CHAPTER I

INTRODUCTION

1.1. Research Background

The development of science and technology is developing very fast nowadays, it would require the carrying capacity of qualified human resources in order to produce human resource that is able to respond to these challenges and develop technologies for the benefit of the community, state and nation as well as the master science. It is necessary for the enhancement and improvement of the delivery of the national education in accordance with the development of science and knowledge.

Facing the development of the more advance societies must responsive to science, because nowadays a lot of jobs that require various high-level skills, requires the ability to always be able to learn in every change, reason, think creatively, make decisions, and the ability to solve problems (Klausner, 1996). Therefore, improving the quality control of science (chemistry) at all levels of education should always be sought.

One of the problems facing our education is the problem of lack of learning. In the process of learning, children are less encouraged to develop the ability to think. The learning process in the classroom geared to the child's ability to memorize information. The learning process is still giving teachers domination and does not provide access for students to develop their independence through discovery and student's thinking process. Students simply memorize concepts and less able to use these concepts if encountered in real life problems related to its concept (Trianto, 2007).

The quality of education is an indicator for development rate of the country, and therefore the development in education sector is a key for the development of the nation. Unfortunately, the quality of education in Indonesia is still low. It caused by learning quality is not optimal. This is shown by the low student learning outcomes in senior high school, especially in chemistry.

The data obtained from national examination showed that average of student's achievement in mathematics and natural science are still below national

standard given by the government. For example, the average achievement of the Senior High Schools students in Physics is 4.00, while other subjects were 5.00. Furthermore, the average student's achievement in Chemistry from the Indonesia national Examination (UN) were obtained successively in 2005 was 6.26, in 2006 was 6.22, in 2007 was 7.13 and in 2008 was 7.34 (Puspendik, 2008). These achievement is categorized as in medium achievement. The student's achievement in Chemistry are presented earlier possible caused by the in learning process faced by the students.

Based on the experience of researcher in SMAN 1 Perbaungan, there are many students who are not getting pass score the examination. They have score lower than KKM that decided by school, it is about 65%, where KKM in this school is 65. It might caused by the method of teacher and student's activity. Based on that percentage of average score shown that teaching of chemistry was not maximal yet to get a good result. Therefore still needed the improvement to minimize the percentage of students number who have score that lower that KKM which is have been decided by the school especially chemistry is science or daily life study.

Nowadays, our government is actively encouraging the education in Indonesia. It is recognized that education in Indonesia is lagging far behind if we compare with developed countries in the world. One of the goverment's effort that we can see is curriculum development become curriculum of 2013. This curriculum requires active students. The curriculum is not only oriented on knowledge or cognitive, but also on the affective and psychomotor. If the students shows good cognitive, affective and psycomotor, it means that the education process is success. But when student show bad conitive, affective and psycomotor, it means that the education process has failed. It's mean that this curriculum will require teachers to measure student's character, things that were ever done.

The description above reinforce the researcher to conclude learning strategy in this model is showing low student's learning outcome In an effort to improve student's learning outcome, required innovation in learning chemistry. One step that can be done by the teacher as mentor learners is to chose the right

model. Clearly, the direct instructional should be change because it's not success to make students understand (the application in daily life), explore new phenomena and to establish the critical thinking. Changing the focus using a constructivist approach from teacher-centered to student-centered is one of its alternatives.

Education experts have been trying to develop a variety of learning models to improve the quality of chemistry teaching in particular subjects, such as learning model that is based on the views of Piaget's constructivism. According to this view, the learning process students learn to construct their own knowledge and gain a lot of knowledge outside of school (Dahar, 2006). One teaching strategy that uses a constructivist view of learning is a model of the learning cycle (learning cycle). The cycle of learning (learning cycle) deductive hypothetical (hypothetical-deductive), the hypothetical deductive learning cycle students learn started with a statement of why ‖ questions? ‖. Students are required to formulate possible answers (hypotheses) of the statement. Then students are asked to derive logical consequences of the hypothesis and to plan and conduct experiments (exploration). Analysis of experimental results led to several hypothesis is rejected, while others received (the introduction of the concept). Finally, the relevant concepts and reasoning patterns involved and discussed, applied to other situations (application concept). Learners actively take knowledge, connect it to previously assimilated knowledge and make it theirs by constructing their own interpretation (Cheek, 1992).

According to Piaget's theory of intellectual development, Hypothetical-deductive reasoning appears in the formal operational stage. Lawson et al. (1995) claim that there are two general developmentally-based levels of hypothesis-testing skill. The first level involves skills associated with testing hypotheses about observable causal agents; the second involves testing hypotheses about unobservable entities. The ability to test alternative explanations involving unseen theoretical entities is a fifth stage of intellectual development that goes beyond Piaget's four stages. The Hypothetical-deductive method is one of the most basic methods common to all scientific disciplines including biology, physics, and chemistry. Its application can be divided into five stages:

1. Form many hypotheses and evaluate each hypothesis
2. Select a hypothesis to be tested
3. Generate predications from the hypothesis
4. Use experiments to check whether predictions are correct
5. If the predictions are correct, then the hypothesis is confirmed. If not, the hypothesis is disconfirmed. (Nuhogu, Hasret, 2006)

