

## CHAPTER 1

### INTRODUCTION

#### 1.1. Research Background

Education plays an important role in creating human quality. The central purpose of education is learning to think. As part of education, teachers need to develop and learn effectively their skills to make the learning process being successful and how to stimulate the critical thinking of students (Shofiyah,2013). The success of the learning process is the main thing that is expected to carry out education in school. The teacher must have the ability to develop and exploiting methods of learning to prevent the material becomes more attractive so that the objective of learning can be achieved correctly.

The development in the education sector is one of key roles for the development of the nation. The data obtained from the national examination showed that the level of graduation rate in senior high school (SHS) in 2013 is decreased compared to 2012. It can be seen from the decline in the percentage passing of national examination for senior high school about 0,02 percent from the previous year (<http://nasional.sindonews.com/read/htm>). Furthermore, the average student's achievement in Chemistry from the Indonesian national examination (UN) were obtained successfully in 2005 was 4.25, in 2006 was 4.50, in 2007 was 5.00, in 2008 until now in 2014 was 5.50 (<http://bsnpindonesia.org/id>). These achievement is categorized as in medium achievement.

The chemistry subject matter is one of the compulsory subjects in senior high school, especially in the natural science program. The existence of chemistry subject in the curriculum is also as the foundations for studying various fields of science and technology. Chemistry subject as basic science can also be used as a tool to develop the intelligence of students, including in reasoning ability and solving scientific problems. In Chemistry subject is developed based

on experiments seek answers to the questions of what, why, and how the natural phenomena, especially relating to the composition, structure, properties, transformation, dynamics and energetics substance so the study required a high level thinking skills (Pohan, 2013). It is expected that the professional Chemistry teacher has to be able to make chemistry more relevant, enjoyable, easy and meaningful to students (Sola, 2007).

Based on experience of researcher at PPLT Unimed at SMAN 1 Perbaungan 2014, particularly in class X and XI Science, student learning outcomes in chemistry subject were still relatively low. One of the problems that lower student's achievement in learning chemistry is that many students' assumption about chemistry subject is one of a difficult subject to learned and it is possibly caused by the difficulties in learning process faced by the students, and the lack of the teacher in communicating the subject by using interactive methods in teaching learning process. There was no willingness of the students to learn and understand the lesson so they ignored this subject. Consequently, the teaching learning process was not running optimally due to the students could not achieve the standard score. The low student achievement in learning chemistry subject can be interpreted as a lack of effective and innovative teaching learning process.

Learning is related to the success of the learning process that outcome will determine the student's achievement will be achieved. Therefore, in choosing learning methods, a teacher mus pay attention to several things; conformity with the purpose of learning methods and teaching materials, teaching methods and conformance with environmental education(Siahaan, 2014).

Based on the interview data with the teacher who taught chemistry subject on January 2012, the method used in teaching and learning process was conventional method or just giving lectures and assignments. This method is less effective in triggering the activity of students, while also caused boredom in the students themselves. While the result of the interview with class XI IPA at SMAN 2 Boyolali academic year 2011/2012 in mind that according to their thinking,

chemistry is a difficult subject. Besides, the use of there is no variation method in teaching learning process so that the students are bored with that teaching learning process (Fajri, et all 2012).

According to (Win, 2008) the difficulties of learning that students experienced have been rising because they can't develop their selves according to their capacities. Generally, school purposed to the student who has middle ability so student who has less ability are ignored. Actually, every student has different intellectual activities, physics, background, habit and teaching approach between one student and the other. The difficulties of learning that student experience consists of internal and external factors. Internal factors involve cognitive, affective and psychomotoric domain. Where eternal factors involve the family, society, and school and the environmental.

Based on the observation at SMAN 13 Medan, information obtained by interview with some students in class X and XI Science, most of student feel interesting with chemistry subject, but the activity of students in learning this subject was very low. Most of them said that in chemistry subject teaching learning process the teacher still using direct instruction where the teacher explaining and writing on the white board and the students generally only listened, read, and memorized the obtained information, so the concept of chemistry subject was not embedded deeply in students caused the center learning was the teacher. On this issue, teachers are required to be able to choose the interesting model and also use variation media that can increase student's motivation to developed student achievement better.

