

CHAPTER I

INTRODUCTION

1.1 Background

Mathematics is one subject that includes concepts, rules, principles, and theories are useful in problems solving in almost all the subjects taught in school. Mathematics is also a compulsory subject in formal education and has an important role in education. Mastering math becomes important capital to study other subjects, such as physics, chemistry, biology, and social sciences.

Even so, it's not unusual if still there are students who think of mathematics as a subject that is very difficult resulting in less favored mathematics. Learning Mathematics for this is still regarded as a difficult lesson for the use of symbols and emblems interpreted as memorizing formulas. Learning mathematics is also very influenced by the view that mathematics is a tool that ready to use. This view encourages teachers are likely to tell the concept / properties / theorems and how to use it.

Understanding the theories of how people learn and the ability to apply them in the teaching of mathematics is an essential requirement for creating effective teaching process. One theory is used to learn the dominant flow of developmental psychology and constructivism. In practice, the teacher is not giving the final answer to the question of students, but rather directs them to form (construct) knowledge of mathematics in order to obtain the structure of mathematics. In addition, teachers must also consider the diversity of skills among the students so that the teacher created certain conditions, the potential of each student to develop optimally.

One of the factors that because the low quality of education is a model of learning that teachers use less varied. Many teachers are still using the conventional method of teacher-centered learning (teacher-oriented) that does not involve students actively. In fact, the active involvement of children in a learning activity allows them to experience the depth of the material being studied and will

eventually be able to increase children's understanding of the material. According to Cawley in Suherman (2003: 146) identify the types of learning errors, that is:

1. Teaching is not proper, incorrect or always limiting,
2. Students should switch to another topic, while topics previously not mastered,
3. Establishing learning objectives excessive.

To obtain a good learning outcomes, the learning process should be planned systematically and involves students participate in the learning process. The selection of methods and models appropriate learning will help smooth the learning process.

According to Sudjana (2002: 158) that: "Participation that needed to be a strategy in learning to make collaborate of students as active in planning, implementation, and evaluation of program activity of learn."

One of the goals of learning mathematics is that students have the ability to solve problems that include the ability to understand the problem, devised a mathematical model, solve the model and interpret the obtained solution (BSNP, 2006: 346).

The goal put the problem into part of the mathematics curriculum is important. In the process of learning and problem solving, students can gain experience using the knowledge and skills already possessed. Experience is then train the students to think logically, analytical, systematic, critical, and creative in dealing with problems.

Based on the results of the tests was conducted the percentage of students of class VII which has a value equal to or above the KKM only reached 60%. The school set a value of 70 for the KKM mathematics courses. This means that students who pass the study around half of it, while others have the ability to solve problems below average. The teacher also stated that: "The students just memorizing the formula. By memorizing the formula without understanding well and less practice is difficult to try the problem related in daily life. The material is continuation of the material that have been learned in primary school. So, because

the understanding the concept still lack in primary school, automatically students have difficulty to learn again this topic in junior high school.

Based on classroom observations, many student still hard to received the lesson, it caused they think that teacher not too good to teach the matter. Teacher only explained at the beginning of learning as an introduction to the material to be studied. After that, teacher gives student worksheet to student and asks them to do and discuss it.

During the discussion, most visible group members work on individual worksheets. So that in one group there has been no communication in group. In addition, discussions on several groups have also involves every member. Discussion was dominated by just a few students. The other student passive in expressed opinion. Then see that students are still not up to using focus groups as a learning medium. As a result, when faced with math problems students are less able to solve it.

Students are active in restoring the feedback provided by the teacher though often wrong in giving an answer. During the Teaching and Learning Activities (KBM), the teacher can control the way the learning process well, but still student learning outcomes are lacking. Thus it is necessary to study other models to increase student learning outcomes especially in problem-solving abilities.

