A. Method of The Research

In conducting this research, the researcher used experimental research method as the method of the research. According to Cresswell (2012:20) experimental research procedures are ideally suited for testing weather and educational practice or idea makes a difference for individual. Experimental research becomes the most conclusive and scientific methods because in experimental research the researcher actually establishes different treatments and then studies their effects (Fraenkel and Wallen, 2009:7). According to Arikunto (2010:207) the aim of experimental research is to find out an effect of something given to the subject of the research. In this research, the researcher wants to know the effectiveness of Sentence Race game for teaching vocabulary.

The kind of experimental research was used in this research was quasi experimental with non-equivalent control group design. This research belongs to non-equivalent control group design because in this research it is impossible to create equivalent groups so there is a disobedience of the beginning class condition (Suwartono, 2007:59).

Furthermore, two classes were involved in this research. One class was called experimental group and the other one was called control group. First, both of group were given pre-test to measure the first condition of
each group. After that, the two group would be taught English vocabulary. Experimental group was taught by using Sentence Race game as a treatment, and control group was taught by using the current method as usually done by the teacher before. After that, both of groups were given post-test. The design of this research could be described as follows:

Where:

- $0_1$ = pre-test of experimental group
- $0_2$ = post-test of experimental group
- $0_3$ = pre-test of control group
- $0_4$ = post-test of control group
- $X$ = treatment with sentence race game
- --- = treatment with the current method
B. Place and Time of The Research

1. Place of the research

This research was conducted in SMP Negeri 1 Kalibagor in academic year 2015/2016.

2. Time

The research was conducted in five months. The schedule of the research could be seen in the following table:

Table 1.
Research Schedule

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Doing Pre-observation</td>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Making Proposal</td>
<td></td>
<td>1 2 3 4</td>
<td>1 2 3 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Doing Seminar</td>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Collecting the Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>5</td>
<td>Analyzing the Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>
C. Subject of the Research

1. Population

According to Arikunto (2010:173) population is all the subject of the research. In this study, the population of the research was seventh grade students of SMP Negeri 1 Kalibagor in academic year 2015/2016. They were grouped into 7 classes (VII A – VII G). The total number of population in this research was 224 students.

2. Sample

Sample is part of population which is researched (Arikunto, 2010:174). In this research, the researcher used two classes as the sample of the research. The researcher got the sample by using purposive sampling. They were VII G as experimental class and VII B as control class. Each class consisted of 32 students.

D. Technique of Collecting Data

In this research, the researcher used test as instrument for collecting data. Test is a set of questions and the other tools used to measure skills, knowledge of intelligence, ability or talents of an individual or group (Arikunto, 2013:193). There were two kinds of test
which were used by the researcher in this research. They were pre-test and post-test.

1. Pre-Test

Pre-test were given for both experimental group and control group. This test was aimed at finding out the students’ initial vocabulary competence in both group. It was held before the treatment was given. The pre-test consisted of 30 items.

2. Post-Test

Post-test was administered to know the students’ achievement after getting treatment. This test were given for both experimental group and control group. The total number of test items in post-test is 30.

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicators</th>
<th>The Number of Test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-Test</td>
</tr>
<tr>
<td>1.</td>
<td>Finding the meaning of the word.</td>
<td>1,2,5,6,7,8,10,11,12,13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,13,15,16,17</td>
</tr>
<tr>
<td>2.</td>
<td>Using the target vocabulary in context.</td>
<td>3,4,9,14,18,19,20,21,22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,22,23,24,25,26,27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.28,29,30</td>
</tr>
</tbody>
</table>
E. Technique of Analyzing Instrument

1. Validity

Validity is a measurement which shows the level of validation of the instrument (Arikunto, 2013:211). An instrument is considered valid if the instrument is able to measure what the researcher is going to measure. In this research, the instrument that was used should be valid to measure students’ vocabulary mastery in seventh grade students of junior high school. To find out the validity of test items, the researcher used the product moment correlation as follows:

\[ r_{xy} = \frac{N(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{(N(\Sigma X^2) - (\Sigma X)^2)(N(\Sigma Y^2) - (\Sigma Y)^2)}} \]

