

CHAPTER III

METHODOLOGY

This chapter elaborates the procedures of the study to answer questions stated in previous chapter. Some big points that cover in this chapter are research method, hypothesis, sample, data collection, research procedure, and data analysis.

3.1 Research Method

3.1.1 Research design

The purpose of this study is to find out whether mind mapping technique improves students' scores in reading comprehension effectively and to find out the students' responses toward the use of mind mapping in reading comprehension.

The research method in this study is quantitative method with quasi experimental design. According to Hatch and Farhady (1982) "quasi experimental design is used as one of the best research approaches in the research since it aims practically to compare true experimentation and the nature of human language behaviour which we wish to investigate" (p. 24).

There are two groups taken as the investigated groups in this study which classify as different groups. There are control group which receive no treatment and experimental group which receive mind mapping technique as a treatment during learning process. The data in experimental group is collected by giving the students pre-test through reading test and then the researcher give the students treatment by applying mind mapping technique in teaching process. After that, the students have to do the posttest through reading test, too. While in control group, the posttest is given without any treatment in teaching process. This can be seen in the following figure:

| | | | |
|----|----------------|---|----------------|
| EG | T ₁ | X | T ₂ |
| CG | T ₁ | - | T ₂ |

Description:

EG : Experimental Group

CG : Control Group

T₁ : Pre test

T₂ : Post test

X : The treatments (five times)

(Adopted from Hatch and Farhady, 1982)

In order to discover the students' responses to the use of Mind Mapping in improving their reading comprehension ability, the implementation of the action is also followed by conducting questionnaire for those students in the experimental group.

3.1.2 Variable

According to Hatch and Farhady (1982, p. 12) state that variable can be defined as "an attribute of a person or of an object which 'varies' from person to person or from object to object." The variables used are classified into dependent and independent variables:

1. The independent variable is mind mapping technique because this is the prominent method which is investigated thus it is selected, manipulated, and measured by the researcher (Hatch and Farhady, 1982, p. 15)
2. The dependent variable is students' reading score that is observed and measured to determine the effect of the independent variable (Hatch and Farhady, 1982, p. 15).

3.2 Hypothesis

According to Hatch and Farhady (1982, p. 86) hypothesis means a tentative statement about the outcomes of the research. It indicates that question must answered by doing experimental. In line with the concept of hypothesis mentioned above, the writer would like to propose two hypotheses as follows:

H₀: there is no significant difference in means between control and experimental group.

H_A: there is a significant difference between control and experimental group.

If the result of the test shows that teaching reading comprehension using mind mapping technique does not improve students' reading ability, it means hypothesis null (H₀) accepted. However, if the result of the test shows that teaching reading comprehension using mind mapping technique improve students' reading comprehension ability, it means hypothesis null (H₀) rejected and hypothesis alternative (H_A) accepted.

3.3 Population and Sample

3.3.1 Population

Population is a whole research subject. Population is generalization area which consists of object/subject which has certain quantity and characteristic which is determined by researcher to study and then take summary (Arikunto, 2010, p. 173). The population of this study was the tenth grades students at one of Vocational High School in Bandung, enlisted in academic year 2013/2014.

3.3.2 Sample

Sample is a part of population (Arikunto, 2010, p. 173). In this research the writer just involved 35 students from two classes as the sample of the research. Class X AP 2 is taken as the experimental group and class X AP 3 is chosen as the control group.

The consideration is based on Hatch and Farhady (1982) statement who stated that “the total 30 students were chosen since it was the smallest size required to get sample normally distributed” (p. 98). Moreover, the consideration of taking smallest size sample is to avoid some students who suddenly absent when they get the treatment sessions or even in the pre-test and post-test. Hence, the number of the sample was 70 students from both classes.

However, the sample was chosen nonrandomized because it is the policy of the school that only allows two classes are used as research subjects. This is one of the limitations in this study, thus the researcher expects other researcher to consider the sample by using random sampling techniques in further research.

