

# CHAPTER I

## INTRODUCTION

### 1.1. Background

Education given knowledge, good thinking patterns, and more systematic framework. Education need logical thinking to connect the abstract part in the mind to applied in solving problem of reality life. To construct this logical thinking, it needs mathematics.

Mathematics subject is one of the principal subject taught begin during elementary school until the university. Mathematics subject is also one of the subjects tested in the national examination both at the elementary school, junior high school, as well as senior high school.

Mathematics is a foundation and framework of the development of science and technology. In everyday life we use and need mathematical concepts and principles, as a tool in application other disciplines as well as in the development of mathematics itself. Seeing the importance of the role of mathematics in everyday life, mastery of the subject areas of mathematics is a must.

Mathematics is one of the most important subjects that provide several vital skills to the learners. The characteristics of math abilities also as principle and process standards in mathematics that will be developed in the National Council of Teachers of Mathematics (NCTM, 2000) are problem solving, reasoning, communication, connection, and representation. The five of characteristics are the goal to be achieved in mathematics learning. So, mathematics is a learning that has final result more than a score in final report.

Indonesia students' mathematics achievement ranked low internationally. The teaching and learning of Mathematics in schools in Indonesia is very much teacher-centred and lacks activities that could enhance students reasoning skills when learning mathematics. Indonesia's position at the international level also indicates that the nation's Mathematics achievement is declining.

Teaching math is not just convey a variety of information such as rules, definitions, and procedures to be memorized by students but teachers must engage students actively in the learning process. The participation of the students will

actively strengthen their understanding of mathematical concepts. This is in accordance with the principles of constructivism that knowledge is constructed by the students themselves, both personally and socially, knowledge can not be transferred from the teacher to the student, except through student activity itself to reason, students actively to construct continuously, so that always changes the concept moving towards more complex, the teacher merely helped provide the means and situations that students' construction process runs.

Each student has a different way to construct knowledge. In this case, it is possible for students to try different ways of representation in understanding a concept. Besides the representation was also instrumental in the process of mathematical problem solving. As stated Brenner that successful problem-solving process that depends on the skill represents a problem such as constructing and using mathematical representations in words, charts, tables, and equations, completion and manipulation of symbols (Neria & Amit, 2004: 409).

Based on the observation of researcher did on February, 24<sup>th</sup> 2017 by doing interview to the vice principle and giving questions and questioner to the students. By giving the questions about statistics to the 37 students of grade VII at SMP Negeri 6 Medan as follows:

1. Pada sebuah jajargenjang diketahui luasnya  $250 \text{ cm}^2$ . Jika panjang alas jajargenjang tersebut  $5x$  dan tingginya  $2x$ .
  - a. Buatlah model matematika permasalahan di atas
  - b. Hitunglah nilai  $x$ , panjang alas dan tinggi jajargenjang tersebut.
  - c. Gambarlah jajargenjang tersebut.

1.  $\frac{p \times l}{2} = 250x$

b.  $2x : 5x : 10x$   
 Luas =  $250 \text{ cm}^2$  ;  $2x = 125 \text{ cm}$   
 kecil =  $25 \text{ cm}^2$  ;  $5x = 50 \text{ cm}^2$

Students not substituted the value of 'x' to equation of 'p' and 'l'

The student don't understand how to make mathematic model from the question.

The students unknown how to get the value of 'x' from the question.

**Figure 1.1. The Student's Answer of Observation Questions**

2. Sebuah persegi panjang berukuran  $panjang = (3x + 4) \text{ cm}$  dan  $lebar = (x + 6)$ . Jika luas persegipanjang  $392 \text{ cm}^2$ .
- Buatlah model matematika permasalahan diatas.
  - Hitunglah panjang dan lebar persegi panjang tersebut.
  - Gambarlah persegi panjang tersebut

20. Rumus L Persegi Panjang =  $p \times l$   
 $392 \text{ cm}^2 = (3x+4)(x+6)$

b.  $392 \text{ cm}^2 = (3x^2 + 10x + 4x + 24)$   
 $392 \text{ cm}^2 = 3x^2 + 14x + 24$

c.

