

## CHAPTER III

### RESEARCH METHODOLOGY

#### A. Research Method

This research aims to see the students concept mastery in concept separation pure substances and mixtures. The method was used in this study is a quasi experimental with design nonequivalen control group.

This research uses quantitative approach (John 2006), based on research objectives that want to be achieved then research method that chosen by researcher. In this research identify the students concept mastery when using video animation in the learning process.

#### B. Research Design

This research was chose two classess as a sample. The research design in this paper was comparing Pretest – Posttest (Oskar 2008) in two classess. In learning process in the control group, the concept was given by using Power Point Presentation. While in the experimental class, the concept was given by using video animation as a media.

In this research, pretest was given in both classess before the concept was delivered. After the concept has been delivered, the students were given the post test.

Table.3.1

Scheme of *Two Group Pretest-Posttest Design*.

	Pre-test	Treatment	Post-test
Control Group	O <sub>1</sub>	X <sub>1</sub>	O <sub>2</sub>

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Experimental Group	O <sub>1</sub>	X <sub>2</sub>	O <sub>2</sub>
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O<sub>1</sub> = Pre-test of students' concept mastery on concept Separation of Pure Substances and Mixtures

X<sub>1</sub> = Power Point Presentation

X<sub>2</sub> = Video Animation

O<sub>2</sub> = Post-test of students' concept mastery on concept Separation Pure Substances and Mixtures. (Martyn 2009).

### C. Population and Sample of Study

In this research random sampling used. The research was conducted in the 7<sup>th</sup> grade which are 7A and 7B in Junior High School in Lab School Bandung. The students in second semester of the year 2013/2014 will be involved into this research. The research will conduct for two weeks at 3 meetings. Population of this research is in 7<sup>th</sup> grade students. The 7A consist of 28 students, while the 7B consist of 27 students. So, the number of population in this study 55 students.

### D. Instructional Tools

#### 1. Lesson Plan

Lesson plan is the design of instructional arrangement that used to conduct the learning process. It is used to be teacher's guidance in conduct learning process to achieve the intended learning outcome and learning objectives. Learning objectives of each meeting is different.

#### 2. Learning Scenario

Learning scenario is briefly illustration of lesson plan. Learning scenario is the design of classroom activity for each meeting that describes initial activity until closing activity. Learning scenario in experimental group and control group is different.

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## E. Treatment

In this research, two kinds of treatment was used, which are showing video animation and power point presentation. Both of treatments are implemented into different groups, showing video animation and power point presentation were implemented in experimental group and power point presentation was implemented in control group.

### 1. Showing Video Animation

Animated visualization that show both structures and processes help teachers convey important scientific concepts in chemistry. According to Sorina (2010), “When running an animation it is important to distinguish between knowledge that involves animation (when the movement is essential to understand the acquired information) and knowledge with emphasis on animation (when the movement is not part of the context to be learned, but it is used in order to draw attention to some aspects of content).” The concept that used in this study is separation of pure substances and mixtures. This concept is divided into two sub topic, first topic is about pure substances and mixtures, second topic is about tecniques of separation. Both topic is delivered by using video animation. Video animations for those topics was taken from Youtube. Researcher was selected those video animations carefully. After that those video animations were eliminated by experts. They eliminated it based on their clarity of voice, suitability of topic, and time duration. Beacuse it should be understandable for the students.

### 2. PowerPoint Presentation

Microsoft PowerPoint is a presentation program in computer that developed by Microsoft in the Microsoft Office application package. Microsoft PowerPoint is an application that is widely used for presentation purpose, such as seminar, promotion of products, as well as scientific activity. PowerPoint is an application program that is used to create presentation in the form of text, table, picture, graph, diagram and etc. PowerPoint Presentation should be able to attract the attention of the audience and have good quality. In control group, PowerPoint

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Presentation was used to describe two sub topic, which is about pure substance and mixtures, and techniques of separation. The PowerPoint Presentation was made by researcher.