3.4 Data collection

In order to obtain the data, this research use two instruments, namely reading test (Pre-test and Post-test) and questionnaire.

3.4.1 Reading test (pretest and posttest)

In order to measure students' reading ability in form of score, the writer conduct reading test. It is conduct to expose the effectiveness of mind mapping technique to improve students' reading ability. The reading test include pre-test and post-test. Pre-test is employed to both groups as the first step of study to know students' reading comprehension ability and to find out that both groups have the same capability of English before they receive the treatment. Furthermore, post-test is employed at the end of the study to measure the students' reading comprehension after the treatment. This is intended to find the differences between students' score of both groups.

The reading test was carried out to 70 students as experimental and control groups. The students should finish the test in 45 minutes. This test used the different reading texts in pre-test and post-test. The test was in form of 20 items

multiple choices which were adapted from internet and constitutes the result of pilot test.

In this research, Barrett's Taxonomy Reading Comprehension is used to check students' comprehension at various levels. Following are the result of reading questions test analysis in Barrett's Taxonomy Reading Comprehension.

Table 3.1
Barrett's Taxonomy Reading Comprehension

| The Barrett's Taxonomy | Item Number | |
|------------------------------|---|--|
| | Pre-test | Post-test |
| 1) Literal Comprehension | 2, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 20 | 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 18 |
| 2) Reorganization | 8 | 1, |
| 3) Inferential Comprehension | 1, 3, 17, 18 | 14, 15, 16, 19, 20 |
| 4) Evaluation | 4, 19 | - |
| 5) Appreciation | - | - |

There are only four levels which appear in pretest and three levels which appear in posttest. Indeed, the three major levels of Barrett's Taxonomy Reading Comprehension (literal comprehension, reorganization and inferential comprehension) are the most common type of question on tests (Teacher Link, www.mgu.ac.jp/~ic/helgesen/marc.article1.htm). The questions of pretest and posttest can be seen in Appendix 3.

3.4.2 Questionnaire

Besides test, the writer use questionnaire to know the students' impression and response about the use of mind mapping to improve their reading comprehension ability in the classroom. Close-ended questionnaire is used in the study in order to provide consistency of response across the students and generally easier to use and analyze related to the objectives of the study (Nunan, 1992).

In constructing each question in the questionnaire, it is important to determine the data that should be gathered related to the objective of the study (Nunan, 1992). Thus the questionnaire items were divided into three general aspects, based on general perception on their skill of reading before treatment is conducted, based on general idea on the students' skill after the treatment is conducted and based on general ideas on their perceptions towards the use of mind mapping.

The question consists of ten items. Those questions were only given to experimental group after the students finish their post-test. There were 35 respondents involved in the questionnaire session.

3.5 Research Procedure

3.5.1 Lesson planning

There were some lesson plans that are used in experimental and control group during the treatments. Those lesson plans were designed for five meeting. The first and the last meeting were allocated for pre-test and post-test, while the rest of five meetings were allocated for the treatment season. Furthermore, the researcher also managed the teaching procedure by measuring time allotment, students' condition, and availability of facility. The lesson plan is presented in Appendix 1.

3.5.2 Administering a pilot test

Pilot test was intended to measure the validity, reliability and testing the difficulty level of the instrument. It was conducted before pre-test and post-test. It was conducted as reflection in making some reflections or changes in the test instrument. The pilot test was given to the students in similar level which are not included in control and experimental group. The test consist of 50 multiple choice items that were administered to 40 students. The result of the try out is presented in Appendix 2.

3.5.3 Conducting treatment

In this study, treatment was implemented only in the experimental class by applying mind mapping technique in teaching and learning process. Whereas, in control group, teaching and learning process was not applied mind mapping technique as a treatment. However, both of group were in similar condition. The treatments were conducted in five meetings.

