

CHAPTER I INTRODUCTION

1.1. Research Background

Education is a container in which there is interaction between learners and educators and is intended to achieve the life and development of the nation and the state. In addition there are other goals to be achieved from such interactions are developing students' potentials both of cognitive, affective, and psychomotor in learning.

An education is not only concerned with an end result, but the most important is the process, in which the students can understand the process and understand the purpose of learning. The role of the teacher is very important in the learning process where the teacher is requested to create an active learning situation, creative, innovative, effective, and fun in the process of learning activities.

In fact, the learning process in the classroom activities are still centered on the teacher (teacher centered), teacher only requires students to memorize concepts and memorizing formulas. Students just sit, listen, record and memorize concepts. Students are not invited to actively follow the teaching, so that learning becomes unattractive and students become bored. Teachers do not provide an opportunity for students to discover concepts, develop the ability to process thought, life skills and cooperation attitudes of students when learn.

Meanwhile, according to Jahro (2009), chemistry is an experimental science, can't be learned only through reading, writing or listening only. Studied chemistry not only master the body of knowledge in the form of facts, concepts, principles, but also a process of discovery and mastery of procedures or the scientific method.

Solubility and solubility product is a chemical material involves chemical reactions and chemical calculations. This material is also related to the material before them stoichiometry, reaction equations, chemical equilibrium, and the pH of the solution. If the student is still weak in understanding the last material so the

student will have difficulty to understand the material further. Thus resulting in lower student learning outcomes in this matter.

The writer found the same opinion when holding observation in MAN Binjai. From interviews with chemistry teachers (Mr. Surya Sudariyanto S.Pd, Mrs. Herlinawati S.Pd and Mr. Mufti Lubis S.Pd) at the school, said that many students who are less active in the learning process. It is possible that the learning process interesting and less monotonous. The above conditions have implications on the low learning achievement chemistry and attitude of students' critical thinking in the study.

It required an action that can improve the learning process and expected an increase in learning outcomes. One way that can be done to overcome the above problems is to use a learning model that centered to student (student centered learning) and also can develop critical thinking in study groups. Critical thinking is important, because it allows one to analyze, assess, explain and develop thoughts, so as to minimize the risk to adopt a false belief, and think and act by using the false belief. The learning model that can be used is the learning model of problem based learning and learning model of process-oriented Guided Inquiry Learning.

According to Killey (2005), learning model of problem-based learning has advantages in terms of helping students choose a problem, defining the problem, solve problems, help develop critical thinking, oral and written communication and develop an attitude of cooperation within the group. In the teaching model of problem-based learning students are more motivated to work harder than the conventional teaching where students very little participation. The learning model of problem based learning if developed will improve interpersonal skills, critical thinking, search information, communication, respect and teamwork of students.

In addition to teaching model of problem-based learning, the model of Process Oriented Guided-Inquiry Learning (POGIL) is a learning strategy that provides an opportunity to teach both content and process skills simultaneously. POGIL emphasize that learning is an interactive process to think carefully, discuss ideas, refining the understanding, practice skills, which reflects on the progress,

and assess performance (Richard, et.all. 2009).

POGIL approach is one of the guided-inquiry. POGIL use guided-inquiry, learning cycle of exploration, discovery and application of the concept is the basis for many of the ingredients are well designed for students and used to guide students in building new knowledge. It's important that teacher act as facilitator, know in advance the results of the experiment (Hanson, 2006).

POGIL learning strategy has strengths in designing the team learned that the teacher as a facilitator rather than as a source of information, students are guided through exploration to build understanding, using discipline content to facilitate the development of important skills including the higher level thinking and the ability to learn and to apply knowledge in new contexts. So that students are able to develop soft skills, such as communication skills, critical thinking with less careful, responsible, and work together.

Several studies have demonstrated the effectiveness of the model of Problem Based Learning and process oriented guided inquiry learning to improve learning outcomes. Results of research conducted by Mutaharoh (2006), concluded that students taught by using the model of Problem Based Learning (PBL) has an influence on the chemistry student learning outcomes when compared with conventional learning models. Based on the results of the calculation of the t-test at a significance level of $\alpha = 0.05$ was obtained $t_{\text{count}} > t_{\text{table}}$ ($4.06 > 2.00$).

Correspondingly, Rizqa (2013), concluded that the learning model Process Oriented Guided Inquiry Learning effect on student learning outcomes. The final result obtained that $t_{\text{count}} > t_{\text{table}}$ ($2,67 > 1,67$). And the results of research conducted by Adnan (2014), concluded that there are differences in learning outcomes of students that learned chemistry using the model of Problem Based Learning (PBL) and Process Oriented Guided Inquiry Learning (POGIL). The final result obtained that $t_{\text{count}} > t_{\text{table}}$ is ($2.847 > 2.002$).

Thus, learning outcomes are taught with Process Oriented Guided learning model Inquiry Learning has an influence on student learning outcomes. The most striking difference in Process Oriented Guided learning model Inquiry Learning

and Problem Based Learning lies in the problem set by the teacher. The learning model POGIL given little information is then the teacher asking questions so that students who seek and find answers that the proposed teacher independently. While the Problem Based Learning which gives teachers the existing problems in everyday life related to the subject matter. Students in demand for critical thinking in addressing the problem that is given to teachers solve the problem that is given and that allows the student is directed to solving these problems with a solution to the problem is given.