## **F. Research Instrument**

Research instrument is the process of collecting data, analyzing, and find the solution. The aim of the technique for collecting the data is to support the success of the research. According to Arikunto (2006:149), the technique of collecting data is the way that can be used by the research to collect data. There are pre-test and post-test for two classess. The pre-test conducted at the beginning of the research. Meanwhile, post-test will be given after conducting of the research.

### **1. Learning Achievement Test (Pretest and Posttest)**

Learning achievement test is an instrument that used to collect the development of students' concept mastering in the concept of separation pure substance and mixture. Learning achievement test that used in this study in the form of pretest and posttest.

Pretest is conducted before students implementing video animation in the learning process. Pretest is to investigate basic knowledge of the students in the concept of separation of pure substance and mixture.

On the other hand, posttest is conducted after students already have implementing video animation in the learning process. The purpose of conducting posttest is to measure the development of students' concept mastering after using video animation. Posttest activity could be conducted immediately after given the treatment.

The type of question that used in pretest and posttest is multiple choices about separation of pure substances and mixtures. It consists of five cognitive level based on Revised Bloom Taxonomy from C1 until C5. There are 30 questions used in pretest and posttest. Those questions spread of five cognitive level and have indicator for each question. Pretest and posttest is shown on the table below.

Table. 3.2

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## Indicator for Pretest-Posttest Questions

Indicator	Test Item Number
Describe the characteristics of mixtures and pure substance	1
Classify a variety of substances used in daily life as pure substance, solutions or mixtures	2, 3, 4
Differentiate the difference between homogeneous and heterogeneous mixture	5, 8, 10
Describe the other name of homogeneous mixture	6
Describe the parts of solutions	7
Describe the characteristics of suspension and emulsion	9
Describe the methods used to separate the components of filtration, dissolving, vaporization, evaporation, magnetism, and etc	11, 12, 13, 14, 15, 21, 26
Explain and understand about separation methods	16, 17, 18, 19, 20, 22
Compare the separation methods with other methods	30
Conclude the trapped substance in the filter paper	25, 27, 28, 29
Differentiate the properties of components	23
Evaluate and understand about mixtures	24

Instrument or test items should be tested before given to the students to know the quality of tests. Testing of instruments that have characteristics of both and must comply with several rules:

a) Validity of Test Items

“Validity of instrument is accuracy of instrument toward the concept that will be measured, so an instrument is called valid if it measure what is purpose” (Suherman, 2003: 102). An evaluation instrument said to be good when having high validity. High and low validity of the instrument can be calculated with the validity and is considered to be a validity coefficient. Validity of item test in this

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study is using judgement from the subject matter experts. The experts who judge the item test in this study is chemistry experts, they are two chemistry lecturers from University of Education in Indonesia. In this study, judges evaluate the appropriateness of item with the criteria such as indicator and level of cognitive. According to Lawshe, (1975), “if more than half the judges indicate that an item test is essential, that item test has at least some content validity. Greater levels of content validity exist as larger numbers of judges agree that an item is essential”. The item test could be rejection or repaired. Because of the judgement in this study 2 experts, so the item test will be rejection if only one person who agree with item test. They judge 61-item test, every item test have their indicator and level of cognitive. After judge with the expert, 19-test items are rejected, 13-test items are repaired, and 29-item tests are accepted.

Table 3.3

## Result of Validation Item Test

Test Item	Indicator		Cognitive Level		Note
	Yes	No	Yes	No	
1	I	I		II	Not used
2	II		I	I	Not used
3		II	II		Not used
4	I	I	I	I	Not used
5	II		I	I	Used
6		II	I	I	Not used
7	II			II	Not used
8	II		I	I	Repair
9	II		II		Used
10	II		II		Used
11	I	I	I	I	Repair
12	I	I	II		Repair
13	I	I	II		Used
14	I	I	II		Used
15	I	I		II	Repair
16	I	I	II		Used

