CHAPTER I

INTRODUCTION

1.1. Background

Education is one of the efforts to improve the quality of human resources and that have certain characteristics such as insightful extensive knowledge, ability to solve everyday problems it faces and the attitudes and behavior positively to the surrounding natural environment. Trianto (2009: 1) states that: "Good education is education that can support future development, which means being able to develop the potential of learners, such as he would be able to face and solve the problems by himself."

Mathematics is the oldest science and basic science has an important role in science and technology. The statement is supported by the statement Cockroft (in Abdurrahman, 2009:253) argues that mathematics should be taught to students because:

1. Mathematics always be used in all aspects of life.
2. All area studies require to math skills appropiate.
3. Can be strong, short and clear in communication.
4. Can be used for present information in various way.
5. Increase logical thinking, accuracy and awareness spatial.
6. Provide satisfaction against to solve challenging problems.

Mathematics education is one of study taught at every level of education. Mathematics education has a very dominant role in educating students for developing critical thinking skills, analytical and logical. One of the problems that occur in the world of education in Indonesia is the low quality of mathematics education, both in terms of process and learning outcomes, Thus causing a low Indonesian student mathematics achievement.

Hamdani (2011: 79) said that:

> The task of the teacher in order to optimize the learning process is a facilitator who is able to develop the students' willingness to learn, develop learning conditions, and impose restrictions on the positive for himself as a teacher. Thus, the learning method is one factor or an educational component that will determine the success or failure of a lesson.

However, the reality has not been as expected. The study mentions that the focus and attention on improving the ability of mathematical thinking still rarely developed.

According Herman (in http://furahasekai.wordpress.com/2011/09/06/permasalahanpembelajaran-matematika-di-sekolah/) said that:

> The problem of the low mastery of math students are the teachers do not provide adequate opportunity to the students to construct their own knowledge. Math has studied by most students directly in the form of ready-made. (formal), because mathematics is viewed by most teachers as a process that procedural and mechanistic.

The mathematics problem is a matter of mathematics or mathematical statement in which there is no procedure or algorithm that can be directly used or used by students to solve the problems, and the statement must be solved by the students. Teachers are required to encourage students to actively learn and can improve the ability of solving mathematical problems which are important factors in mathematics.

Mathematics is a field of study that is learned by everyone from an early age. There are many reasons on the need for students to learn mathematics. As stated by Cornelius (in Abdurrahman, 2012: 204):

> "Five reasons for the need to learn math because math are
>
> (1) the means to think clearly and logically,
>
> (2) the means to solve the problems of everyday life,
>
> (3) the means to know the relationship patterns and generalization of experience,
>
> (4) the means to develop creativity and
>
> (5) the means to increase awareness of cultural development."

Given the role of mathematics is very important in the process of improving the quality of human resources in Indonesia, the efforts to improve the quality of mathematics learning requires serious attention.

There are many reasons for the need to study mathematics. As proposed by Cockroft (in Abdurrahman, 2009: 253):

> The reasons of mathematics thaught to students because

(1) always used in our life,

(2) all fields of study require appropriate mathematical skills,

(3) a powerful means of communication, concise, and clear,

(4) can be used to present information in a variety of ways,

(5) improve the ability to think logically, accuracy, and spatial awareness, and

(6) give satisfaction to the efforts to solve challenging problems.

From the above statement it is seen the purpose of learning mathematics is to make all parties must continue to improve the quality of education. One of the capabilities that are expected to be achieved by students is the mathematical reasoning ability. It is stated in the Ministerial Regulation No.22 of 2006 on Subjects Mathematics Content Standards, the purpose of learning mathematics is that the students are able to:

(1) understanding mathematical concept, explaining the relationship of concepts and applying concepts or algorithms, are flexible, accurate, efficient, and precise in solving the problem,

(2) using reasoning on patterns and properties, perform mathematical manipulation in making generalizations, compile evidence, or explain ideas and statements of mathematics,

(3) solving problems that include the ability to understand the problem, devised a mathematical model, solve the model and men afsirkan obtained solution,

(4) communicating the ideas with symbols, tables, diagrams, or other media to clarify the situation or problem, and

(5) having respect usefulness of mathematics in life, curiousity, concerns and interests in learning mathematics and a tenacious attitude and confidence in solving problems.

Various reasons for the need for schools to teach math to students in essence can be summarized as problems of everyday life. According exposure Liebeck (in Abdurrahman, 2003: 253) "There are two kinds of mathematics

mathematical reasoning abilitythat must be mastered by the student, mathematical calculations and mathematical reasoning".

Reasoning in mathematics has a very important role in the process of thinking of a person. Reasoning is also a foundation in mathematics. If the students do not develop the ability to reasoning, then for math students will only be a matter that follow set procedures and emulate the examples without knowing its meaning.