The treatment schedule was set to make the experiment run well. The materials, themes and lesson plans were also set to follow the material schedule of the school. The details of the treatment activity are shown in the following table:

Table 3.2
Schedule of the Study

| No | Experimental group | | Control group | |
|----|----------------------------------|--|----------------------------------|--------------------|
| | Date | Material/Theme | Date | Material/Theme |
| 1. | 18 th October 2013 | Pre-test | 18 th October 2013 | Pre-test |
| 2. | 19 th October 2013 | Treatment 1: Overview how to make a good mind mapping | 19 th October 2013 | Present tense |
| 3. | 26 th October | Treatment 2: | 26 th October | Jessica, My Friend |

| | | | | |
|----|-----------------------------------|--|-----------------------------------|--|
| | 2013 | Jessica, My Friend | 2013 | |
| 4. | 2 nd November 2013 | Treatment 3: Biography of Barack Obama | 2 nd November 2013 | Biography of Barack Obama (Past tense) |
| 5. | 9 th November 2013 | Treatment 4: Biography of Zayn Malik | 9 th November 2013 | Biography of Zayn Malik (Past tense) |
| 6. | 16 th November 2013 | Treatment 5: Biography of your Idol (depending on the student's idol) | 16 th November 2013 | Past Tense review |
| 7. | 23 rd November 2013 | Post-test and Questionnaire | 23 rd November 2013 | Post-test |

Mind mapping is used to teach experimental group. The treatment is conducted for five meetings. Every meeting consisted of 2 x 45 minutes. The material presented is about of someone's identity and biography.

Treatment 1

In the first meeting, the teacher introduced students with the mind mapping technique. Since building knowledge or preparation is the first stage of teaching (Cooper, 1990). In this stage, the teacher should build up students' background knowledge about mind mapping, thus, the teacher tells students what mind mapping is and how to implement mind mapping in reading comprehension. The teacher gave students a simple text and shows how to make mind mapping from the text. In the end of the meeting, the students were given some questions about the text they have learned. In order to know more detail see lesson plan in Appendix 1.

Treatment 2

In second meeting, students should be able to implement the previous lesson on how to read a text using mind mapping. They were required to apply the steps of making mind mapping based on the text they have read. Hence, first, the teacher gave students a text about someone's identity entitled "Jessica, My Friend". Students should read text carefully and make mind mapping based on the text. In this meeting, the students were guided by the teacher in making mind mapping. Teacher gave some keywords to be applied in their mind mapping. After that, the students continued to write important information from the text into their mind mapping. At the end of the meeting, students answer some questions related to the text. In order to know more detail see lesson plan in Appendix 1.

Treatment 3

In third meeting, the level of the text was increased as scaffolding strategy (Alber, 2014). The students are given a longer text about biography of Barack Obama. Before they read a text, they should answer some questions that contain of vocabulary in order to help them in reading a text. After that, they read text carefully and make mind mapping based on the text. In this meeting the students are not guided by teacher in making mind mapping. They are free to be creative to make mind mapping with colors and pictures (Buzan, 2006). In the end of meeting, students have to complete a cross puzzle which contain of some questions related to the text. In order to know more detail see lesson plan in Appendix 1.

Treatment 4

In fourth meeting, the students are given biography text of Zayn Malik, a member of boy band One Directions. Before they read the text, they pay attention to vocabularies in the box. Those help them in understanding the text and also they are ready to tackle the challenging text (Alber, 2014). After students

understanding all vocabularies in the box, they start to read the text carefully. As usual, they should make mind mapping based on the text they have read. They are free to be creative to make mind mapping with colors and pictures. After that, students have to answer the questions related to the text. In the end of the meeting the students get assignment as a home work that is finding biography text about their idol in the internet or magazine. The text will be used for the material at the last meeting. In order to know more detail see lesson plan in Appendix 1.

Treatment 5

The fifth meeting is the last meeting in which the students should apply the mind mapping technique in reading comprehension based on what they have learned individually. In this meeting the students bring a biography text about their idol. Teacher asks them one by one about their idol. After that, teacher reminds them about how to make a good mind mapping. Teacher also gives some keywords of what should students write in their mind mapping. They ask to make mind mapping based on their text. In the end of the meeting they should present and explain their mind mapping of their idol in front of class, while other students pay attention and may give a question or comment. In order to know more detail see lesson plan in Appendix 1.