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17	I	I	I	I	Repair
18	II		I	I	Used
19	II		II		Used
20	II		II		Used
21		II	I	I	Not used
22	II		I	I	Repair
23	I	I	I	I	Not used
24	II		II		Used
25	II		II		Used
26	II		I	I	Repair
27	II		II		Used
28	II		II		Used
29	II		I	I	Repair
30		II	II		Not used
31	II		II		Used
32	II		II		Used
33	II		II		Used
34	II		I	I	Repair
35	II		I	I	Repair
36	II		II		Used
37	II		II		Used
38	I	I	I	I	Not used
39	II		II		Used
40	II		II		Used
41	II		II		Used
42		II	II		Not used
43	II		II		Used
44	II		I	I	Used
45	II		I	I	Repair
46	II		I	I	Used
47	I	I	II		Repair
48	II		I	I	Repair
49	I	I	I	I	Not used
50		II	II		Not used
51	II		I	I	Not used
52	II		II		Used
53	II		II		Used
54	II		II		Used
55	II		II		Used

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56		II	I	I	Not used
57	I	I		II	Not used
58	I	I	I	I	Not used
59		II	I	I	Not used
60	II		II		Used
61	I	I		II	Not used

#### b) Reliability

Reliability of an instrument is intended as a tool that gives the same results if the measurement is given on the same subject although done by different people, at different times and different places (Suherman, 2003: 131). It is not affected by the behavior, circumstances, and conditions. High reliability measurement tool called a reliable gauge. Reliability of item test is conducted by test it to be students after test item was evaluated by the experts. Students who test the item doesn't come from experimental group and control group. It used 61 test items to calculate reliability. In this research, calculating reliability is using Anatest program to make it efficient.

Table 3.4

#### Reliability of Item Test

Reliability Statistics	
Reliability test	N of Items
0.51	25

Table 3.4 shows the result of reliability of item test. Reliability value in this table can be seen in the Reliability test column, it is about 0,51. As general interpretation, if the reliability value  $> 0,40$  it means that the test item which used is reliable.

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After instrument has been tested, it is given to experimental group and control group in the form of pretest and posttest. Pretest is given to determine prior knowledge of students in both group, meanwhile posttest is given to show the development of students' concept mastering in both group. All test items spread out into five cognitive level, as follow as:

Table 3.5

## Distribution of Test Items in Cognitive Level

<b>Cognitive Level</b>	<b>Test Item</b>
C1 – Remembering	1, 6, 26
C2 – Understanding	2, 3, 4, 5, 7, 8, 9, 10, 16, 25
C3 – Applying	11, 12, 13, 14, 17, 18, 19, 20, 21, 22
C4 – Analyzing	23, 27, 28, 29
C5 – Evaluating	15, 24, 30

## G. Research Procedure

In this research, there are three stages that have done. Which are preparation stage, data implementation, and the last stage is data analysis stage that described as follows:

### 1. Preparation stage

Before conduct the research , the researcher should prepare everything that needed in the research. In the preparation stage are mainly about the steps when the researcher preparing all instrument being used in research, as follow:

- a. Identify issues to be used as research material through observations or problem that happening nowadays.
- b. Reading some literature study such as journal as the foundation to determine the research problem of this study.

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- c. Determine the material that will be used in the research. In this research, researcher choose Separation of Pure Substances and Mixtures because this concept is one of complex concept that students need media.
- d. Making lesson plan appropriate with the material taken and video animation used in the learning process.
- e. Making instrument that will be used in the research. Some instruments need to support the research to be conducted such as Concept Mastery Test which is Pretest and Posttest.
- f. Before the instrument used, firstly it must be validated. In this research two experts judge the instrument to use in the learning process or not.
- g. Doing revision of the instrument to revise mistakes after judged by the expert.
- h. Giving instruments to the students to test the quality of questions.
- i. Calculating the reliability of test items.
- j. Select the test item which has a good validity and reliability.
- k. Determine research sample by using random sampling technique.