(Arikunto, 2013:213)

Where:
- \( r_{xy} \) = product moment correlation
- \( N \) = the number of respondents
- \( \Sigma X \) = sum of score in X distribution
- \( \Sigma X^2 \) = sum of square scores in X distribution
- \( \Sigma Y \) = sum of score in Y distribution
- \( \Sigma Y^2 \) = sum of square scores in Y distribution
- \( \Sigma XY \) = sum product of paired (x) and (y) distribution

2. Reliability

After the researcher determined the valid item of test validity then the researcher measure the reliability of the instrument.
Reliability of the test refers to the consistency of the test result. It meant that when the test is administered to the same candidates in different time and place the result is consistent. In this research, to find out the reliability of the instrument, the researcher used formula as follows:

\[
\begin{align*}
    r_{11} &= \left( \frac{k}{k-1} \right) \left( 1 - \frac{\sum pq}{V_t} \right) \\
    (\text{Arikunto: 2013:231})
\end{align*}
\]

Where:

- \( r_{11} \) = the reliability of the instrument
- \( k \) = the number of test items
- \( V_t \) = the total variants
- \( p \) = the proportion of the subject that get score 1
- \( q \) = the proportion of the subject that get score 0
- \( \sum pq \) = the sum of multiplication between the numbers of subject who get the score correctly and the number of subject who get score incorrectly.

The criteria of reliability values were as follows:

- 0.00 – 0.20 = there was no reliability
- 0.21 – 0.40 = very low reliability
- 0.41 – 0.60 = enough reliability
- 0.61 – 0.80 = high reliability
- 0.81 – 1.00 = very high reliability
Before the researcher used the formula, the researcher did some steps as follows:

a. Determining the total variant (Vt)

To determine the total variants of the students’ score, the formula is as follows:

\[ V_t = \frac{\sum Y^2 - \left(\frac{\sum Y}{N}\right)^2}{N} \]

(Arikunto, 2013:227)

Where:

- \( V_t \) = the total variants
- \( \sum Y \) = the total score Y
- \( \sum Y^2 \) = the total of quadrate Y
- \( N \) = the number of respondents

b. Finding out \( \sum pq \)

In finding out \( \sum pq \), the steps were as follows:

1. Determining p

\[ p = \frac{\sum \text{correct answers}}{\text{the number of respondents}} \]

2. Determining q

\[ q = 1 - p \]

3. Multiplying p and q, then calculating the result of \( \sum pq \)

c. Entering the result of \( \sum pq \), Vt, and k to the formula of reliability of instrument:
3. Item Difficulty

Item difficulty was purposed to know whether items were too difficult or too easy for the test participants. To determine the index of difficulty, the researcher used formula as follows:

\[ r_{11} = \left( \frac{k}{(k-1)} \right) \left( 1 - \frac{\Sigma pq}{Vt} \right) \]

(Arikunto, 2010:210)

Where:

- F.V = the index of difficulty
- R = the number of correct answer
- N = the number of the student taking the test

Furthermore, according to Arikunto (2010:210) there are some criteria of item difficulty as follows:

- 0.0 – 0.30 : difficult
- 0.30 – 0.70 : medium
- 0.70 – 1 : easy

F. Technique of Analyzing Data

The researcher analyzed the data by using the following statistical formula:
1. Student’s Individual Competence

To measure the students’ individual competence, the researcher uses the formula as follows:

\[ P = \frac{F}{N} \times 100\% \]

Where:

- \( P \) = the percentage of correct answer
- \( F \) = the frequency of correct answer
- \( N \) = Total number of items

According to Arikunto (2010:269) there are five categories of student’s competence as follows:

- a. 81 – 100% of the answers are correct = very good
- b. 61 – 80% of the answers are correct = good
- c. 41 – 60% of the answers are correct = fair
- d. 21 – 40% of the answers are correct = bad
- e. 0 – 20% of the answers are correct = very bad