Low ability students in solving this problem are related to the possibility of learning approaches used by teachers. Results of the assessment carried out Slameto (2003: 13) suggest that in general the process of mathematics learning is still done conventionally encountered, drill, and lectures. Learning process like this only emphasizes on achieving the demands of the curriculum than students' learning abilities. Therefore, it is necessary to find the model and learning approach that is able to improve the learning ability of students principally in mathematical problem solving.

The view that problem-solving skills in the learning of mathematics teaching is a general purpose, contains an understanding that mathematics can help in solving problems both in other subjects as well as in daily life. Therefore,

this problem solving capabilities become a general purpose learning mathematics. While the view of problem solving as a core process and major in mathematics curriculum, the mathematics learning processes and strategies prioritize the student to solve it rather than just the results, so that the skills and strategies in solving the problem into learning basic skills in mathematics.

The lacks of students' mathematics understanding have direct impact on the ability of problems solving in mathematical and the quality of education in Indonesia. The facts is an indicator that the teacher should choose and use the model varies with the material that will be taught so as to increase interest in learning mathematics and improve students' creative thinking.

The low ability students in this problem solving likely has something to do with the learning approach used by the teacher. The results of the assessment conducted Slameto (2003: 13) suggests that the process of learning mathematics in general which met still done conventionally, drill, and lectures. The learning process like this only emphasizes the demands of the curriculum rather than the achievement of student learning abilities. Therefore, it is necessary to find a model or approach to learning that can improve the learning ability of students primarily in mathematical problem solving.

In teaching of mathematics, many teachers complain less optimal student ability in problem solving. It looks from the mistakes students in solving problems, and low potential for student learning (value) in both the daily tests and final exams. Therefore, to improve the quality of education and increasing skills in problem solving the need for reform in education, namely the renewal method or increasing relevance of teaching methods. The method of teaching is said to be able to deliver relevant if students achieve educational goals through teaching.

Thus mathematics learning, now and in the future should not stop at achieving basic skills, but instead should be designed to achieve a high level of mathematical competence (high order skill) as mathematical problem solving ability.

One approach that has the characteristics of constructivist learning based on understanding the mental construction in understanding a concept in order to

encourage the formation of knowledge and are predicted to increase students' mathematical problem solving is a modification of APOS.

The process of formation of new knowledge (especially in mathematics) is believed to be result of a series of processes introduced by Dubinsky as the Action-Process-Object-Schema (APOS). Objects that have been stored in one's memory as knowledge will be processed when the action occurs due to some particular stimulus.

The terms of action, process, object, and the scheme is essentially a mental construction in an attempt to understand a mathematical idea. According to APOS theory, if one is trying to understand a mathematical idea then the process will start from the idea of mathematical mental action, and will eventually get anyway construction schemes of certain mathematical concepts covered in the given problem.

In the process of thought, an idea can't suddenly appear in your mind. The ideas came after a wide range of symbols processed so that it can be said that the thought process going through the construction of stage miraculous mental as mentioned Asiala, et al in Nurlaelah and Usdiyana (2009: 10), that is:

1. Action, at this stage of the transformation objects that individuals perceived as necessary and the instructions step by step how to perform the operation.
2. The process, which is a mental construction that occurs internally when someone is able to do the level of action repeatedly.
3. Object, can be interpreted as resulting from the construction of the mental that has been done at this stage of the process.
4. The scheme, which is a collection of actions, processes, and objects that are summarized into a scheme.

Relating with the foregoing, we need a mathematical learning model that can help the student thinking developed through the four stages of the construction of the mental. The learning that has a characteristics above is a learning based on the theory of APOS. One model of learning is based on the theory of APOS is a learning model of M-APOS, which utilizes that is learning task as a substitute recitation student activity within the framework of APOS learning model.

Based on the issues that have been raised, the authors feel compelled to conduct research entitled “The Differences Learning by using M-APOS and Expository to Improve Student Problem Solving Ability in Grade VII at SMP-IT KHAIRUL IMAM”.