## 2. Implementation stage

In the conduct of research done stages as follows:

- a. Conducting the pretest with the same question to the control group and experimental group to know the basic knowledge of the students before the learning process.
- b. Teach the experimental group by using video animation as an media in learning activity. Meanwhile the control group using traditional teaching-learning model by powerpoint presentation that given by teacher during the lesson activity.
- c. After third meeting students given posttest with the exactly same questions as pretest question distributed to measure the improvement of student's concept mastery in both experimental and control group.

## 3. Final stage

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In the final stage performed the following steps:

- a. Data analysis done to process the data obtained from the whole research pretest and posttest data processing done by using SPSS 17.0.
- b. Making conclusion from data obtained, namely the improvement of student's improvement in concept mastery.

## **Research Flow**

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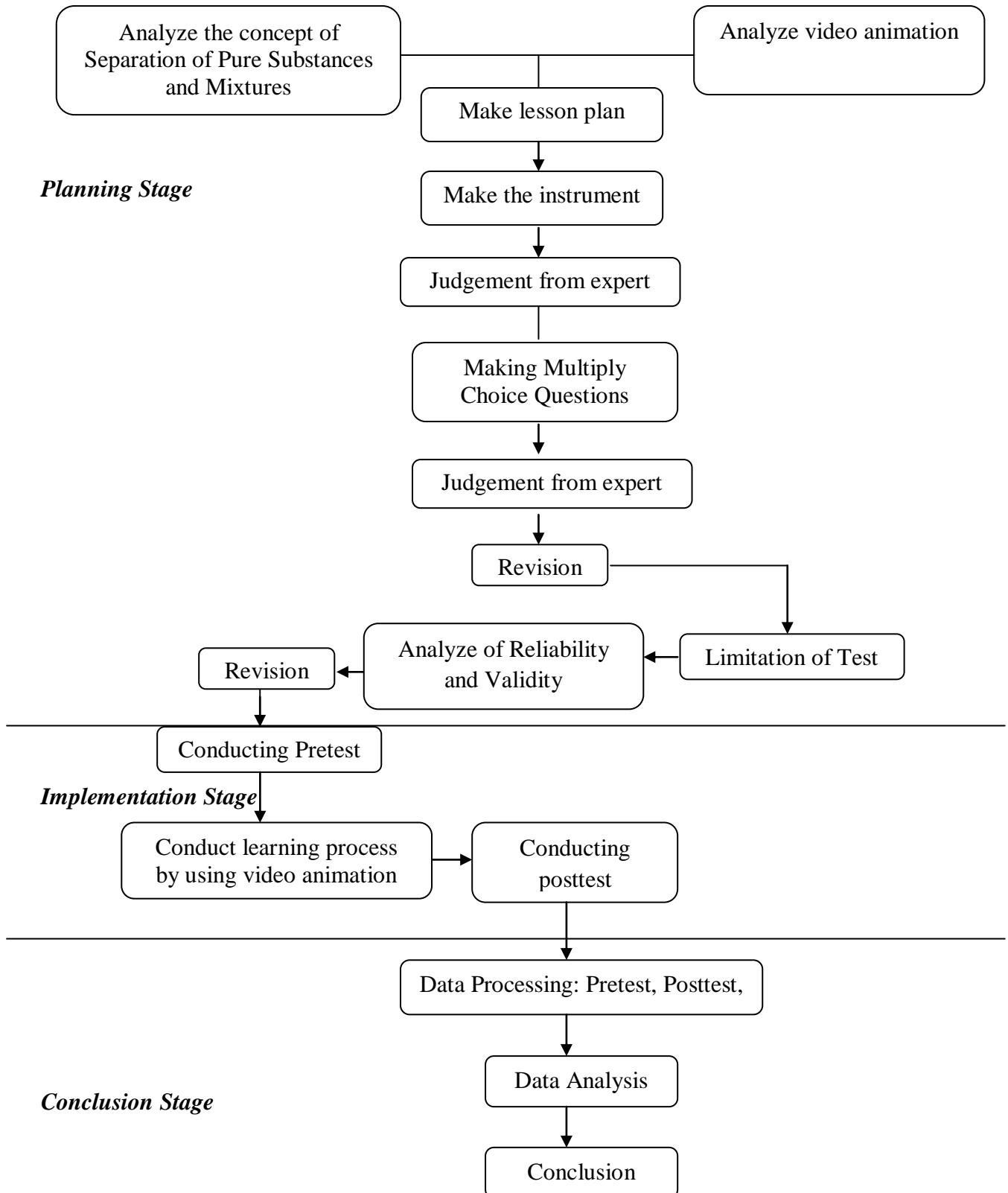