2. T-Test computation

To know the effectiveness of Sentence Race game for teaching vocabulary at the eighth grade students of SMP Negeri 1 Kalibagor in academic year 2015/2016, T-test computation was used. The formula is as follows:
\[
T - \text{test} = \frac{M_x - M_y}{\sqrt{\left(\frac{\sum x^2 + \sum y^2}{N_x + N_y - 2}\right) \left(\frac{1}{N_x} + \frac{1}{N_y}\right)}}
\]

(Arikunto, 2013:354)

Where:

- \(M_x\): the mean of deviation of experimental group
- \(M_y\): the mean of deviation of control groups.
- \(\sum x^2\): the total square of experimental group
- \(\sum y^2\): the total square of control group
- \(N_x\): the number of students in experimental group
- \(N_y\): the number of students in control group

Before the researcher used the t-test formula above, the researcher did some steps, they are:

a. Making table

<table>
<thead>
<tr>
<th>Number of students</th>
<th>Experimental Class</th>
<th>Control Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(X_1) (X_2) (X) (X^2)</td>
<td>(Y_1) (Y_2) (Y) (Y^2)</td>
</tr>
<tr>
<td></td>
<td>(X_1) (X_2) (X) (X^2)</td>
<td>(Y_1) (Y_2) (Y) (Y^2)</td>
</tr>
<tr>
<td>(\Sigma)</td>
<td>(\Sigma)</td>
<td>(\Sigma)</td>
</tr>
</tbody>
</table>

Where:

- \(X_1\): Pre-test result of experimental group
- \(Y_1\): Pre-test result of control group
X₂ : Post-test result of experimental group
Y₂ : Post-test result of control group
X   : deviation of each score between X₂ and X₁
Y   : deviation of each score between Y₂ and Y₁

b. Calculating the mean of deviation of experimental group (Mx) and control group (My)

1. Calculating the mean of deviation of experimental group (Mx)

   There were some steps to calculate the mean of deviation of experimental group as follows:
   a. Calculating X and ∑X

      In experimental group, the post-test score of each student was subtracted by the pre-test score to determine X. Then, the researcher totaled X of each student to get ∑X.

   b. Entering the result of ∑X to the formula below:

      $$M_x = \frac{\sum X}{N}$$

      Where:

      Mx : the mean of deviation of experimental group

      ∑X : total of deviation in experimental group

      N   : Number of students

2. Calculating the mean of deviation of control group (My)
There were some steps to calculate the mean of deviation of experimental group as follows:

a. Calculating $Y$ and $\sum Y$

In control group, the post-test score of each student was subtracted by the pre-test score to determine $Y$. Then, the researcher totalized $Y$ of each student to get $\sum Y$.

b. Entering the result of $\sum Y$ to the formula below:

$$M_y = \frac{\sum y}{N}$$

Where:

- $M_y$: the mean of deviation of experimental group
- $\sum y$: total of deviation in control group
- $N$: Number of students

c. Calculating the sum of squared deviation of each group

a. Experimental group

$$\sum x^2 = \sum X^2 - \left(\frac{\sum x}{N}\right)^2$$

b. Control group

$$\sum y^2 = \sum Y^2 - \left(\frac{\sum y}{N}\right)^2$$

Where:

- $\sum X^2$: the sum of square deviation in experimental group
- $\sum Y^2$: the sum of square deviation in control group
d. Applying all the result into t-test formula

\[ T - \text{test} = \frac{M_x - M_y}{\sqrt{\frac{\sum x^2 + \sum y^2}{N_x + N_y - 2} \left( \frac{1}{N_x} + \frac{1}{N_y} \right)}} \]

3. Degree of Freedom

The formula of degree of freedom was as follows:

\[ d.f. = (N_x + N_y - 2) \]

Where:

\( Df \): degree of freedom

\( N_x \): the number of the students in experimental group who take the test

\( N_y \): the number of the students in experimental group who take the test