

CHAPTER I

INTRODUCTION

1.1 Background

The concept of “learning by doing” (Bruner, 1990) is certainly not new; however, allowing the student to learn by doing within the classroom context is a departure from traditional methods. In this context, laboratories are important components of education to make students to gain experience. Especially when thinking that chemistry is totally an applied branch of science, the importance of laboratory applications in instruction is clearly understood. In the chemistry laboratory students become active in their learning by seeing, observing and doing.

In this technology era, the quality of teaching and learning also can improve so that it can increase the student achievement. Then, the instrument which is developed must be concordance with the student’s interest so that the teaching and learning process can be fun, interesting, and increase student achievement related to chemistry subject. The learning process is not difficult anymore.

According to Kemp (1994) the difficulty in learning are caused by the abstract and complex concept in chemistry subject. Another expert also has the same opinion, Poedjiaji (2005), “Chemistry is a difficult subject that is not quite attractive for student among the natural science subject.” Then, the teacher must design and implement many alternatives of learning strategy to motivate student in learning process. The good learning outcomes of students will be gotten if students are able to invest their knowledge based on observations and direct experiences (Dale, 1969).

This has become an obstacle for teachers to implement a real lab. Many schools have the incomplete laboratory facilities or even do not have a laboratory, so that the learning process is only done in class with the lecture method. As be seen when doing the observation to the school, there is a laboratory for science but it has been used as the classroom since the total of students cannot load the

classroom anymore. Then the virtual lab is the solution. Virtual lab is a teaching tool in a medium which is essentially to optimize student learning and improve learning outcomes. In this research, it is done by the simulation in computer using macromedia flash.

Many researchers and educational practitioners believe that Virtual laboratory has provided new insights into education. Duffy and Jonassen (1992) claimed that today's educational technology practices should indeed be couched in the constructivist paradigm. This plays out in terms of developing systems that are implemented in the real world as much as possible. Sung and Ou (2002) reported that VR's capability to facilitate constructivist-learning activities is one of its key advantages. Therefore, as an experiential learning tool, virtual reality is an enactive knowledge-creation environment.

Therefore, the researcher want to use the virtual laboratory media or simulation programs because it can overcomes some of the problems faced in traditional laboratory applications and make positive contributions in reaching the objectives of an educational system. It is not always possible to see the results of students' studies in a real laboratory application, especially in inadequate laboratory conditions. Use of simulation programs can overcome that mistakes occur as a result of such laboratory conditions or misuse of the laboratory.

Moreover virtual laboratory also overcome the possible dangers that can be seen in the real laboratory conditions. For example a dangerous experiment for human health is prepared in computer as simulations, so that students can see the experiments design and perform the experiment in computer and observe the result. Other than performing dangerous, difficult or impossible experiments, simulations have advantages from the time, security, cost and motivation point of view (Rodrigues, 1997).

Indonesian Government (Permendikbud No. 69 Tahun 2013) states that the curriculum enacted in 2013 started for students in academic year 2013/2014. The curriculum aims to prepare the 2013 Indonesian people that have the ability to live as individuals and citizens who believe, productive, creative, innovative,

and affective and able to contribute to society, nation, state, and world civilization. In the structure of the curriculum in 2013 SMA/MA there are additional hours of study for 4-6 hours per week. With the additional hours of study and the reduction of the number of Basic Competencies, teachers have the flexibility of time to develop a process-oriented by learning to make students more active. Student active learning process takes longer in deliveries process because students need information to perform exercises, observe, ask, associate, and communicate. From the description above, then needed a suitable method and media of learning that can help students increase their achievement and it is suitable for the curriculum 2013.

One of the learning models which is student active learning oriented is problem based learning model. Through problem-based learning, students will learn how to use an interactive process of evaluating what they know, identify what they need to know, gather information, and collaborate in evaluating a hypothesis based on the data collected. While teachers act more as tutors and facilitators to help students explore and find the hypothesis, and draw conclusions. Problem based learning is an innovative model that involves student to solve problems through scientific steps so that students are able to learn the knowledge which are related to the problem possessed and also have the skill to solve the problems.

Then, using of problem-based learning model can make the learning process more interesting and motivating students by giving them some problems. Nowadays, there are a few of teacher who build students' confidence to take on the problem, and encourage the students, while also stretching their understanding. PBL represents a paradigm shift from traditional teaching and learning philosophy, which is more often lecture-based. The construct for teaching PBL are very different from traditional classroom/lecture teaching. Combination of problem-based learning with virtual laboratory make the student receives learning matter easily thus will give the best result in learning process.

In study was conducted to make a contribution in evaluation of researches in computer based instructional activities as parallel to rapid development in

information technology, it is aimed to investigate the effects of problem based learning combined with virtual laboratory prepared by using computer animations which is suitable with curriculum 2013 in teaching “Solubility and Solubility Product”, a part of 11th grade chemistry curriculum on students’ achievement.

General chemistry knowledge is a core component of scientific literacy. In addition to being a long-established prerequisite for most of the traditional science, engineering, and medical fields, general chemistry knowledge is a foundation for many modern interdisciplinary pursuits such as forensics, environmental studies, and patent law. A basic chemical understanding also can assist everyday citizens with their personal choices as well as their participation in public policy decisions (Evans & Leinhardt, 2008). “Solubility and Solubility Product” is one of the important units in the chemistry. The matter of Solubility and Solubility product was taught in the second semester grade 2 SHS curriculum. It was one of subject matter categorized as difficult in SHS student because the subject is generally abstract to student. Also sometimes the calculation is rather difficult because they cannot match the suitable formula to the kinds of problem.

Based on the description above, researcher would like to investigate **“Effect of Problem-Based Learning Model Using Virtual Laboratory Flash Media on Student’s Achievement on the Teaching of Solubility and Solubility Product”**

1.2 Identification of Problems

Based on the background of the problems that have been presented, some problems are identified as follows:

1. Why do the teaching and learning process of in chemistry especially in Solubility and Solubility Product topic does not grow enthusiasm of students?
2. Why do teachers do not use problem based learning in teaching and learning process of chemistry topic?

3. Why teachers do not use virtual laboratory flash media in teaching and learning process chemistry topic?
4. How the improving of student's achievement using problem based learning model combined with virtual laboratory flash media and without problem based learning?

1.3 The Scope of Problems

In order to provide the right direction of this study, then some of the things that identified problems are constrained as follows:

1. This study is limited to observe the effect of Problem Based Learning using virtual laboratory flash media to improve students' achievement on Solubility and Solubility Product topic.
2. The student's achievements are acquired through pretest and posttest results individually.

1.4 The Problem of the Research

To give the instruction that can be used as the guidance for research then listed the problems below:

1. Is the student's achievement taught by using problem-based learning model higher than direct instructional model which both used virtual laboratory flash media in teaching of Solubility and Solubility Product topic?

1.5 Research Objectives

The objectives of this study are to know:

1. The significant differences of student's achievement which is taught by using problem-based learning and direct instructional model which both used virtual laboratory flash media in the Solubility and Solubility Product topic.

1.6 Research Significances

By this research can give the benefit especially for chemistry teacher about how to make the good learning by implementation of problem-based learning using virtual laboratory in teaching of Solubility and Solubility Product. The benefit from the result of this research is generally described such as:

1. As the reference for chemistry teacher about alternative the problem-based learning using virtual laboratory and applying in learning process.
2. As the attractive learning in improving student achievement with Solubility and Solubility Product topic.
3. Contribution to the process of learning chemistry that have insufficient laboratory facilities.
4. Perception to another researcher about problem-based learning using virtual laboratory.