To clarify the teaching and learning process in experimental group, following is the steps of teaching and learning process by using mind mapping:

Table 3.3
Steps of Teaching and Learning Process

| Teacher Activities | Students Activities |
|---|---|
| 1) Pre-activity <ul style="list-style-type: none"> - Teacher greets students -Teacher and students pray together -Teacher checks students' attendance | 1) Pre-activity <ul style="list-style-type: none"> - Students great teacher - Students and teacher pray together -Students pay attention while teacher checks their attendance. |

| | |
|--|---|
| <p>-Brainstorming: Teacher shows picture of someone. (<i>Do you know who is he/she? Who is he/she?</i>)</p> | <p>- Students identify picture of someone</p> |
| <p>2) Main activity</p> <p>~Exploration</p> <ul style="list-style-type: none"> - Teacher asks students some information about someone in the picture. (<i>E.g. who is his/her name? Where is he/she come from? What is her/his profession? Etc.</i>) - While students give their opinion, the teacher writes it on the board in form of mind mapping - Teacher gives students biography text of public figure (based on topic in every meeting) <p>~Elaboration</p> <ul style="list-style-type: none"> - Teacher asks students to identify the text (the topic, vocabulary, tenses, etc) - Teacher asks students to read the text carefully - Teacher asks students to make mind mapping based on text (in the first and second meeting teacher guides students in making mind mapping) | <p>2) Main activity</p> <p>~Exploration</p> <ul style="list-style-type: none"> - Students give opinion about their prior knowledge about someone in the picture - Students receive biography text of a public figure <p>~Elaboration</p> <ul style="list-style-type: none"> - Students identify text before reading the text. - Students read the text carefully - Students prepare to make mind mapping based on the text they have read -Students make mind mapping of the text. They are allowed to use |

| | |
|--|---|
| <p>~Confirmation</p> <ul style="list-style-type: none"> - Teacher asks some students to present their mind mapping. - Teacher gives some written questions based on the text to evaluate students' comprehending of the text. | <p>picture, color and make their own creative mind mapping</p> <p>~Confirmation</p> <ul style="list-style-type: none"> - Students present their mind mapping in front of class. - Some students are allowed to give comments and appreciation of students' presentation. - Students answer the question related to the text individually. |
| <p>3) Last activity</p> <ul style="list-style-type: none"> - Teacher asks students what they have learned today. - Teacher gives students follow up about next material. | <p>3) Last activity</p> <ul style="list-style-type: none"> - Students and teacher together review the material that they have learned. - Students get follow up from teacher. |

3.5.4 Administering pretest and posttest

Pre-test and post-test was conducted in experimental and control group to know the score of students, whether or not mind mapping can improve students' reading comprehension ability. The pre-test was intended to measure the students' comprehension in reading before they get treatment. After series of treatments were conducted, post-test was also administered to the both of group. The post-test was intended to know students' comprehension in reading after they got treatment.

3.5.5 Administering questionnaires

The questionnaires were conducted only to the experimental group students after post-test performed. The researcher used close-ended questionnaire to know students' responses toward the use of mind mapping in reading comprehension during treatment.

3.6 Data Analysis

3.6.1 Scoring procedure

The instrument used in the research was in the form of multiple-choice questions. The data were collected by using research instrument. After the data were collected, and then the data analysed by using scoring technique. According to Arikunto (2002) there are two kinds of formula can be used to process the multiple choice item data, the formula with punishment and without punishment. This study used the formula without punishment. The formula is stated as follows:

$$S=R$$

S : Score

R : Right answer

3.6.2 Analysis of data from the pilot test

This pilot test was administered to check validity, reliability, and testing the difficulty level of the instrument. It was conducted before doing pre-test and post test. Forty multiple choices questions were tested to the students out of sample. The valid and reliable items are used as pre-test and post-test.

