CHAPTER I
INTRODUCTION

1.1 Background

The process of learning is often be the one case in school. From the teaching and learning process will be obtain a result. To obtain optimal learning results, influenced by the teaching and learning components, such as: how to organize the material, the strategy adopted, the media used and others (Silberman, 2007). Learning is the most basic activities in the overall education process in schools. Educational objectives achieved or not depends a lot on how the learning process experienced by students as a protege (Slameto, 2003).

Based on the above opinion is clear that learning activities are psychic and physical activity of students in the learning process through the guidance of the teacher. At the time of an active student, by itself it is also active soul, and vice versa. A teacher can only be present and provide learning materials, students are processing and digesting itself in accordance with the will, skills, talents, and background.

As accepted throughout the world the idea of using student centred constructivist based instructional methods is widely accepted, since teacher centred, traditional instructional methods has given insufficient opportunities for student to construct their own learning. Eliciting students' individual capabilities, intelligence and creative thinking can only be achieved through student centered instructional methods.

Although constructivism is a learning theory that describes the process of knowledge construction, it is the application of what are often referred to as 'constructivist practices'in the classroom and elsewhere that provides support for the active knowledge-construction process. Since, most of the contents of science lessons are abstract topics, to make students to understand such topics it is necessary to use constructivist based student centered instructional methods.

The concept of ‘‘learning by doing’’ 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. Such kinds of application cause not only a better but also a permanent learning. Many researchers in science education admitted that laboratory studies increase students' interest and abilities for the science subjects (Bryant and Edmunt, 1987).

The chemistry has its own characteristics. The difficulties in studying chemistry related with its characteristic, they are: 1) a number of chemistry is abstract, 2) chemistry was simplification from the fact, 3) chemistry are succesived and developed quickly, 4) chemistry is not only consisted of numeric problem but also the explanation of its facts, laws, terms and ect. 5) many material have to be studied (Situmorang, 2010). So, we need an appropriate method and media due to those characteristics.

Acid-base titration is one of chemistry subject matter served in senior high school. This matter must be discussed in class XI. The materials are widely consisted of things that are needed to be understood not just by reading the book or simply asking the teacher. This matter is full of abstract thing, because we discuss about very small particles and their interaction to another. Therefore, to make the teaching of acid-base titration more interesting and be easily understood, some experimental method must be applied. In other word, laboratory method is quiet good for this matter.

Although laboratory application in students' learning has a very important place in science education, in use, it has some limits and problems, especially in developing countries. From 29 Senior High Schools surrounded in Medan, showed that 65.5% of Senior High School have the laboratory but have not properly used it, because laboratory activity has not been implemented in accorance with the expected quality and quantity (Jahro, 2009).

Spesifically, the main problems of this laboratory method conducted in our region can be summarized as the author faced the teaching and learning process during my field experience in SMAN 2 Kisaran for August until November 2013 as follows: 1) In conducting experiments and arranging with equipment, the laboratory activities are quite expensive, 2) For planning and application, it is much time consuming, 3) Checking students' performance during the activities can be difficult in over-crowded classes and 4) The Lack of laboratory or equipment, or insufficient lab conditions which limits the teacher to perform a simple lab activity.

As mentioned above, in the real situation, sometimes due to the limitation of equipment, limited time allocated for the topic or insufficient laboratory conditions, force teachers to perform laboratory activities in crowded groups, or sometimes a demonstrational activity can be performed. This application is opposed to the basic constructivist philosophy at laboratory method which accepts that knowledge can be gained through personal experience and observation. When taking these limitations into consideration looking for appropriate alternatives is inevitable. Among these alternatives, the use of educational technologies, more specifically use of computer in supporting the laboratory methods can be a logical one.

Many researchers and educational practitioners believe that Virtual reality (VR) technology has provided new insights to support education. Today's educational technology practices should indeed be couched in the constructivist paradigm. This plays out in terms of developing systems that are situated in the real world as much as possible and are as experiential as possible. 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. (Tuyzuz, 2010)

Interactive learning environment by using animations and simulations for abstract topic, where students become active in their learning, provide opportunities for students to construct and understand difficult concepts more easily In this research, appropriate simulations and applications based on

simulations generally increase learning speed by allowing students to express their real reactions easily. Better designed simulations provide students opportunities to express their cognitive style and to choose from the computer screen. Such opportunities allow students to develop their own hypothesis about the topic and develop their own problem solving methods.

Therefore, use of VR in labs, in other word, use of virtual laboratory or simulation programs, 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.

One of the most promising computer applications in science instruction is the use of simulations for teaching material, which cannot be taught by conventional laboratory experimentation (Mintz, 1993). But can a simulation be as effective as a conventional laboratory or replace it? More than two decades several studies have been performed about whether the computer simulation experiments or traditional laboratory experiments are effective on the students' achievement about science subjects. The answer would be that it depends on the concept or the situation.

For example, the comparison of achievement among students instructed using hands-on Chemistry labs versus those instructed using virtual Chemistry labs (eLabs). They found out that there were no significant differences in achievement gain scores for the traditional versus the online students. They commented on that the findings obtained from their study demonstrated that students who completed the traditional, hands-on labs performed as well as students who completed the virtual labs (Kerr et al, 2004). In our country, this Virtual Laboratory has been tested for Senior High School especially in Medan. The student achievement taught by using computer-based learnig media (Virtual Lab) is significantly higher than conventional method on solubility and solubility product (Oktavia, 2013).

Based on the reasons mentioned above, the author tries to apply this Virtual Laboratory in research, entitle:

The Difference Between Virtual Laboratory Media and Real Laboratory to Increase Student's Achievement in Senior High School on Learning Acid-Base Titration

1.2. Scope of The Research

In order to make it easier to understand the problem and to simplify the implementation of the research, it is necessary to make a scope of study, they are:

1. The subject matter is Acid-Base Titration
2. The media that is used is virtual laboratory
3. The program that is used to support the media is macromedia flash

1.3. Problem Formulation

Based on the background described above, then the problem can be formulated as follows:

1. Is there a significant difference of student's achievement on learning the acid-base titration using of virtual laboratory and real laboratory ?
2. Is there an improvement of students character of responsibility and activeness on learning acid-base titration by using virtual laboratory media ?

1.4. Problem Limitation

This research focuses on the difference virtual laboratory media and real laboratory to increase student's achievement on learning acid-base titration and observing the improvement of students character of responsibility and activeness taught by virtual laboratory media. The research was conducted in Class XI of Senior High School in Medan, and the topic that was taught by this media is acid-base titration.

1.5. Research Objective

The research is done by the purpose to know:

1. There is a significant difference in student's achievement of learning the acid-base titration between the using of virtual laboratory and real laboratory.
2. There is an improvement of students character of responsibility and activeness on learning acid-base titration by using virtual laboratory media.

1.6. Research Benefits

This study is expected to provide benefits, especially for chemistry teachers and also for the other researcher about how to improve learning through computer-based learning (virtual lab) in student achievement on the learnig of acid-base titration. The expected benefits of this research are spesifically described as follows:

1. For Chemistry teacher, computer-based learning (virtual lab) as a learning media and as an effort which can improve student's achievement and students character of responsibility and activeness
2. For other researchers, it can be a modal to make a further research related to the study.