

CHAPTER III

RESEARCH METHODOLOGY

This chapter is aimed at examining the effect of the 5E model to improve vocabulary at tenth grade of SMK Bahrul Ulum Menganti Gresik in terms of the significant differences between students who are taught using 5E model and those who are taught without using 5E model. It includes research design, population and samples of the study, research instrument, procedure of collecting data, and technique of analyzing data.

3.1 Research Design

The design of this study is quasi-experimental design. (Best, 1981:68) stated that “Quasi experimental design provides a less satisfactory degree of control, used only when randomization is not feasible”. Quasi experimental is the research that is like an experimental design but it is not quite equal to it. In quasi experimental, the researcher meets some conditions that cannot meet all the demand of a true experiment but still wants to answer causal questions. In which the pre-test post-test control groups design to fulfill purpose of this study, which is to find out the significant of 5E model influence to improve vocabulary mastery at tenth grade of SMK Bahrul Ulum Menganti Gresik.

The experiment is the event plan and carried out by the researcher to gather evidence relevant to the hypothesis. The experimenter deliberately and systematically introduces change into natural phenomena and then observes the consequences of those changes. The hypothesis stated the expected answer to the research question (Ary, 2002:103) is there are significant differences of

vocabulary achievement between the students who are taught using 5E model and those who are taught using other strategy to improve vocabulary.

The researcher used quasi-experimental because in educational research conducted in a school setting it may not be possible to assign subjects randomly to groups. Designs that do not include random assignment are known as quasi-experimental designs and are used where true experimental designs are not feasible (Ary, 2002:316). The design chart can be seen in figure below:

Group	Pre-test	Independent Variable	Post-test
Experiment	Y₁	X	Y₂
Control	Y₁	-	Y₂

Table1. Pre-test Post-test Quasi-Experiment Design

3.2 Population and Sample

The research is carrying out at SMK Bahrul Ulum Menganti Gresik in second semester 2011/2012 academic year. This school takes to be the object of experiment because SMK Bahrul Ulum Menganti Gresik was newly established in 2008. Another reason is 5E model has never been applied in this school. That was known by the researcher after she conducted the preliminary observation and interviewed some of the teachers in SMK Bahrul Ulum Menganti Gresik.

The population of this research is the tenth grade students at SMK Bahrul Ulum Menganti Gresik in second semester 2012-2013 academic years. The total number of the population was 30 students. The researcher took one class, class X-AK as sample of this research. They are divided into two groups. Which is half

the experimental group and other the control group. The researcher has a reason why take class X-AK , because X-AK class have the higher average at final exam in first semester (see appendix 1).

3.3 Research Instrument

The data of this study is taken from Accountancy class of SMK Bahrul Ulum. The class consists of 30 students. In collecting the data, kind of instruments that researcher uses is vocabulary test. A test means some questions to the students to be answered. Ary (2002:216) define that a test is set of stimuli presented to an individual in order to elicit responses on the basis of which a numerical score can be assigned. This score is an indicator of the extent to which the examinee possesses the characteristics being measured. In this study, vocabulary test employed in the form of a pretest and a posttest. The pretest and posttest were administered to the experimental and control group. Pretest gave to the experimental and the group to ensure that the sample have the same background and the same English proficiency before the treatments conducted. After the treatment, both groups would have a posttest to measure the influence of the treatment given. The researcher designed the pretest different from posttest but the test still equal in every item. She designed vocabulary test by herself from book sources from the school.

The type of the objective test chosen by the writer is multiple choices items. According to Alderson (2003:203) the objectives tests can be scored more rapidly and more reliably than either of the other types. The objective test is scored objectively. The test has only one possible answer. In this study the researcher

used an objectives test to know student's mastery in English vocabulary.

Vocabulary tests is a method use to collect the data by using, in order to know their mastery in vocabulary. The vocabulary tests given to the students were 20 items. They test in pre-test and post-test, selection of tests adapted with syllable of SMK X grade second semester; are traffic signs, degree of comparison, express preferences, express capabilities, asking and giving direction, invitation, and memo which included; 1) grammar, 2) meaning relationship.