3.6.2.1 Analysis of the validity

Validity is measurements which show the validity level of quality level of instrument (Arikunto, 2002). The data are calculated using Anates V4.

Table 3.4
Category of Coefficient Correlation of Validity

| Raw Score | Interpretation |
|-----------|----------------|
| 0.80-1.00 | Very high |
| 0.60-0.80 | High |
| 0.40-0.60 | Moderate |
| 0.20-0.40 | Low |
| 0.00-0.20 | Very low |

(Arikunto, 2002)

3.6.2.2 Analysis of the reliability

According to Hatch and Farhady (1982), reliability is the extent to which a test procedure reveals a consistent result when administered under similar condition. This study used Anates V4 to reveal the item's reliability. It is used to assure whether or not the test is reliable to be used in pre-test and post-test. The test item is reliable if the raw score are 0.40-0.70. The following is shown the criteria of reliability:

Table 3.5
Category of Coefficient Correlation of Reliability

| Coefficient Correlation | Interpretation |
|-------------------------|----------------|
| 0.00-0.20 | Low |

| | |
|------------|-----------|
| 0.20-0.40 | Moderate |
| 0.40-0.70 | High |
| Above 0.70 | Very high |

(Arikunto, 2002)

3.6.2.3 Analysis of the difficulty level

According to Arikunto (2006) difficulty level is used to measure how far the test items are relevant with the participants' ability. Arikunto (2010) also states that the difficulty test analysis which a good item should not to be too difficult or too easy. It can be analyzed by using difficulty index, as follows:

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

Where:

P = Index of difficulty

B = the number of students who can answer the item correctly

JS = the number of students

Furthermore, difficulty level gained from the test results were interpreted using the classification of difficulty level as follows:

Table 3.6

Difficulty Test Item Interpretation

| Index of Difficulty | Difficulty Degree |
|---------------------|-------------------|
| 0.00-0.30 | Difficult |
| 0.30-0.70 | Moderate |
| 0.70-1.00 | Easy |

(Arikunto, 2006)

3.6.2.3 Analysis of the discrimination index

Discrimination index is used to indicate how far a single test item can distinguish the upper group from the lower group of class (Arikunto, 2006)

Table 3.7
Criteria of Discrimination Index

| Discrimination index | Interpretation |
|-----------------------------|-----------------------|
| 00.00-0.020 | Poor |
| 0.20-0.40 | Moderate |
| 0.40-0.70 | Good |
| 0.70-1.00 | Excellent |

(Arikunto, 2006)

The table shows the criteria of discrimination index which differ the upper and lower group.

3.6.3 Analysis of the data from pretest and posteset

The data gather from both of pretest and posttest was analyzed by using SPSS 20.0 for window. There are four steps in analyzing the data, normality test, homogeneity test, independent t-test, and effect size.

3.6.3.1 Analysis of the normality distribution test

Normality distribution aims to investigate whether or not the distribution of pretest and posttest score in two groups are normally distributed. It is calculated before t-test. The statistical calculation of normally test use Kolomogrove-Simirnov. The following are the steps:

1. Setting the level of significance at 0.05 and establishing the hypothesis as follows:
 H_0 : the distribution of scores in experimental and control groups are normally distributed.
 H_1 : the distribution of scores in experimental and control groups are not normally distributed.
2. Analyzing the normality distribution with One-Sample Kolomogrove-Simirnov test in SPSS 20.0 for Windows.

3. Comparing the Asymp.sig with the level of significance for testing the hypothesis. If the Asymp.sig is more than the level of significance ($\text{Asymp.sig} > 0.05$), the null hypothesis is not rejected and the distribution of data is normal. Hence, if the Asymp.sig is less than the level of significance ($\text{Asymp.sig} < 0.05$), the null hypothesis is rejected and the data is not normally distributed.