Mathematics and reasoning are two things that can not be separated, that is mathematics theory understanding through reasoning and mathematical reasoning can be understood and be trained through learn math. Students are able to think and make sense of a mathematical problem if it had been able to understand the math problems. A point of view of students about math problems influence the thought patterns of settlement that will be done. In addition to mathematics is a science which is understood through reasoning, also because one of the goals of mathematics learning is that the students are able to use our reasoning in the patterns and character, manipulation mathematics in making generalizations, compile evidence, or explain mathematical ideas and statements. This is similar to the Directorate General of Primary and Secondary Education Regulations explanation No. 506 / C / PP / 2004 (in Sadiq, 2009: 14) states of the indicators of reasoning that should be achieved by students. Indicators show the reasoning, among others:
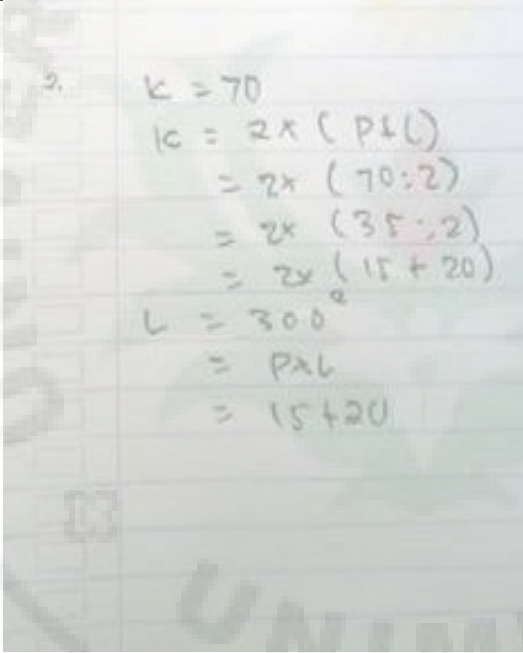
(1) ability to present mathematical statement in writing, and drawing,

(2) ability to manipulate the math,

(3) ability to check the validity of an argument,
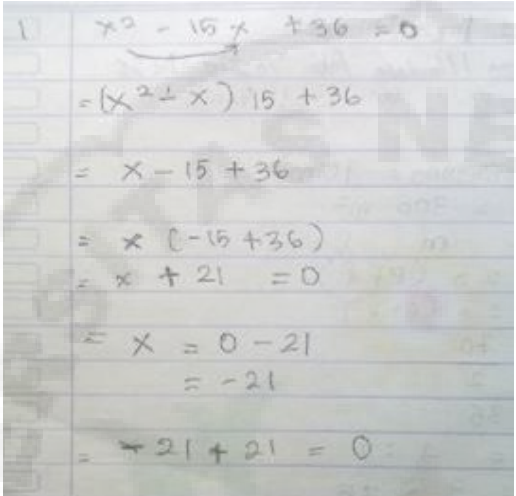
(4) ability to draw conclusions from the statement.

From the research in field observations were carried out in SMP Negeri 11 Binjai shows that the ability of mathematical reasoning students still low seen from students who do not understand the problem, confused associating with known what was asked so difficult to manipulate formulas to be used, and many students are less rigorous in calculation so that the effect on the end result. This is evident from the questions given to students:
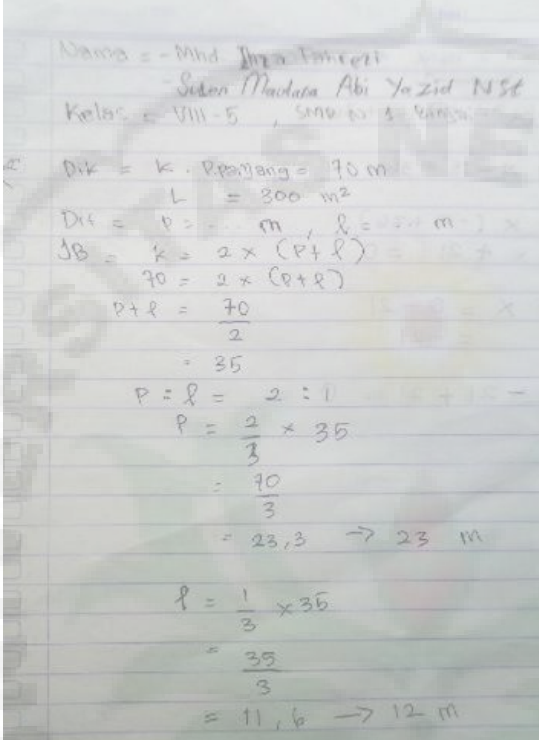
1. Determine the roots of a quadratic equation $x^2 - 15x + 36 = 0$

2. Perimeter of a rectangular garden is 70 m. If area of the garden is 300 m^2, Find the length and breadth of the garden!