1.2 Problem Identification

Based on the background of the issues outlined above, it can be identified the problems posed are:

1. Problem solving ability in mathematics of students still low.
2. Learning is not meaningful; it means that the students can't relate the material into daily life.
3. The students have difficulty in problem solving mathematical, because the understanding of the concept still lack.
4. The students have problems in learning the Arithmetic Social which are already entered on a higher level, namely its application in daily life.

1.3 Problem Limitation

The limit problems in this study are:

1. This study is limited simply to measure the problem-solving ability on subject of Social Arithmetic using learning model of M-APOS.
2. Population in this research is student at SMP-IT Khairul Imam grade VII in odd semester of academic year 2013/2014.
3. Indicator of mathematical problem-solving ability that is identifies the problem, formulates a mathematical model, determines the completion of mathematics and provides interpretation of the results obtained

1.4 Problem Formula

Based on limitation problem above, then that becomes the focus of the problem in this study can be formulated as follows:

1. Is there difference of improving student problem solving ability that learn by using M-APOS and expository in grade VII at SMP-IT Khairul Imam.
2. How the students' response to learning by using a model M-APOS?
3. Is there any differences students' activity that is learning using M-APOS and expository method?

1.5 Purpose of Research

Based formulation of the problem that has been described above, the purpose of this study is as follows.

1. Knowing the differences of students' problem solving ability that learning using M-APOS is better than the students' problem-solving skills through the use of conventional teaching expository method.
2. Knowing the students' response to learning of mathematics by using learning model of APOS modification.
3. Knowing the students' activities that are learning using model of APOS modification and expository.

1.6 Benefits of Research

This study is expected to be providing the following benefits:

1. Theoretical benefits

In general, the results of this study is expected to be provide benefits to learning of mathematics, especially to improving mathematical problem-solving ability of students in follow the learning of mathematics by using learning model of APOS modification.

2. Practical benefits

This research is expected to be providing a real solution in the form the steps to improve the mathematical problem-solving ability through the learning process of APOS modification.

Results of this research are expected to provide benefits for teachers, students, and other researchers.

- a. For students, can assist the students in learning of mathematics concepts so that it can improve students' mathematical problem solving ability.
- b. For teachers, become input in order to apply the learning model of APOS modification an effort to improve students' mathematical problem solving ability toward improvements to the quality of teaching of mathematics in schools.
- c. For other researcher, the results of of this research are expected to provide and broaden knowledge as well as a reference for conducting research related to the learning model of APOS modification.

1.7 Operational Definition

To avoid misunderstandings and research efforts are consistent with the objectives, the operational definition is given as follows:

1. Learning model of APOS modification is a learning model that based on the theory of APOS (Action-Process-Object-Schema) are modified. Modifications performed on the activity phase, where activity in the computer lab learning model APOS replaced with recitation of assignment given before learning implemented. Recitation assignments presented in the form of a worksheet that guide and assist the students in reviewing of mathematics concepts or solve problems.

The sense of action, process, object, and the scheme is described as follows:

- a. Action, at this stage is transformed objects perceived individuals as necessary, as well as step by step instructions how to perform the operation.
- b. Process, which is a mental construction that occurs internally when a person is able to perform the action level over and over again.
- c. Object can be interpreted as resulting from the constructed something mental that has been done at this stage of the process is done in stages.

- d. Schemes, which are collections of actions, processes, and object that summarized into a scheme.
2. A conventional learning model that uses the expository method of teaching models commonly performed by mathematics teachers generally, where the learning process is only centered on the teacher explains or convey the material while the students only recording what has been submitted by teachers.
3. Improvement problem solving of mathematical ability can be interpreted as an increase in ability to identify problems, formulate mathematics models, to determine the completion of the mathematical model and an interpretation of the results obtained.
4. Mathematical problem-solving ability is a students ability to solve mathematics problem by considering the following steps:
 - a. Understand the problem,
 - b. Planning the problems or choosing an appropriate resolution strategy,
 - c. Implement problem-solving plan or strategy planned settlement,
 - d. Re-examine the procedures and results of completion.