3.6.3.2 Analysis of the homogeneity of variance test

According to Arikunto (2010) homogeneity of the variance is one of requirements that should be fulfilled by experimental group and control group. It is used to check whether the experimental and the control group posttest score were homogenous or not. The following are the steps of analyzing of variance by using Levene test in SPSS 20 for window:

1. Setting the level of significance at 0.05 and establishing the hypothesis as follows:
 H_0 : the variance in experimental and control groups are homogenous.
2. Analyzing the homogeneity of variance by using Levene test in SPSS 20 for windows.
3. Comparing the Asymp.sig with the level of significance for testing the hypothesis. If the Asymp.sig is more than the level of significance ($\text{Asymp.sig} > 0.05$), the null hypothesis is not rejected and the variance of data are homogeneous. However, if the Asymp.sig is less than the level of significance ($\text{Asymp.sig} < 0.05$), the null hypothesis is rejected and the variance are not homogeneous.

3.6.3.3 Analysis of the independent t-test

As Kranzler and Moursund (1999, p. 90) state that t-test for independent is “to reflect a significant difference between the two groups under comparison”. Further, Arikunto (2010) states that independent t-test is used to seek the

difference between the mean of both classes, experimental and control groups. the independent t-test is conducted to see whether there is a significance difference between the experimental and control group's score on pretest and posttest. There are three steps in analyzing the independent t-test.

1. Setting the level of significance at 0.05 (two-tailed test) and setting hypothesis.

H_0 : there is no significant difference in means between control and experimental group.

2. Analyzing the independent t-test by using SPSS 20 for windows.
3. If the t obtain value is less than to t critical value at the level significance 0.05 (two-tailed), the null hypothesis (H_0) is not rejected, and it can be concluded that there is no significant difference in means between control and experimental group. If t obtain value is more than or equal to t critical value at the level significance 0.05 (two-tailed), the null hypothesis is rejected, and it means that there is significance difference in means between control and experimental group.

3.6.3.4 Analysis of the effect size

Effect Size is calculated to investigate how important the effect of the independent variable in practical terms. It means that effect size is a way to consider how well the treatment works if there is a large different between the two group's means. If the treatment worked well then there will be a large effect size. The formula of effect size as follows:

$$r = \frac{t^2}{t^2 + df}$$

Where:

r = effect size

t = t_{obt} or t value from the calculation of the independent t-test

df = $N_1 + N_2 - 2$

After the value of r has been obtained, the scores are matched with the following scale to interpret the effect size.

Table 3.8
Effect Size

| Effect size | r Value |
|-------------|---------|
| Small | 0.100 |
| Moderate | 0.243 |
| Large | 0.371 |

(Arikunto, 2010)

3.6.4 Analysis of the data from questionnaire

The researcher uses questionnaire to clarify the information and explain the data focusing the research question about what are the students' response toward the use of mind mapping in learning process to improve their reading comprehension ability.

In analyzing the data of the questionnaires, the answers of students on the questionnaires are categorized into three major findings, that are the students' responses based on general perception on their skill of reading before treatment was conducted, based on general idea on the students' skill after the treatment was conducted, and based on general ideas on their perceptions towards the use of mind mapping. Then three major points are also elaborated based on students answers of the questionnaires.

In the end, the researcher is interpreting the data to reveal the points which have been categorized. The finding of students' answers on the questionnaires are calculated and depicted in the chart.

The criteria percentage of respondent categories and described as follows:

Table 3.9
Criteria Percentage of Respondent

| Percentage of respondent | Criteria |
|---------------------------------|----------------------------|
| 1-25% | Small number of students |
| 26%-49% | Nearly half of students |
| 50% | Half of students |
| 51%-75% | More than half of students |
| 76%-99% | Almost of students |
| 100% | All of students |

The formula of percentage is used to analyze the questionnaires. The data are interpreted based on the frequency of the students' answers. The formula describes as follows:

$$P = \frac{F_0}{N} \times 100\%$$

Where:

P = percentage

F = amount of each response for certain question

N = amount of all response for certain question