

## CHAPTER I INTRODUCTION

### 1.1 Problem Background

Education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for him to have the spiritual strength of religious, self-control, personality, intelligence, noble character, and the skills needed themselves and society. In the era of globalization increasingly advanced and complex, a person required to master science and technology. Knowledge can be acquired through education, namely formal and informal education. Mathematics is the basic science that has an important role in science and technology. The role of mathematics and mathematics education in the common goal of preparing students to be able to face changes in circumstances that are developed through critical action research base, rational and careful, and could use a good mind set in learning mathematics and science in everyday life.

Otherwise, approach in mathematics is influenced by the views of teachers towards students in learning mathematics and mathematics Adams & Hamm, 2010 in (Wijaya : 5). Adams and Hamm mentions four different views on the position and role of mathematics, namely: (1) Mathematics as a way of thinking; (2) Mathematics as an understanding of patterns and relationship; (3) Mathematics as a tool; (4) Mathematics as a language or communication tools. In addition influenced by the teacher's views about the position and role of mathematics, mathematics learning direction is also influenced by the goal of mathematics education.

In fact, Indonesia in learning mathematics still has many problems such as students' mathematics learning outcomes are still low. Based on the research results of the Third International Mathematics And Science Study Repeat (TIMSS-R) in 2011 stated that among in the 46 countries, Indonesian junior high students' achievement is on the order of 38 rank. This situation is very poor to the

position and role of mathematics, since mathematics is the basic of science but nowadays mathematic has not turned out to be a favorite subject.

In addition students are less, students still regard mathematics as a subject that is difficult. Confusing and even feared by most students. Why it can be said like that? It because the use of traditional method such as conventional learning method not make student as learning subject. They do not want to create new learning context that different from the previous as using multimedia base of interactive learning. From this, it should be removed paradigm students about mathematic is so difficult. And to find solutions to help the student in solving mathematical problems by improving teaching methods and themselves. Whereas, based on the the appendix Minister of National Education (Permendiknas) No. 20 of 2006 concerning content standards (Wijaya, 2012: 16) says that the purpose of learning mathematics as follows: (1)Understand the mathematical concepts, explains the relationship between concepts and apply concepts or algorithms, flexibly, accurately, efficiently, and appropriately, in solving the problem; (2)Use the pattern and nature of reasoning, mathematical manipulation in making generalizations, compile evidence, or explain mathematical ideas and statements; (3)Solve the problems that include the ability to understand the problem, devised a mathematical model, solve the model and interpret the obtained solution; (4)Communicate the ideas with symbols, tables, diagrams, or other media to clarify the situation or problem; (5)Have respect for the usefulness of mathematics in life, which is curious, attention, and interest in studying mathematics, as well as a tenacious attitude and confidence in solving problems.

Based on the objective of mathematics learning, can be said that learning mathematic not only enough be able to computation mathematic, but should be mathematics learning become meaningful learning where students can use his ability and curiosity inepedently, and not look mathematics as an abstract thing. Mathematics should be able to imagined by student, so that student can understand mathematics concept very well. Moreover, mathematics education in Indonesia has seen the development of mathematical thinking skills, especially the second goal is the reasoning. Reasoning is a mental process or activity in the

developing minds of some facts or principles, and the results of the mental processes of knowledge or conclusions.

Mathematics and mathematical reasoning are two things that can not be separated, mathematics is understood through reasoning, and reasoning to understand and put into practice in the learning of mathematics, so that mathematical reasoning ability is very important and needed in the study of mathematics. According to (Suryanto : 37)

*“Pendidikan Matematika Realistik (RME) adalah pendidikan matematika sebagai hasil dari adaptasi Pendidikan Matematika Realistik yang telah diselaraskan dengan kondisi budaya, geografi, dan kehidupan sosial Indonesia.”*

In application PMRI very concerned that the study of mathematics is an abstract object, a thing that cannot be compromised, but also noticed that the mental development of children requires a step to bring the children learn the abstract object.