Based on this background, the authors are interested in making the study titled **“The Differences of Student’s Achievement and Critical Thinking By Implementing Problem Based Learning (PBL) and Process Oriented Guided Inquiry Learning (POGIL) On Solubility and Solubility Product Topic”**.

1.2. Problem Identification

Based on the above background of the study, the problems identification in the study was:

- a. Students tend to be passive and monotonous in the learning process.
- b. In schools, teachers still use a teacher-centered learning and less variation of learning model in the chemistry learning process .
- c. Student’s achievement in learning chemistry is still low. It can be seen from the student’s score in final exam is less than 75
- d. Student’s critical thinking in the learning process was still low, so that the tendency to participate in teaching-learning process is less.

1.3. Problem Limitation

The Problem Limitation of this research are:

1. The object of research is student of science grade XI in MAN Binjai at Academic Year 2014/2015.

2. The learning model used in this research is Problem Based Learning (PBL) for the experimental class I and Process Oriented Guided Inquiry Learning (POGIL) for the experimental class II.
3. The material that discuss in this research is limited to the subject of solubility and solubility product.
4. Student's achievement in this research can be divided into two, namely the cognitive and affective. Cognitive domains measured by the Bloom's taxonomy C1 (Knowledge), C2 (Comprehension), C3 (Application), C4 (Analysis) and affective domains in this research of student's critical thinking skills in learning groups.

1.4. Problem Formulation

Based on the background of research and the scope of research above, the Problem Formulation of this Research are:

1. Is there a significant difference between student's achievement that is taught by using Problem Based Learning (PBL) and Process Oriented Guided Inquiry Learning (POGIL) on Solubility and Solubility Product topic?
2. Is there a significant difference between student's critical thinking skills that is taught by using Problem Based Learning (PBL) and Process Oriented Guided Inquiry Learning (POGIL) on Solubility and Solubility Product topic?

1.5. Research Objective

The Research Objective of this research are:

1. To know there is a significant difference between student's achievement that is taught by using Problem Based Learning (PBL) and Process Oriented Guided Inquiry Learning (POGIL) on Solubility and Solubility Product topic.

2. To know there is a significant difference between student's critical thinking skills that is taught by using Problem Based Learning (PBL) and Process Oriented Guided Inquiry Learning (POGIL) on Solubility and Solubility Product topic.

1.6. Research Benefit

The Benefits expected from the results of this Research are:

1. For Researchers/Students, the results of the research will add knowledge, ability and experience to improve their competence as a teacher candidate.
2. For Chemistry Teacher, the results of research will provide input on the use of Problem Based Learning (PBL) model and Process Oriented Guided Inquiry Learning (POGIL) model in the teaching of chemistry, especially on the subject of solubility and solubility product.
3. For Students, this Research is expected to increase the knowledge and experience of student learning.
4. For Schools, this Research is expected to contribute to improving student achievement in schools so as to improve the quality of teaching chemistry at MAN Binjai
5. For the Next Researcher, this Research can be used as a reference in conducting further research.

1.7. Operational Definition

In order to avoid different interpretations in understanding any existing variable in this study, it was necessary given the operational definition to clarify it. The operational definitions of research are:

1. The learning results were essentially the changes that occur in a person after the end of the learning activities. Benjamin S. Bloom (1979) classifies learning outcomes in three domains, namely: cognitive, affective domain, and psychomotoric domain. Cognitive domain includes the ability development of intellectual skills (knowledge) with the levels which

Knowledge (C1), Comprehension (C2), Application (C3), Analysis (C4), Synthesis (C5), and Evaluation (C6). In this study, the observed learning outcome includes two aspects: cognitive domains consist of C1 through C4 and affective domain includes aspects of critical thinking skills and attitudes of students in cooperative learning groups.

2. According to Surya (2013) critical thinking is an active process that includes regular or systematic way of thinking fatherly understand more in depth information, so as to form a belief correctness of information obtained or opinions expressed. Active process was indicated a desire or motivation to find answers and reach an understanding. In this study measured students' critical thinking skills through observation sheet attitude assessment.
3. A learning method of Problem-based Learning (PBL) is one of the alternatives from the many innovative methods are applied in the process of teaching and learning activities to help students in processing the information that has been so in her mind and put together their own knowledge about the social world and beyond (Kusnadi, et.all, 2013)
4. A POGIL learning activity engages students, promotes restructuring of information and knowledge, and helps students develop understanding by employing the learning cycle in guided inquiry activities. The learning cycle consists of three stages or phases: *exploration*, *concept invention or formation*, and *application* (Hanson, 2006).
5. The matter of solubility and solubility product is one of the lesson in senior high school chemistry class XI. Topic solubility and solubility product includes definition and unit of solubility, Constanta of solubility product (K_{sp}), the relationship between solubility (s) and Constanta of solubility product (K_{sp}), the effect of common ion toward solubility, solubility and pH, pH and solubility of base, pH and solubility of salts, and precipitation reaction.