

CHAPTER I

INTRODUCTION

1.1. Background

Basically the vision of science education is to prepare the students to have an understanding of science and technology, through the development of thinking skills, attitudes and skills in an effort to understand themselves, they will be able to manage the environment, can overcome the problems in the environment. Fenrich (in Pranomo, 2008) state that, in the long run, the vision of science education provides critical thinking ability, logical, systematic, be creative, diligent, disciplined, follow the rules, be able to work together, be open, confident, have job skills, social skills, communication skills and other basic capabilities which is a scholarly work continuously need to be developed to provide students in the face of the challenges in an increasingly competitive society.

Wiederhold (in Costa, 1980) state that, the underlying philosophy is the study of the basic capabilities of this scientific work is the very essence of science which holds science as a product and a process. As a product, is the science of Sciences acquired through a structured process of active, dynamic and explorative of inductive activity (Carin, 1997). Next learning science is based on constructivism learning theory which holds that learning is an activity to build knowledge that is done by the students based on the experience of previous owned (Ramsey, 1993). The learning process is carried out through an exploration of the stages which have experience through scientific activities started with the observation of primary and or secondary data up to the conclusion that a new knowledge. Learning is an activity to apply new knowledge on relevant issues conducted in inductive and deductive, which is an activity that develops thinking and acting in a sustainable way (Zevenbergen *et al.*, 2010).

According to Ariani and Haryanto (2010), doing science with basic scientific work ability gives an understanding of the basic knowledge, thinking,

and higher-order thinking, developing a critical attitude, logical, systematic, disciplined, objective, open and honest, cooperative, curiosity, love to learn science. In addition, it will foster job skills through relevant activities. The attitudes and skills ability to grow "science disposition", i.e. the desire, awareness and dedication to science is needed in 21st century technology. The purpose of learning starts with a desired or would like to know the students. Dalton (2008) state that learning based on constructivism reference gives students experience as a means to form knowledge. The provision of science learning, students are required to develop the science process skills, inductive thinking, scientific attitude, skill manipulation tools, communication skills all of which are integrated in the basic skills of scientific work (Liliasari, 2009)

According to (Arifin, 2005), currently, the problems of the quality of secondary education are often discussed and debated, especially not the achievement of a quality education which evenly even if Indonesia has used the national curriculum as a guide. Various efforts to improve the quality of education continue to be done in various ways, but the indicator towards the improvement of the quality of education is still slow. Improved quality of education should always be done continuously, either conventionally or through innovation in anticipation of the changes to be faced by the students, so as to be able to think globally and act in accordance with the culture of Indonesia (Pandley *et al.*, 1994)

Chemistry is one of the disciplines of the natural sciences that focus on studying the matter and energy in terms of the nature of the reaction, structure, composition and the energy changes that accompany reactions. Its allow students to understand why and how the phenomenon occurs in the vicinity (Amien, 1988). Chemical concepts of empirical research are generally based on the structure of matter and chemical bond is the subject material that difficult to study. The nature of the concepts of chemistry are also in line with the concept that involves the mathematical calculations. This shows that the lessons of chemistry requires a set of higher-order thinking skills. One of the capabilities that require chemical is

"Chemical Equilibrium". Chemical Equilibrium contains concepts difficulties analysis concept in study and teach it.

Many research findings revealed the students difficulties on the concepts relating to the topic of chemical equilibrium which is, stated that students have difficulty in describing the scheme of particulate matter and transfer to the sub-micro symbolic representations in equilibrium in solution. According to Orgill & Shuterland (2008) states, although students are able to complete the calculation (as a symbolic representation), but find it difficult to represent aspects of the system submicroscopic solution. Based on this problem researchers intend to make innovation of teaching materials, in order to facilitate the students to understand the concepts learned.

According to Atwi Suparman on (Suhi achmad, 2009), improving the quality of education should always be performed conventionally or through innovation. Innovation in education is seen as central concept for obtaining change for a better education, as it believed that the quality of education is an indicator for the development rate of the country. The common approach of innovation is a changed in a significant and substantial respect for the innovated object. The innovations in education are including the invention, diffusion and adoption, communication and utilization that produce better result. Innovation in education could be in a new practice in technology of teaching, aided instruction, teaching and learning activities, learning material, and another practice that bring improvement in education sector.

According to Joice and weil in Nahadi (2010), innovation in education are often linked with the renewal that comes from the result of creative thinking, findings and modifications that make the ideas and methods that are used to address a problem of education. Educational innovations also include a plan or pattern that can be used to build learning instructional materials in the classroom or outside class including learning materials. Thus, innovation in the learning materials very urgent to implement so that the delivery of the material to be

focused and able to support the achievement of competence of students in learning. Therefore, it is necessary that learning can make students understand about the subject presented and can be applied in everyday life. Need a concrete attempt to design learning which gives ease to students in solving problems and guide students to associate of science in real life creatively (Giantcarlo and Slunt, 2004)

Innovation learning materials on chemical subjects especially on the topic of Chemical Equilibrium is also very necessary as it relates to the improvement of the quality of graduates in employment fill the field of chemistry. The utilization of information technology for learning has also encouraged a shift from the conventional learning, learning to be independent so that the impression of learning long remembered by students, in addition to the technology will make students more interactive learning independently, besides learning innovations can also provide increased efficiency and effectiveness of learning toward renewal (Ingo Eilks and Bill Byers, 2009).