The prevention of using conventional method must be running in a row with it. Many conventional learning methods which are used by teacher are just to present a subject matter that makes the students tend to be lazy to think and just listen to the explanation withaout understanding what was said by the teacher, just say that one of the conventional learning method is mostly covered by Direct Instruction learning model. This model brings one direction communication where teacher dominates teaching and learning process without paying attention to what

students actually need and wants, this makes the students get bored and sleepy easily. But actually the case is that a teacher is expected to be able to present the subject matter as interesting as possible, so that the students are going to be interested in being creative and active in learning activities (Roestiyah, 2001).

In fact we consider that chemistry is subject matter which is have application in daily life, so the students must be mastered it not only in theory but also their capability of discovering concept or doing experiment and also in calculation data. One of chemistry topics which need understanding in concept, experiment, and calculation is Solubility and Solubility Product. The scope of this topics includes (1) The definition of solubility, (2) Solubility product ( $K_{sp}$ ), (3) The relationship of solubility ( $s$ ) and solubility product ( $K_{sp}$ ), (4) The effect of a common ion and pH on solubility, and (5) The relationship of solubility product ( $K_{sp}$ ) to precipitation (Simaremare, 2012). Solubility and solubility product is a concept that adequately represent the abstract of chemistry lesson so that the subject is difficult to understand. So to fulfill the competences need to be achieved there must be understanding obtained from discovering the concept. Here, students are obligated to have analysis ability of observing, classifying, suspecting, explaining, measuring, and making conclusion. If the students have low quality of analysis, there will be a big possibility of getting misunderstanding about the concept (Prayogi, 2013). As an alternative model in learning to improving student activity in learning, researcher choose one of the Inquiry Learning type which focus on student's analysis ability but still under the guidance of teacher as facilitator, motivator, and role model. This type is Guided Inquiry Learning. In this model the problem is given to students, but they are self-directed in terms of designing procedure and exploring the answer (Smitheny, 2010).

The comparison between the guided inquiry and the traditional method for teaching of the structure of matter showed a significant supremacy of the first method. The statistical analysis showed the means are  $M_1 = 43.99\%$  for control group (traditional method) and  $M_2 = 70.67\%$  for experimental group (guided

inquiry method). There is statistically significant difference between two sample (Vlassi and Karaliota,2013).

The using of concept mapping as learning media also can increase student more active in learning. A concept mapp stimulates this process by requiring the learner to pay attention to the relationship between concepts. Concept mapping techniques are iterpreted as representative of students knowledge structures. A concept mapping includes nodes (terms or concepts), linking lines (usually with a unidirectional arrow from one concpet to another), and linking phrases that describe the relationship between nodes. Two nodes connected with a labelled line are called a proporsition. Moreover, concept arrangement and linking line orientation determine the map's structure (Yin at al., 2001; Erdem, Yilmaz, and Oskay, 2009). There is a common view that using the concept maps as teaching materials by the teacher enables students to get the contents and have confidence in themselves in the teaching process. However, there are views that it could lower the participation in learning process as it practice students (Beydogan and Bayindir, 2010).

In her research depending on concept mapping, Pohan (2013) observes the student's achievement that be taught with concept mapp strategy is higher than conventional method with  $F_{\text{count}} = 52.73 > F_{\text{table}} = 3.92$ . Also some researchers use the concept maps as material synthesizing the information and the effect of using concept mapping can increase participation of students in learning. The results revealed that concept maps were informative for teacher educators and have the potential to improve student teacher's learning and contributed to their awareness of learning process (Buldu and Buldu, 2010).

Beside teaching method, another thing that influenced to achieving student's achievement is metacognition which is internal factors of student's motivation. Succes and failure of students in learning are among the most motivation factors. The students perception use for explaining their performance, succes or failure in learning. Most of student did not know what factor that can analyzed their succes or failure in learning. According to Flavell (1970) in

(Hrbackova, Hladik and Vavrova, 2012) described theory of “thinking about thinking” as metacognition. It means knowledge of one’s own cognitive proces, as an example knowledge of how one learns and acts as weel as control of these process by the person who learns in various situation. High ability in student’s metacognition given chance to achieved success in learning, because from that student’s metacognition can observed how far student’s effort in improving their learning (Purwaningsih, 2011).