Focus item	Question number	
	Pre-test	Post-test
Traffic signs	1, 2, 3, 4	1, 2, 3, 4
Grammar focus degree of comparison	5, 6, 7, 8	5, 6, 7, 8
Express preferences and capabilities	9, 10, 11	9, 10, 11
Asking and giving directions	12, 13, 14	12, 13, 14
Invitation	15, 16, 17, 18	15, 16, 17, 18
Memo	19, 20	19, 20

Table2. Distribution of questions

3.4 Procedure of Collecting Data

There are four steps procedure of data collection: first, validity and reliability test. Before conducting pre-test and post-test, the test items should be tried out in terms of its validity and reliability. A good test has some important characteristics, and the most important ones are validity and realibility. It is stated by Ary, (2002:227) validity is the most important consideration in developing and

evaluating measuring instruments. Validity was defined as the extent to which an instrument measured what it intended to measure. Reliability, on the other hand, is the extent to which a measuring device is consistent in measuring whatever it measure in term of content validity, and instrument must measure fairly the extent to which attested has learnt what the curriculum is intended to teach them (Ary, 2002:227).

The Validity of the test

Validity is the most important consideration in developing and evaluating measuring instruments (Ary, 2002:242). Sugiyono (2009:350) stated that the validity of the test instruments must comply the content validity and construct validity. With regards to validity, it is important to note here that an affective test will ensure adequate content validity and construct validity (Cohen, 2000:131). In order to check the validity of the the test, the researcher do it into two steps. The steps of check the validity of the test are:

a. Content validity

Content validity is achieved by ensuring that the content of the test fairly samples the class or fields of the situations or subject matter in question.

Content validity is achieved by making professional judgements about the relevance and sampling of the contents of the test to a particular domain. It is concerned with coverage and representativeness rather than with patterns of response or scores. To test the content validity, the researcher compare the contents of the instrument to the subject matter that has been taught.

b. Construct validity

Construct validity is achieved by ensuring that performance on the test is fairly explained by particular appropriate constructs or concepts. As with content validity, it is not based on test scores, but is more a matter of whether the test items are indicators of the underlying, latent construct in question. In this respect construct validity also subsumes content and criterion-related validity. To test the construct validity, the researcher constructs the instrument on aspects that will be measured based on the theory, and then the researcher consulted with the lecturer.

Based on a tryout that already held, the validity of instrument (pre-test and post-test) stated that valid in content with some improvements. Descriptive content of instruments can be seen at table 2 about distribution of questions that are appropriate with the topic in syllable for X grade at second semester (see appendix 10).

The Reliability of the test

Item reliability is the correlation between subjects' responses to particular item and their total test score. In calculating item reliability the researcher uses SPSS version 15 to help her with formula:

$$\alpha = \left(\frac{K}{K - 1} \right) \left(\frac{{}^s x^2 - \sum {}^s i^2}{{}^s x^2} \right)$$

Where

K : number of items on the test

$\sum {}^s i^2$: sum of variances of the item scores

${}^s x^2$: variance of the test scores (all K items)

In selecting items the researcher has two ways. First, consider removing questions if the correlation coefficient is less than 0.3 (for large sample sizes) and consider removal if the correlation between the question and the total does not reach significance. Second, consider Cronbach's Alpha value; if an Alpha if item deleted listed here is higher than the overall Alpha value, it should consider deleting the question.

The analysis result of the vocabulary tryout as follows (see appendix 2 and 3); the tryout of vocabulary tests for pre-test and post-test which consists of 30 items, and the researcher tried it out to the tenth grade students of tengering technical class at SMK Bahrul Ulum Menganti Gresik second semester 2012/2013 academic years. After trying out the items, the researcher analyzed the validity of pre-test and post-test items. The result showed that for the items of pre-test there were 17 valid out and 6 revised of 30 items of the test and for the items of post-test there were 13 valid out and 9 revised of 30 items of the test. At last, the researcher used 20 items for testing students' vocabulary in pre-test and post-test.