Research on the learning model of the learning cycle, conceptual change science to know that based on the constructivist approach have been carried out by previous researchers, including by Hulya Yilmaz, Pinar Cavas Huyuguzel (2004), reported the results of his research that the application of the learning cycle more successfully than students who were taught with the traditional approach. There are also significant differences between the two groups regarding their attitudes toward science after treatment. Science learning cycle method generates attitudes are more positive towards science as compared to traditional methods. Then other researcher research use quasy experiment method and instruments that are used are science generic skill test , like scale questionnaire and observation sheet. The research project is class XI IPA Semester 2 students from one of the public school in Palembang City in 2008/2009 academic year and samples from two classes are taken randomly from three classes. The study result showing improvement on rigid body equilibrium science generic skill on students who use hypothetical deductive learning cycle model was higher significantly compared with students who use direct instructional learning, this results is based on science generic skill N-gain average of experiment class 0,73 model (Taufik and Ketang, 2009).

Colloid is one subject that can engage students actively in the learning process because it's depend the students observe the penomenon in daily life, the subject matter is directly related to the problems faced by students and the community at large. It is the learning matter that should be taught with experimental method. For that is the subject of colloid are expected to conform when using the hypothetical-deductive Learning Cycle. It is expected that students are more interested in studying this material and are expected to improve student learning outcomes.

Laboratory experiment is key rules to improve the student's ability and skills in teaching of chemistry. Laboratory experiment known as a practicum, is compulsory for many topics in chemistry as it is known that theoretical aspect has to be proven by experimental work in the laboratory. It is known in chemistry that a laboratory experiment could be used to improve the student's ability and skills in chemistry. This is the reason that practicum has to be included for many topics in chemistry subjects for it is known that theoretical aspect has to be supported and proven by the experimental work in the laboratory. Experimental method give the real world to the students in teaching and learning process. Teaching colloid with learning cycle model with experimental method believes can increase students achievement.

The main purpose of this research is to examine effectiveness of "Colloidal concepts" instruction based on the hypothetical-deductive learning cycle approach and attitudes toward science as a school subject. Students' attitudes, feelings and perceptions of science are also important for science achievement.

This research had deal with hypothetical-deductive learning cycle model, and its effectiveness. It tries to compare instruction based hypothetical-deductive learning cycle model with traditional chemistry instruction (direct instructional). Therefore this research will provide some information about the instruction based on hypothetical-deductive learning cycle model and its application into the classroom situation.

Based on problems above, the writer is interested to do research with the title **"The Effectiveness of Hypothetical-Deductive Learning Cycle To Increase Senior High School Student's Achievement and Cooperation in The Teaching of Colloidal System".**

1.2. Scope of Research

The scope in this research is the effectiveness of hypothetical deductive learning cycle in increasing student achievement and cooperation in the teaching of Colloidal. The scope of this research is to observe the effectiveness of hypothetical deductive learning cycle which is innovate by researcher increasing

student achievement in teaching of Colloidal. The research will be done in SMAN 1 Perbaungan on grade XI.

1.3. Problem Identification

1. The unsuitable selections on the model or the lacks of proper learning methods which are conducted by the teachers.
2. Teaching and learning processes are generally running by conventional way where the processes tend to be dominated by teacher's activity.
3. Teacher have to establish the knowledge and encourage students to work together solving problem.
4. Learning is not just about learning achievement, but teacher should choosing the right method in teaching to increase students' achievement and attitude in studying chemistry.

1.4. Problem Limitation

1. The research is conducted by applying hypothetical deductive learning cycle
2. Subject that will present is Colloidal
3. Learning outcomes analyzed are in cognitive domain C_1, C2 and C3 level.
4. The curriculum is using Curriculum 2013 to measure the character of cooperation
5. Subjects are students of class XI in SMAN 1 Perbaungan academic year 2013/2014

1.5. Problems Statement

1. Is there the effectiveness of the hypothetical-deductive learning cycle as teaching model to increase student's achievement in teaching of Colloidal concepts by looking the student's achievement on solving problem in teamwork dealing with related chemistry subject?
2. Which is the useful method between hypothetical-deductive learning cycle compare with direct instructional teaching method?
3. Is there the correlation between student's achievement and student's character (cooperation) with the hypothetical-deductive learning cycle on the teaching of Colloidal subject?

1.6. Research Objective

The research objective is to investigate the best innovative teaching method on the teaching of Colloidal subjects. Specific objectives of the study are:

1. To investigate the effectiveness of the hypothetical-deductive learning cycle as teaching model to increase student's achievement in teaching of Colloidal concepts by looking the student's achievement on solving problem in teamwork dealing with related chemistry subject.
2. Comparing the useful method between hypothetical-deductive learning cycle with direct instructional teaching method.
3. To investigate the correlation between students' achievement and students' character (cooperation) with the hypothetical-deductive learning cycle on the teaching of Colloidal subject

1.7. Research Benefit

Based on the research objectives, this study is expected to be useful as:

1. Input for teachers and prospective teachers in the selection of appropriate learning strategies to present the subject material.
2. Providing strategies that can be used as a reference for teachers to improve student learning outcomes.
3. The results of this study will provide input to the school as the place of the research in order to increase the quality of learning chemistry.

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