It is absolutely efective to use this kind of learning model on the teaching and learning activities. Therefore, due to the condition described above, the researcher was interested intently the research entitled **The Effectiveness of Guided Inquiry with Concept Mapping Toward Student’s Metacognition and Student’s Achievement In the Teaching of Solubility and Solubility Product.**

### **1.2. Problem Identification**

Based on the background describe above, problems can identified as follows:

1. Student’s achievement is low
2. The chemistry subject is a difficult/ abstract with calculation concept
3. The lack of student’s activity in learning chemistry subject
4. Teaching and learning process are generally running by conventional way where the process tend to dominated by teacher centered learning
5. The lack of theoretical and practical understanding about science especially chemistry

### **1.3. Problem Limitation**

In order to keep this research more focused and directed, research was limited as follows:

1. The research will be conducted in Senior High School in Medan, North Sumatera and limited to the grade XI even semester of academic year 2014/2015
2. The topic was limited to the unit of chemistry of solubility and solubility product
3. Teaching method used in this research was limited to the learning of model of Guided Inquiry with concept mapping as experiment class and direct instruction with concept mapping as control class
4. In this research, the study was limited to the investigation the correlation of student's metacognition to the student's achievement obtained by Guided Inquiry with concept mapping

#### **1.4. Problem Statement**

To give the direction of this research, the problem statement in this research more formulated as follows

1. Is the student achievement that be taught by guided inquiry with concept mapping significant higher than the student achievement that be taught by direct instruction with concept mapping?
2. Is there any significant correlation between student's metacognition to the student's achievement obtained by Guided Inquiry with concept mapping?
3. What is descriptive explanation of the Student's Metacognition obtained by Guided-Inquiry with concept mapping?

#### **1.5. Research Objective**

The general objective of this research was to investigate the effectiveness of implementing Guided Inquiry with Concept Mapp learning model in improving senior high school student's learning outcome on the teaching of solubility and solubility product. The specific objectives of this research were to investigate:

1. Whether or not the students achievement that be taught by Guided Inquiry with concept mapping is significant higher than the students achievement that be taught by Direct instruction with concept mapping
2. Whether or not there is significant correlation between student's metacognition to the student's achievement obtained by Guided Inquiry with concept mapping
3. Knowing the percentage of student's metacognition including knowledge of cognition (KC), monitoring of cognition (MC) and regulation of cognition (RC) obtained by Guided-Inquiry with concept mapping

#### **1.6. Research Benefit**

This research was expected to:

1. Provide guidelines for science teacher especially chemistry teacher to implement Guided Inquiry with Concept Mapping on the teaching of chemistry topics
2. Give reference of best teaching model (Guided Inquiry with Concept Mapping) which can improve the student's achievement on the teaching of solubility and solubility product
3. Establish both basic and advanced knowledge of students about interesting model and media in learning
4. Give motivation to teachers to conduct similar and better research examining learning model to chemistry topics
5. Provide inputs for next researchers to do similar research in the future

#### **1.7. Operational Framework**

Learning is usually defined as a change in an individual caused by experienced. Change caused by development (such as growing taller) are not instances of learning. learning takes place in many ways. Sometimes it is intentional, as when students acquire information presented in a classroom or when they look something up in the encyclopedia. Sometimes it is unintentional,

as in the case of the child's reaction to the needle. All sorts of learning are going on all the time.

Guided Inquiry is planned, targeted, supervised intervention throughout the inquiry process. The principles and foundation of Guided Inquiry are based on solid research grounded in a constructivist approach to learning. In Guided Inquiry the teacher provides the problem for investigation as well as the necessary materials. Students are expected to devise their own procedures to solve the problem. Guided Inquiry is carefully planned, closely supervised targeted intervention of an instructional team of teachers to guide students through curriculum based inquiry units that build deep knowledge and deep understanding of a curriculum topic, and gradually lead towards independent learning.

Concept mapping is a graphic illustration of concrete that indicate how a single concept linked to other concepts in the same category. According to Martin (in Trianto, 2009) Concept mapping is an important new innovations to help children generated meaningful learning in the classroom. Concept mapping provides a concrete visual aid to help organizing information before that information learned by students.

Metacognition may then be understood as a set of abilities and skills to recognize one's own cognitive (learning) activities, to plan, to monitor and to evaluate procedures that he has applied in his learning. Metacognition does not include only the knowledge about cognitive processes (Knowledge Cognition) but also processes of monitoring, controlling and regulating one's own cognitive processes that are connected under the term of metacognitive skills (Monitoring Cognitive).