Tabel 1.1

Students Error In Solving Problem

No.	Student's Answer	Student's Mistaken
1		o Students can not change the results of factoring in the form of roots. o Students are less precise in the calculation .

No.	Student's Answer	Student's Mistaken
2		o Lack of understanding of the basic concepts / material precondition of a quadratic equation is an algebraic seen from the students who are still confuse with factoring. o Did not understand the question
3		o Did not written where are the known and questioned. o In this question, students could not identifying the question which can be seen that student just remembering the formula

| 4 | | o The steps of answering th question almost right but student still confuse to connect between equations obtained from the circumference of square with the width of the square |

Based on the examples above, it can be concluded that there are still many students who have difficulty in solving mathematical problems that reasoning math student can not be increased as expected of teachers. This illustrates the mathematical reasoning problems, hence the need for an action to be able to train and develop the skills of mathematical reasoning students in order to increase the learning of mathematics.

Connecting with these problems shows that the reasoning of students is important, it is supported by the general aim of providing reasoning structuring and formation of student attitudes and skills in the application of mathematics. Recognizing the importance of mathematical reasoning for students, it is necessary that learning can improve students' mathematical reasoning. One step that can be done by teachers as mentors are appropriate learning models, one of which is to implement cooperative learning model. According Artzt & Newman (in Trianto, 2009: 56) states that in a cooperative learning students learn together as a team to accomplish the tasks of the group to achieve a common goal. Thus, each member of the group has the same responsibility for the group's

success. Some experts claim that this model is not only excel in helping students understand difficult concepts, but also very useful to cultivate the ability to think critically, work together, and help a friend.

This is also supported by the results of interviews with teachers of mathematics at SMP Negeri 11 Binjai (on January 16th 2016) says that, generally there are difficulties in learning mathematics when a given problem is not the same as the example, this would mean a lack of understanding of the students in understanding the concept of bringing the ability to think they are not too maximal and its effects reasoning ability also becomes low, the implementation of learning mathematics dominated by teacher makes student involvement for this study is still not optimal. He also said that students are not too interested in math so that students easily forget and understand only when he explains.

One of solutions that can be applied to solve the low mathematical reasoning skills students is to apply the model of cooperative learning. Character of cooperative learning is students learn together as a team to accomplish the tasks of the group to achieve a common goal. Thus, each member of the group has the same responsibility for the group's success. Some experts claim that this model is not only success in helping students to understand the difficult concepts, but also very useful for the kind of critical thinking, working together, and help a friend. This is supported by the results of research conducted by Slavin (in Rusman, 2012 : 205) said that:

(1) Using the cooperative learning can improve student achievement while increasing social relationships, cultivate a tolerance and respect for the opinions of others,
(2) Cooperative learning can solve the needs of students in critical thinking, reasoning, and integrate knowledge with experience.

In this model of cooperative learning, teachers not only impart knowledge to students, but also have to build knowledge in his mind. Students have the opportunity to gain direct experience in implementing their ideas, this is an opportunity for students to find and implement their own ideas (Rusman, 2012:201).

There were 4 of cooperative learning approach according to Trianto (2011: 67), "That Student Teams-Achievement Division (STAD), JIGSAW,

Investigation Group (Teams Games Tournaments or TGT), and the Structural approaches include Think - Pair-Share (TPS) and Numbered Head Together (NHT)".

Because teachers' mastery of the learning model is still not optimal, the researcher tried to introduce cooperative learning models for math teachers in SMPN 11 Binjai. One of the cooperative learning model to improve mathematical reasoning abilityis cooperative learning model type Think-Pair-Share (TPS). The reason the researchers chose this learning model because TPS is a type of cooperative learning that is designed to influence the pattern of interaction that occurs between students in learning activities. In this case the student is expected to work in small groups to help each other and be identified with a pattern of cooperation rather than individuals. The advantages of TPS models are shaping individual and a pair group responsibility, because in this model there are individual tasks and task groups. So also with cooperative learning model Student Teams-Achievement Division (STAD) is the simplest cooperative learning, with 4-5 people heterogeneously discussions. STAD cooperative learning created between student interaction with the students and also between students and teachers to create a learning community. Students not only learn from teachers but also from fellow students. In STAD cooperative learning requires active student participation in group discussions. According to Istarani (2011: 68-69), think-pair-share has strength:

1. Be able to improve students' reasoning, critical power of students, the students' imagination and power of analysis to a problem;
2. Promote cooperation among the students as they work in groups;
3. Improve the ability of students to understand and appreciate other opinions;
4. Improve students' ability to express opinions as implementation of his/her knowledge;
5. Teacher is more likely to increase students' knowledge when they finished with the discussion.