Figure 3.1

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## Research Flow

### H. Data Analysis

Data that has been acquired from research instrument then will be processed by using statistic. Statistic was used to analyze data. Researcher used SPSS 17.0 software (Statistic Product and Service Solution) which is a statistical computer program that capable to processing statistic data quickly and accurately, as well as serving in a variety of output.

#### A. Analysis the role of video animation in students' concept mastery

To simplify the data processing, all statistical tests in this research was used SPSS 17.0 software for windows. Details are written in below as follows:

##### 1. Normality Analysis

Normality is identified to search whether gain from experimental and control group are distributed normally or not. This analysis will be used as the consideration in analysis data whether the analysis use of parametric or non-parametric analysis test. If both data distribute normally, we can continue the data processing to homogeneity test. If the data show that the distribution from one or all the data not normally distribute, the data processing can continue using non-parametric statistic it is using Mann-Whitney test.

##### 2. Homogeneity Analysis

After the normality has been identified, the consideration of analysis method is not able to considered yet. Still another aspect which needs to be identified is homogeneity. If both data normally distribute and homogenous, the hypothesis test will be use is t-test, meanwhile if the data comes from normal and did not have homogenous variences then hypothesis test that will be use is t'test.

##### 3. Score of Mean Difference

Score of mean difference is done to determine whether both experimental and control group have the same mean score or not. If the data obtained normally distribute and has homogenous variences the next test will be t-test (independent t-test). If the data normally distribute and did not have homogenous variences then taht will be tested with t'test. Meanwhile if the data obtained did not

distribute normally and did not have homogenous variences the test will be use is non-parametric test which is Mann-Whitney test.

#### 4. Significant Test

To analyze the correlation of pretest and posttest result, the determination of normalized gain index is conducted. Normalized gain is calculated by using of the formula proposed by Hake (1998):

$$\langle g \rangle = \frac{\%posttest\ score - \%pretest\ score}{100\ \% - \%pretest\ Score}$$

Table 3.6

Table of N-Gain Criteria

<b>Gain</b>	<b>Interprets</b>
$g > 0,7$	High
$0,3 < g < 0,7$	Medium
$g < 0,3$	Low

#### B. Analysis of the improvement of Students' Concept of Mastery in Cognitive Level

To simplify the data processing, all statistical tests in this research was used SPSS 17.0 software for windows. Details are written in below as follows:

##### 1. Normality Analysis

Normality is identified to search whether gain of each cognitive level from experimental and control group are distributed normally or not. This analysis will be used as the consideration in analysis data whether the analysis use of parametric or non-parametric analysis test. If both data distribute normally, we can continue the data processing to homogeneity test. If the data show that the

distribution from one or all the data not normally distribute, the data processing can continue using non-parametric statistic it is using Mann-Whitney test.

## 2. Homogeneity Analysis

After the normality has been identified, the consideration of analysis method is not able to considered yet. Still another aspect which needs to be identified is homogeneity. If both data normally distribute and homogenous, the hypothesis test will be use is t-test, meanwhile if the data comes from normal and did not have homogenous variences then hypothesis test that will be use is t'test.

## 3. Score of Mean Difference

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## 4. Significant Test

To analyze the correlation of pretest and posttest result, the determination of normalized gain index is conducted. Normalized gain is calculated by using of the formula proposed by Hake (1998):

$$\langle g \rangle = \frac{\%posttest\ score - \%pretest\ score}{100\ \% - \%pretest\ Score}$$