminating Power Analysis.

It is used to know how accurate the question differ higher subject and lower subject. It means that the discrimination power of an item indicated the extent to which the item discriminated between the testees, separating the more able testees 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 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

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

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

P_B : The proportion of participants in lower group that answered true.[20]

The criteria are:

$0{,}00 \leq p \leq 0{,}20$: Poor

$0{,}20 \leq p \leq 0{,}40$: Sufficient

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

$0{,}70 \leq p \leq 1{,}00$: Very Good

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

BA=10 BB=3

JA=10 JB=10

$$DP = \frac{BA}{JA} - \frac{BB}{JB}$$

$$DP = \frac{10}{10} - \frac{3}{10}$$

DP = 0.70

According to the criteria, the item number 1 above is good category, because the calculation result of the item number 1 is in the interval $0.\ 70 \leq D \leq 1.00$.

After computing 20 items of try –out test, there are 4 items is considered to be very good, 9 items are good, 3 items are sufficient, 3 items are poor and 1 item is very poor.

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

Table 4

The result Computation of Discriminating Power of Item

No.	Criteria	Item No.	Amount
1	Very Poor	11	1
2	Poor	10, 17, 19	3
3	Sufficient	.4, 6, 7	3
4	Good	2, 5, 9, 12, 13, 14, 15, 18, 20	9
5	Very Good	1, 3, 8, 16	4

Based on the analysis of validity, reliability, difficulty level, and discriminating power, finally 15 items are accepted. They are number 1 2 3 5 6 7 8 9 12 13 14 15 16 18 20.

H. Technique of Data Analysis

1. Pre-request Test

Before the writer determines the statistical analysis technique used, the writer 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 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 (χ^2), with the formula:

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

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

14) Determining the value of χ^2 table

15) Determining the distribution normality with test criteria:

If $\chi^2_{count} > \chi^2_{table}$, the data is not normal distribution and the other way if the $\chi^2_{count} < \chi^2_{table}$, the data is normal distribution .[21]

b. Homogeneity Test

Homogeneity test 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.[22]

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:

If $F_{count} > F_{table}$, the data is not homogeneous and the other way if the $F_{count} < F_{table}$, the data is homogeneous.[23]

[21] Sudjana, *Metode Statistika*, (Bandung: Tarsito, 2002), p. 273.

[22] David Nunan, *Research Method in Language Learning* (Cambridge: University Press, 1992) p. 92.

[23] Sudjana, *op cit*, p. 250.

c. Test of the Average

It is used to examine average whether experiment group and control group have been decided having different average.[24]

T-test is used to analyze the data of this research. A t-test would be the measure you would use to compare the mean scores of the two groups.[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 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:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$$

The hypotheses are:

Ho = $\overline{X}_1 = \overline{X}_2$

Ha = $\overline{X}_1 \neq \overline{X}_2$

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

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

$\overline{X}_1$: Average data of experiment group

$\overline{X}_2$: Average data of control group

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).[26]

2. 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 = Ho = $\overline{X}_1 = \overline{X}_2$

Ha = $\overline{X}_1 \neq \overline{X}_2$

- 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

[26] Sudjana, *op. cit*, p. 241

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:

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

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).[27]

3. Interpretation of the Questionnaire

To get the result of questionnaire, the writer will tabulate the questionnaire data to make the result of grading clearly readable. The table consists of these columns; name, multiple-choice items of each number, calculates answer of each item and then the writer concludes of the result.

I. Procedure and Time line

In collecting data the researcher needs six weeks and did some steps as follows:

1. 1st meeting, asks permission to headmaster of the school
2. 2nd meeting, the researcher asks permission and meet to the English teacher.
3. 3rd meeting, the researcher gives try out test to other class (IV C)
4. 4th meeting, the researcher gives pre-test to both control class (IV A) and experiment class (IV B).
5. 5th meeting, the researcher teaches control class (IV A).
6. 6th meeting, the researcher teaches experiment class (IV B)

[27] Sudjana, *Ibid*, p. 243.

7. 7th meeting, the researcher gives post-test to both control class and experiment class.

Table 5

List of time of the study

Number	Activity	Month/Date				
		January		February		
		22nd	25th	1st	8th	12th
1.	Try out	-				
2.	Pre test		-			
3.	Treatment 1			-		
4.	Treatment 2				-	
5.	Post test					-