And there are some of the strength of cooperative learning model STAD (Student Teams-Achievement Division), according Nurgayah (2011: 86-88) are:

a. In STAD cooperative learning model, learners are not overly relied on teachers, but also increased confidence in the ability to think independently, finding information from a variety of sources as well as learning from other learners.

b. STAD cooperative learning model develops the ability to express an idea or ideas verbally and compare with other people's ideas.

c. STAD cooperative learning model can help learners to appreciate others and aware to the limitations as well as receiving all the difference.

d. STAD cooperative learning model can help learners to take more responsibility in learning.

STAD cooperative learning model improves academic achievement and social, including developing a sense of self-esteem.

Based on the background described above, the researchers intend to conduct a study entitled: "Comparative Ability of Reasoning Math Students Using Cooperative Learning TPS Model (Think-Pair-Share) With Learning STAD (Student Teams Achievement Division) Model In Class VIII SMP Negeri 11 Binjai TA 2015/2016 "

1.2. Problem Identification

Based on the problems in background that have been mentioned above, can be identified several problems as follows:

1. Teacher dominated in Math study

2. Teacher have to establish knowledge and encouradge students Mathematics Reasoning.

3. Teacher does not encourage the students to be more active thinking bounce ideas off so the reasoning ability is still low.

4. Teacher is no use cooperative learning model for TPS (Think-Pair-Share) and STAD (Student Team Achievement Divisions) yet.

5. Students' ability to solve problem is lack.

6. Students are not always motivated to want to look for his own ideas.

7. Students lack of ability to associate,organize and define the concepts.

1.3. Problem Limitation

Based on the background and the problem identification above, the research problem is limited only to compare the ability of mathematical reasoning students taught by cooperative learning model TPS (Think-Pair-Share) and STAD (Student Team Achievement Divisions) on the subject of quadratic equations in Class VIII SMP Negeri 11 Binjai.

1.4. Problem Formulation

Based on the identification and scope of problem above, then that becomes the problem in this research is : How the comparison reasoning abilities mathematics students taught by cooperative learning model TPS (Think-Pair-Share) and STAD (Student Team Achievement Divisions) on the subject of quadratic equations in class VIII SMP Negeri 11 Binjai?

1.5. Problem Objctives

As for the purpose of this research is to know how to compare the ability of reasoning math students taught by cooperative learning model TPS (Think-Pair-Share) and taught by cooperative learning model STAD (Student Team Achievement Divisions) on the subject of the equation squares in class VIII SMP Negeri 11 Binjai.

1.6. Research Benefit

This research was conducted with the hope to provide the following benefits:

1. For teachers, it can expand the knowledge of cooperative learning model Think-Pair-Share and Student Team Achievement Divisions in helping students to improve mathematical reasoning abilities

2. For students, through cooperative learning model can help students improve their mathematical reasoning abilities.

3. For schools, as consideration in the development and improvement of mathematics teaching programs in schools.

4. For researchers, as information material as well as a handbook for investigators in performing duties as a prospective teacher in the future.

5. As the material information to readers or other researchers who want to conduct similar research.

1.7. Operational Definition

The operational definition in this research are:

1. Mathematical reasoning is important to know and to do math. The ability to reason make the students solve problems in life, inside and outside the school. Whenever we use reasoning to validate our thinking, then we increase confidence in mathematics and mathematical thinking.

2. Cooperative learning model STAD *(Student Team Achievement Divisions)* is a cooperative learning model using small groups with the number of each member of each group of 4-5 students heterogeneously. Beginning with pen y ampaian learning objectives, delivery of material, group activities, quizzes and awards groups. The teacher presents a lesson, and then students work on their team to make sure that all team members have mastered the lesson. Then, all students are given a test on the material, at the time of this test they are not allowed to help each other.

3. The learning model *Think Pair Share* or think in pairs is a type of cooperative learning designed to influence students' interaction patterns.

The step of learning *Think Pair Share* types as follows:

i. Step 1: Thinking *(Thinking)*
Teachers ask a question or problem that is associated with the lesson, and ask students to use a few minutes to think for themselves answer or problem.

ii. Step 2: Pairing (Pairing)

The teacher asks the students to pair up and discuss what they have acquired. Interaction during the time provided unite answer questions if a unifying idea or if a particular problem is identified.

Normally teachers give no more than 4 or 5 minutes for pairs.

iii. Step 3: Sharing (Sharing)

In the final step, the teacher asks the pairs to share with the whole class that they are talking about. It is effective to go around the room from partner to partner and continued until about most couples have the opportunity to report.