From interviews with Mrs. Agustina, S.Pd as mathematics teacher at SMP Negeri 1 Binjai which states that :

Students are still difficulties in solving mathematical problems, which have an impact on learning outcomes and value of diagnostic student who does not complete. This is due to the lack of reasoning power of students to problem-solving. And the implementation of learning mathematics often use the lecture method is centered on teachers (teacher centered), this affects the students are passive in learning mathematics.

Based on survey research conducted on January 30<sup>th</sup> 2014 which showed low. reasoning ability can be seen from the results of the students' graduation of Formative Test reached 20% of the total number of students, while 80% of students do not achieve a passing grade. This can be seen in the responses of the students from one of the diagnostic test about the average student can not answer the question correctly. One of the “Ratio and Proportion” given problem is as follows, “a contractor estimates that he can have a work completed in 40 days by employing 48 workers. After 10 days, the work is paused for 6 days. How many workers must he had so that work can be completed in time ?”

$40 \text{ hari} \rightarrow 6 \text{ hari}$   
 $30 \text{ hari} \rightarrow 24 \text{ hari}$   
 $40 : 24 : 48 = 6$   
 $= \frac{1152}{40}$        $40 \cdot 60 = 12$  ✓

$\text{Banyaknya pekerja} = 48 \times 40 = 1.920$   
 $\text{Sisa pekerja selama} = 10 \text{ hari}$   
 $= (40 - 10) \times 48$   
 $= 30 \times 48$   
 $= 1440$   
 $\text{Sisa kerja} = (40 - 10 - 6)$   
 $= 24 \text{ hari}$

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**Figure 1.1** The Students Answer from One of Item Formative Test

By looking at the students' answers about the one item from the Formative Test, we can conclude that the reasoning ability of students is still low, it is supported by students answer that question without understanding the concept of using inverse proportions is accompanied by mathematical manipulation by understanding the context question, while the students' answers in the question they are still confused to understand how to solve the problem and get the result. The function of reasoning ability test is to evaluate whether the statement can be believed or embraced. Or again literally, we see no reason (reason) behind a statement. And for students, the function reasoning ability test is to evaluate how far ability students to solve problem by reasoning. Can see from the formative test have done, some students doesn't understand the concept to solve the problem.

The Efforts should be made to improve the students lack of mathematical reasoning ability is the improvement of the learning activities. It is time to change learning math teacher-centered to student-centered change. Knowledge is not something ready-made, but a process that must be cultivated, conceived and constructed by the students, and can not be transferred to those who simply accept passively. Thus, students must be active themselves. While the teachers should act as a facilitator and mediator who creatively so that students can learn in a pleasant atmosphere. Learning paradigm is connected to the theory of Realistic Mathematics Education (RME), which in Indonesian means Realistic Mathematics Education and operationally called Realistic Mathematics Learning.

Sets is one of subjects in the Junior Grade VII. This material is the contextual and it's close to daily life. However, this material is often difficult due to the lack of ability to solve the problem. The weakness is caused due to the mathematics students are often taught in a very abstract concept while in elementary school. Lack of trained students how to solve problems in daily life. By applying the Realistic Mathematics Education in teaching of arithmetic social is a right thing, which is oriented approach to learn mathematics in everyday experience of mathematics (mathematize of everyday experience) and apply mathematics in daily life so that students are expected to build their own knowledge gained and try to use logic to think or reason in constructing knowledge.

Statement of Freudenthal in Wijaya (2012: 20) argues that "Mathematics is a form of human activity that underlies the development of Realistic Mathematics Education Approach (RME)." Realistic Mathematics Education is an approach to teaching mathematics in the Netherlands. The word "realistic" is often misunderstood as a "real-word", which is the real world. Many people who think that the Realistic Mathematics Education is an approach to learning mathematics using everyday problems. The use of the word "realistic" is actually derived from the Dutch "Zich realiseren" which means "to imagine" or "to imagine" (Van den Heuvel-Panhuizen, 1998). According to Van den Heuvel Panhuizen, the use of the word "realistic" is not merely indicate the existence of a connection with the real world (real word) but rather refers to the focus of Realistic Mathematics Education in placing emphasis on the use of a situation that could be imagined (imaginable) by students. This is supported by Treffers and Beishuizen (1999) in (Hough and Gough : 1) that :

‘RME involves a complete reversal of the teaching/learning process’. The common practice of demonstrating the formal element of a topic, followed by consolidation through exercises with some application problems towards the end of the learning process, does not feature at all. Instead, context problems are used as both a starting point (a route 'into' the mathematics) and the medium through which pupils develop understanding (a route 'through' the mathematics).