The students know to make the mathematic model

Students don't understand how to solve the equation to get the value of 'x'

Students known to draw the picture but not complete.

**Figure 1.2. The Student's Answer of Observation Questions**

From 37 who answer the questions, can be seen that 66,67% of them have not been able yet to build their visual representations in making figure exactly, while 70,27% of students also have not been able yet to build their mathematical representations ability in equation or mathematical expression aspect especially in making the equation. Mathematical model from initial representation is also given

65,49% of students have not been able yet to represent their ideas or knowledge in writing the text form.

The mathematical representation ability of students has not satisfied yet according to the observed results. This situation is caused by the lack of their understanding in triangular and quadrilateral topic and lack of representing something from abstract to concrete.

In mathematics during this time students never or rarely given the opportunity to present their own representation. Students tend to imitate the teacher in resolving the problem. As a result, the ability of the students did not develop a mathematical representation. In fact, the mathematical representation is needed in understanding mathematical concepts and problem solving. In addition, a mathematical representation can also improve mathematical communication. In general, the representation was instrumental in the improvement of mathematics competence.

NCTM suggested that students needed to understand and improve mathematical concepts and operations. In other words, using different representations of information in classroom strengthens learning methods and improves their successes by the referral to various sources of information. Representing information visually is considered an efficient representation process in mathematics education, especially in problem solving. The importance of using visual representations in mathematics education can be explained with the contribution it makes to the development of understanding and intuitional perspectives. The importance given to visual representations shows itself in the visualization strategy definitions by researchers.

Debrenti (2013: 3) said that, visual representations play an important role in the learning process. Numerous psychological studies confirm that using visuals in teaching helps a deeper understanding of concepts. People tend to remember the visual aspects of a concept better than analytical aspects. People tend to remember the visual aspects of a concept better than analytical aspects. For a mathematical thinking and communication we need to represent in some way the elements of mathematical structures.

According to Ainun (2015:56), N, Tiya, K (2013:177), Sukmawati, R and Purnamasari, W (2016:86) say that, generally teacher-centered learning and learning models emphasize the demands of the curriculum so that students are passive in the learning process. Teacher explanation is too fast one of the factors that make students less enthusiastic in learning mathematics, lazy to do the task given. Relevant models are needed to optimize, improve students' abilities. One way we can do is to use a learning model that is more supportive of student activities in understanding a material and more emphasizing students play an active role in learning. The effective learning model used is Teams Games Tournament (TGT) because of the syntax that requires students to work together, discussion.

Teams Games Tournament (TGT) is type of cooperative learning model that involves all students as peer tutors and contains elements of the game. According Slavin (2010:63) state that Teams Games Tournament is one of type cooperative learning that puts student in a group consist 5-6 students that have ability, gender, and syllable or a difference race. Teacher presents the material and students work in their groups. In Teams Games Tournament there are 5 key component, (1) class presentation; (2) teams; (3) game; (4) tournament; and (5) team recognition. Cooperative learning model type Team Games Tournament (TGT) is one model of cooperative learning that lesson apply the concept of the game (games) were performed between groups with members of each group. With this model of learning as students are more active towards learning that are expected to improve students' mathematical communication.

According to Kagan (2007), NHT indirectly trains the students to share information, listen carefully, and speak with the calculation, so that students become more productive in learning. According to Mulyono and Asih T N (2013), applying of NHT learning cooperative and assisted computer program is the increasing of result learn, motivation, and student activity. NHT learning strategy gives priority to group work rather than individual work, so that students work in an atmosphere of mutual cooperation and have many opportunities to distribute information and to improve communication skills. NHT can develop social skills

of students because it contains how to cooperate, share, ask, and appreciate the friends' idea. Moreover, it can encourage students to enhance the spirit of cooperation. NHT is one of alternative learning strategies that can be used to solve the problems. NHT learning strategy promotes the cooperation between students in groups to achieve learning objectives.