There were 20 valid out of 30 items. The analysis of realibility of pre-test and post-test shows that the coeficient of realibility is 0.613 for pre-test and 0.638 for post-test. Because the realibility is higher than r value (0.361) the instrument is reliable (appendix 7).

Second, the researcher chooses the subjects and divine group who were taught by using 5E model as experiment group and group who were taught by using other strategy. The researcher gives pre-test before treatment to both of of

groups as first data; the purpose of pre-test scores is to know the similarity is confirmed by similar group means. If the pre-test is similar and selection-maturation and selection regression interactions can be shown to be unlikely explanations of post-test differences, the result of this quasi experiment design are quite credible (Ary, 2002:318).

Third, after pre-test given, the treatment for both experiment group and control group are started. Each group is gotten different teaching models. Only the experiment group was exposed to the experimental treatment. The researcher give 6 (six) times treatments with a time allocation 2 x 45 minutes to the experiment group.

Fourth, after the treatments are over, all students of both groups measured on post-test. The score of experimental and control group are recorded and analyzed by using some statistical calculations for the data analysis. Finally, from the results those statistical calculations, interpretations, and conclusion are made.

3.5 Technique of Analyzing

The data analysis is carrying out in order to answer the research problems with the data obtain through pre-test and post-test. The researcher analyse the data by using Independent sample t-test. Since the samples are small and the groups are independent, the t-test for independent samples is carried out to determine whether the differences between experiment group and control group. The researcher use SPSS version 15 to compute descriptive statistics, it is conducted in

order to find the effect of the treatment whether there is effect of using 5E model on vocabulary mastery.

Assumptions for the Independent t-test are: (1) Independence: Observations within each sample must be independent (they don't influence each other), (2) Normal Distribution: The scores in each population must be normally distributed and, (3) Homogeneity of Variance: The two population must have equal variances (the degree to which the distributions are spread out is approximately equal). The steps of analyzing the result are:

a. Homogeneity Test of Variance

The analysis of variance, assume that variances are equal across groups or samples. For homogeneity test, the researcher uses Levene's *test of homogeneity*. The test statistic of Levene's test, p , is defined as follows:

$$P = \frac{(N - k) \sum_{i=1}^k N_i (Z_i - Z_{..})^2}{(k - 1) \sum_{i=1}^k \sum_{j=1}^{N_i} (Z_{ij} - Z_i)^2}$$

Where

- P is the result of the test,
- k is the number of different groups to which the samples belong,
- N is the total number of samples,
- N_i is the number of samples in the i^{th} group,
- Y_{ij} is the value of the j^{th} sample from i^{th} group,

$$z_{ij} = \begin{cases} |Y_{ij} - \bar{Y}_i|, \bar{Y}_i \text{ is a mean of } i^{\text{th}} \text{ group} \\ |Y_{ij} - \tilde{Y}_i|, \tilde{Y}_i \text{ is median of } i^{\text{th}} \text{ group} \end{cases}$$

The significance of P is tested against $F(\alpha, k - 1, N - k)$ where F is a quintile of the F test distribution, with $k - 1$ and $N - k$ its degrees of freedom, and α is the chosen level of significance (0.05).

b. Hypothesis Testing

Hypothesis testing procedures that use separate samples for each treatment condition (between subjects design). In hypothesis testing has three steps to analyzing the data, are:

Step 1: State the Hypothesis

$$H_0: \mu_1 - \mu_2 = 0 \quad (\mu_1 = \mu_2)$$

$$H_1: \mu_1 - \mu_2 \neq 0 \quad (\mu_1 \neq \mu_2)$$

Step 2: Set the criterion

The researcher use independent sample t-test with significant $\alpha = 0.05$ to interpret t-test and degree of freedom (df) for the independent statistic is $n_1 + n_2 - 2$ or $df_1 + df_2$.

Step 3: Compute the t-statistic

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{S_{\bar{x}_1 - \bar{x}_2}}$$

Where

$$S_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{S^2_{pooled}}{n_1} + \frac{S^2_{pooled}}{n_2}}$$