Based on the above quote Realistic Mathematics Education (RME) on approach is not only used to illustrate the application and the reality in the real world, but as a resource for learning mathematics itself. Given the context of the real world that is already known by the students. The most important thing that is real enough for students to be able to engage with them so that they can solve the problem that makes sense. So from the above statement implies that the RME is a learning does not start from the definitions, theorems, or the properties and then followed by examples, as it has been implemented in various schools. However, the properties, definitions and theorems that are expected as though it was rediscovered by the students through the completion of a given contextual teachers in early learning. In other words the RME on approach students are encouraged or challenged to actively work, even expected to construct or build their own knowledge gained and try to use logic to think or reason in constructing knowledge.

Based on description of the background, then writer interest to do a research with title **“Improving of Student Mathematical Reasoning Ability by Applying Realistic Mathematics Education (RME) on Approach Subject Sets in VII Grade SMP Negeri 1 Binjai Academic Year 2013/2014.**

## **1.2 Problem Identification**

From the description of the background obtained by the identification of problems, namely:

1. Students reasoning ability is low
2. Learning methods are often used is still centered on the teacher
3. Mathematic knowledge is not built from meaningful life context and relevant to student so that students cannot construct his formal skill to be formal skill.
4. Realistic Mathematics Education approach is not yet implied students' mathematical reasoning abilities.

### **1.3 Problem Limitation**

As described above, there are many problems that are identified, there needs to be more focus on problem restrictions. In this study the problems that arise bounded on Improvement of Mathematical Reasoning Ability Students By Applying Realistic Mathematics Education (RME) on approach Subject Sets in VII grade SMP Negeri 1 Binjai Academic Year 2014/2015.

### **1.4 Problem Formulation**

Based on the background that have described above. The problem in this research is formulated as follows :

1. How is the improvement of students reasoning ability who studied by realistic mathematics approach at SMP Negeri 1 Binjai on the subject sets ?
2. How to effectiveness of realistic mathematics approach to increase students at SMP Negeri 1 Binjai on the subject sets ?
3. How to Implementation realistic mathematics approach so that be able to improve of students mathematical reasoning ability at SMP Negeri 1 Binjai on the subject sets ?

### **1.5 Research Objective**

Based on the problem formulation above, the pupose of this research are :

1. To know the improvement of students mathematical reasoning ability who studied by realistic mathematic approach.
2. To know the effectiveness of realistic mathematic approach in increasing students.
3. To know implement realistic mathematics approach so that be able to improve of students mathematical reasoning ability.

## 1.6 Benefits of Research

1. For Students
  - a. It is expected students by implement realistic mathematics learning can improve student's reasoning mathematical abilities.
  - b. It can raise motivation and interest of students in mathematic.
- 2 For teachers, It is expected to be input in the use of the approach varied in the pursuit of learning in the classroom and can relevant appeal study for society in the next day.
- 3 For schools, it is expected to be used as input in their policy innovations related learning in schools to improve the quality of teaching mathematics.
- 4 For the authors, this study is expected to be a positive feedback in preparing themselves as prospective educators.
- 5 For other researchers, the study is expected be medium for applying the approach of realistics in learning process.

## 1.7 Operational Definition

To avoid the happening of the different interpretation to the terms that used in this research, therefore need to presented operational defenition as follows :

1. Mathematical resoning ability that mean in this research is : 1) propose conjecture; 2) doing mathematic manipulation; 3)giving explanation and fact characteristic, relation, or pattern that exist; 4) collect conclusion; 5) the ability of solving mathematics problem by following logic arguments.
2. Realistic mathematics education is an approach in mathematics learning that many benefitted imaginable situation. Realistic approach based on five characteristics, they are : 1) phenomenological exploration or the use of context; 2) the use of models for progressive mathematicalization; 3) the use of students own production and construction; 4) interactivity; 5) the intertwining of various learning stands or unit.