A good learning materials must be able to present the teaching material according to the demands of the curriculum, following the development of science and technology and can bridge the learning for competencies has been established can be achieved (Rosenberg, 2001). Chemical materials in the learning materials should be systematic, complete, easier to understanding, attract, motivate independent study and has additional material as appropriate to the characteristics of student enrichment. The research aims to produce innovative chemical materials in hardcopy and electronic forms to support the achievement of desired competencies (Bruner, 2010).

Studies that have been made connection with the development of innovative and interactive chemistry learning material on the topic of chemical equilibrium that Vika Hardila (2012) with the title “The Influence of Critical Thinking Developments in learning Salt Hydrolysis Concept Through Chemistry Modules to Increase Student’s Achievement Grade XI” with student’s achievement from normalized gain which taught using critical thinking

development through module is 74% whereas in the control class (without module) is 61%. The other researcher that have been made in connection with the teaching method that Dimas Frananta S (2013) with the title “The Effectivity of Innovated Learning Module and Demostration Methode with Macromedia Flash Animation to Improve Student’s Achievement on the Teaching of Salt Hydrolysis” with effectiveness percentage of innovated module is 74,25% for student without module and 84.33% with innovated module.

Based on the description, researchers are interested in doing some research and trying to develop innovative learning materials in learning chemistry. This research entitled “**The Development of Innovative and Interactive Chemistry Learning Material on the Teaching of Chemical Equilibrium**”

1.2. Problem Identification

Based on the background of that which has been described previously, some problems can be identified as the following:

1. The arrangement of chemistry learning material on the topic of Chemical Equilibrium to order it is suited to the common curriculum.
2. Prepare an innovation and interactive chemistry learning material on the topic of Chemical Equilibrium in order the teaching and learning process can be proceeded optimum.
3. Make innovation on to the chemistry learning material of Chemical Equilibrium in order the students can easily to study chemistry.
4. Standardize a developed learning material to meet the standard provided by *Indonesia Education National Standard Beareau* (Badan Standar Nasional Pendidikan).

1.3. Problem Formulation

Based on the background that has been stated previously, then the formulation of the problem in this study are:

1. How the arrangement of chemistry topic Chemical Equilibrium to order it is suited to the common curriculum?
2. How to prepare an innovative and interactive chemistry learning material on the topic of Chemical Equilibrium in order the teaching and learning process can be proceeded optimum?
3. What kind of innovation can be made on to the learning material of Chemical Equilibrium in order the students can easily to understand chemistry?
4. How to standardized a developed learning material to meet the standard provided by *Indonesia Education National Standard Beareau* (BSNP)?

1.4. Problem Limitation

In order for this study did not deviate from the purpose of research, the problem in this study should be limited. From the formulation of this problem, so that limit the problem in this study are:

1. Arranging and developing the standard innovative and interactive learning materials on the topic of Chemical Equilibrium.
2. Preparation of innovative and interactive teaching materials developed from the general chemistry textbooks used in the Science Faculty, State University of Medan.
3. Analyze the student's opinion to the textbooks used in university.
4. Teaching materials will be reviewed and revised by the chemistry lecturer and students in Chemistry Department to obtain the standard learning materials.

1.5. Research Objectives

The objective of this research is to develop an innovative and interactive learning material on the teaching of Chemical Equilibrium in the university. The specific objectives to be achieved in this study are:

1. Arrangement of chemistry learning material topic Chemical Equilibrium to order it is suited to the common curriculum
2. To prepare an innovative and interactive chemistry learning material on the topic of Chemical Equilibrium in order the teaching and learning process can be proceed optimum
3. To know what kind of innovation can be made on to the learning material of Chemical Equilibrium in order the students can easily to study chemistry.
4. To standarize a developed learning material to meet the standard provided by *Indonesia Education National Standard Beareau* (Badan Standar Nasional Pendidikan).

1.6. The significance of Research

The advantages that were hoped from this research:

1. Chemistry teacher can use teaching material as module to make an effective teaching and learning and to increase student's achievement.
2. For researcher, to develop and standardize the teaching material as module to be used in student in university.
3. Student who learn chemistry can understand the topic of Chemical Equilibrium easier, more attractive, and enjoyable.
4. For the next researcher, can contribute the ideas to do the other researcher.

1.7. The Operational Definition

Based on that explanation, the operational definition as the following:

1. Innovation are research activities, development, and engineering which aims at developing or applying the practical value and the context of the new science, or new ways to apply science and technology that already exists in the product or production process because Innovative for learning material here is a learning that is designed/ composed by integrating new innovations in the learning with the goal of keeping students more easily understand the learning done. Innovation is a new breakthrough that is different from the ordinary (conventional) learning, such as the addition of the media in the process of learning, the formation of discussion groups and so on.
2. Interactive learning material are a modification of material to meet attractive one. Said interactive because the user will experience the interaction and being active for example actively paying attention to images, pay attention to the writings of varying color or motion, sound, video and even animated films.
3. materials are all materials (both information, tools or text) that are arranged systematically, which shows the figure of the whole of the competence to be controlled by the learners and are used in the process of learning with the aim of planning and review of the implementation of the study.
4. *Indonesia Education National Standard Beareau* (Badan Standar Nasional Pendidikan) is an independent institution, professional, and independent mission to develop, monitor and evaluate the implementation of national education national standard