Irawan A, Mardiana, and Saputro S (2017) said that “cooperative learning model that can be applied in learning mathematics is a cooperative learning model of Numbered Heads Together (NHT) and Teams Games Tournament (TGT). The learning model Numbered Heads Together (NHT) is a model of learning that can eliminate the gap between students who are intelligent and not intelligent so, each student will play actively in discussion. This learning model demands a responsibility of each student, because in practice, teachers will designate one of the students randomly to answer each question. Effective teaching of mathematics is interactive, two-way process in which students play an active part by answering questions and discussion, explaining and demonstrating their methods to others in the class. It will ensure the involvement of all students and it is a very good attempt to increase individual responsibility in group discussion. Cooperative learning model of Teams Games Tournament (TGT) is a learning model that provides a challenge to students to compete as individuals who represent their respective groups to collect as much as score in game tournaments. This technique provides an opportunity for all members of the group to be able to participate to get value”.

Based on this background that the researcher has described above, it has been done the study entitled “The Difference of Students Mathematical Representation Ability by Using Cooperative Learning Model Team Game Tournament (TGT) and Numbered Heads Together (NHT) types at SMP 6 Negeri Medan”.

## **1.2. Problem Identification**

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

1. Mathematics learning outcomes is still low
2. Learning methods are often used is still centered on the teacher
3. The students ability representation is still low
4. The Teams Games Tournament Model is not yet implied

### **1.3. Problem Limitation**

As described above, there are many problems that are identified, there needs to be more focus on the problem of restriction. In this study problem that arise bounded on “Teams Games Tournament (TGT) is higher than student’s mathematical representation ability in the classroom than taught using Numbered Heads Together (NHT)”.

### **1.4. Problem Formulation**

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

Whether difference between students’ mathematical representation ability in the classroom taught using Teams Games Tournament (TGT) with students’ mathematical representation ability in the classroom that using Numbered Heads Together (NHT)?

### **1.5. Research Objective**

Specifically, the objectives of the research is to know whether the students’ mathematical representation ability in the classroom taught using Teams Games Tournament is higher than students’ mathematical representation ability in the classroom taught using Numbered Heads Together (NHT).

### **1.6. Research Benefits**

1. For Students

To enhance the student’s mathematical representation ability

2. For Teacher mathematics

To be an alternatives sources for teacher in selecting the appropriate instructional model in the classroom to enhancing student’s mathematical representation.

3. For School

To be as references that can be used by the other teacher.

#### 4. For The Authors

To be inspiration or comparison to do or develop the similar research.

### 1.7. Operational Definitions

In order to avoid the differences of clarity meaning about important term contain in this research, the operational definitions will be noted as following :

1. Mathematical representations are expressions of mathematical ideas (matter, statement, definition, and others) are revealed to show (communicate) the results of its work in a certain way (how conventional or unconventional) as a result of interpretation of mind.
2. Mathematical representation ability is students' ability to express mathematical idea (problem, definition, statement, and so on) into form : (1). Picture, diagram, table, or graph; (2). Mathematical notation, numerical/algebra symbol; (3). Written texts/word the interpretation of their mind.
3. Teams Games Tournament (TGT) is learning that engage students actively in the learning process where students have the freedom to interact and express their opinions. In addition, the learning model is used in games and tournaments academic intergroup where students compete with the other group to get good grades and awards in the group. In this study all the students in each group is required to attempt to understand and master the material taught by the teacher. There are five phase of TGT model as following: (1) class presentation; (2) teams; (3) game; (4) tournament; and (5) team recognition.
4. Numbered Heads Together (NHT) is one type of cooperative learning that emphasizes on the special structure designed to influence the pattern of students' interaction, and its goal is to improve the academic mastery. There are four phase of NHT model as below: (1) Numbering, (2) Questioning, (3) Heads together, and (4) Answering.