

## **CHAPTER I**

### **INTRODUCTION**

#### **A. Background of the Study**

One of the basic competencies that is necessary to be achieved in learning mathematics is reasoning. Klipatrick, Swafford and Findell (2001: 116) introduce five components of mathematical proficiency that necessary to be developed in the learning mathematics of school, including adaptive reasoning. Adaptive reasoning interacts with other expertise, especially during solving problem process. Adaptive reasoning has an important role in improving the thinking skills of students in mathematics. Due to the adaptive reasoning, students are trained to think logically, reflect and predict the answer, explanatory or provide an explanation of the concept and answer procedure and justify or evaluate a mathematical truth.

However, so far mathematics is considered as absolute truth or as the product which is ready for use. Most students still must be guided and directed the steps in solving a mathematics problem. Students also tend to be afraid in solving a mathematics problem. In addition, the perception that mathematics is a scourge number one among other subject, make the student's reasoning weaker.

This condition is supported by the result of TIMSS (Trends in International Mathematics and Science Study). In TIMSS 2011 International Result in Mathematics, an average overall mathematics grade 8 in Indonesia

only 386, while TIMSS uses the center point of the scale 500 as a point of reference that remains constant from assessment to assessment. Average mathematics in terms of cognitive dimensions that include understanding of 378 (31%), application of 384 (23%) and reasoning of 388 (17%) (Ina et al., 2012: 462). From the cognitive aspect of the achievement is still far from the target, of which 35% for comprehension, 40% for application and 25% for reasoning (Ina et al., 2012: 86).

In order student's reasoning can develop properly then students should be conditioned to be active during learning activities so as to construct and evaluate arguments and can generalize when drawing conclusion. In this case, the learning model selection plays an important role to obtain the optimal learning outcomes, as revealed by the following Aunurrahman :

"The use of appropriate learning models can encourage the growth of sense of fun learning, growing and improving motivation in doing the task, makes it easy for students to understand the lessons that allow students achieve better learning outcomes (Aunurrahman, 2009: 143)."

Problem Based Learning (PBL) through group investigation is one of the various models of learning that can be applied in learning mathematics. This model presents a variety of problematic situations authentic and meaningful to the students, which can serve as a springboard for investigation and inquiry (Richard, 2008: 41). Basically, the model is designed to leads students to define problems, explore the problem, collect relevant data, develop and test hypothesis (Aunurrahman, 2009: 151).

Hmelo-Silver (in Brian, et al., 2009: 2) express that there are five steps in PBL, that is (a) determine what they know and need to know collaboratively,

(b) research content and/or conduct scientific tests individually, (c) communicate the research result among themselves, (d) determine a solution to their problem collectively and (e) present their solution to classmates and/or community representatives. While in Group Investigation (GI), there are three main concepts, namely: research or inquiry, knowledge, and the dynamic of the learning group (Udin S. Winaputra, 2001:75). Thus, problem based learning model through group investigation involve students to active in learning activities. Students will work in teams to collect information, analyze data, conduct experiments, find the solution of problem and make a conclusion.

These activities are designed primarily to help students develop adaptive reasoning skill, skills of problem solving and intellectual skills, learning the roles of adults with experience through a variety of situation real or simulated situations and become independent and autonomous learners (Richard, 2008: 43).

From the background above, researcher is encouraged to conduct research on the implementation of problem based learning model through group investigation in mathematics learning viewed from student's adaptive reasoning in SMP Negeri 1 Surakarta.

## **B. Identification of Problem**

Based on the background of study, researcher identified the problems as follows:

1. Adaptive reasoning skill of students in learning mathematics is still weak.
2. Most students must be guided and directed the steps in solving mathematics problems.
3. Students tend to be afraid of in solving mathematics problems.
4. Teacher still uses conventional model.

## **C. Limitation of Problem**

Based on the problems identification mentioned above, so that the problems will be studied more directed, then researcher restrict these problems as follows:

1. A learning model is used problem based learning model through group investigation. This learning model provides an opportunity for students to get the right information, carry out experiments and find a solution.
2. Adaptive reasoning includes the ability of students to think logically, give an explanation of the concepts and procedures used and solve mathematics problems.
3. Student's mathematics achievement on this research is limited to student's learning outcomes are achieved through the process of teaching and learning on the subject of a circle.

#### **D. Problem Formulation**

The principal problems will be answered in this research are:

1. Is there any influence of the use of problem based learning model through group investigation to student's mathematics achievement in SMP Negeri 1 Surakarta ?
2. Is there any influence of adaptive reasoning ability to student's mathematics achievement in SMP Negeri 1 Surakarta ?
3. Is there interaction between the use of problem based learning model through group investigation and adaptive reasoning ability to student's mathematics achievement in SMP Negeri 1 Surakarta ?

#### **E. Objectives of the Study**

The expected goals of the study are :

1. To analyze the influence of the use of problem based learning model through group investigation to student's mathematics achievement in SMP Negeri 1 Surakarta.
2. To analyze the influence of adaptive reasoning ability to student's mathematics achievement in SMP Negeri 1 Surakarta.
3. To analyze the interaction between the use of problem based learning model through group investigation and adaptive reasoning ability to student's mathematics achievement in SMP Negeri 1 Surakarta.

## F. Benefits of the Study

The expected benefits of this research are as follows :

### 1. Theoretical benefits

Generally the results of research are expected the use of problem based learning model through group investigation can influence on student's mathematics achievement. Particularly this research gives contribution to mathematics learning in the form of a paradigm shift that is originally only focused on mathematics learning towards focuses on the learning process.

### 2. Practical benefits

- a. For school and teachers, the research is expected to provide information and suggestion in an effort to optimize student's mathematics achievement. In addition, teachers will be more open sight diversity of learning model that can be selected and used in the learning process
- b. For students, this research is expected to motivate improving her/his mathematics skills especially in reasoning.
- c. For further research, this study is expected to be a material consideration and material inputs or scientific reference for future research.