

CHAPTER I INTRODUCTION

1.1 Background

Development of science and education technology allows all parties can get information quickly and easily from a variety of sources and places of the world. Thus students need to have the ability to select and acquire, manipulate information to survive in the ever-changing circumstances, uncertain and competitive. These capabilities require critical thinking ability, the systematic, logical, and creative capability of collaborating effectively. How to think like this could be developed through learning math because math has a structure and strong and clear linkages between the concept so as to allow skilled students think rationally (Ministry of national education, 2003:5).

Mathematics is a science that underlies the universal development of modern technology so that it has an important role in various disciplines and develop the human intellect. Mathematical subjects need to be given to all students ranging from elementary school to equip learners with the ability to think logically, systematic, analytical, critical, and creative, as well as the ability to work together (Regulation of the Minister of National Education, 2006). Realizing how the need for math, at least we can see in the math curriculum in schools that can be hours more servings compared to other subjects. In addition, according to Garis-Garis Besar Program Pengajaran (GBPP, 2006) of mathematics, general purpose mathematics in primary and secondary education level, namely:

1. Prepare students to bear to face the changing circumstances in life and in the world who are always developing, through the practice of acting on the basis of thinking logically, rational, critical, careful, honest, effective, and efficient.
2. Prepare students to use mathematics and mindset of mathematics in everyday life, and learn a variety of science.

Based on the purpose, there is generally a mathematical lesson at school is meant as a means to train the students to be able to have the ability of critical

thinking. This indicates that the critical thinking ability is very important competencies to be developed.

Critical thinking is required to navigate the ever-complex environment in which they live. Critical thinking is a form of thinking that needs to be developed in order to solve the problem, formulate conclusions, collecting various possibilities and make informed decisions when using all these skills effectively in the context of and the right type.

According to Ennis (Fisher, 2009:4), critical thinking is rational and reflective thinking that is focused on what is believed and worked on. Richard Paul (Fisher, 2009:4) reveals that students who think critically are through “thinking about thinking of yourself “. And consciously strive to improve it by referring to the several models of thinking which are good in that field. Critical thinking ability is not only beneficial at a time when students are learning, but it can be a provision for students in the days to come.

Based on the above explanation, it is clear is that the critical thinking ability is very important. However, the reality on the ground suggests that the critical thinking ability of the students is still very low. The results of the study of Program for International Student Assessment (PISA) in 2015 for the students of SMP/SMA SMK in Indonesia, stating that Indonesia ranked-63 from 69 countries are evaluated with score average is 386, far below the average score International is 490. With these accomplishments, the gained information that such students are only capable of mastering math simple problems to solve as one, they haven't been able to solve the problem of a complex and complicated problem. This is due to the efforts of the development of critical thinking ability in schools is rarely done. In fact, learning mathematics is dominated by teachers through the conventional model. This makes conventional learning students just listen, take notes, ask questions, and do question individually and groups.

In line with the above, when a researcher doing the observations during teaching practice, most students do not know and confused the benefits of studying mathematics. This causes the response of students against Mathematics subjects classified as low. One of the causes of low student response is learning

math isn't interesting and boring. The low response of students towards subjects of mathematics this will hinder the process and results of the study. Meanwhile, the student's response is one of the important factors which determine the success of student learning.

Critical thinking ability of someone in the field of study cannot be detached from his understanding of the field of study material. This is in line with the opinion of the Meyer (1986 : 120), it is not possible that someone can think critically in a certain field of study without the knowledge of the contents and the theory of the field of study. Therefore, in order for students to think critically in math, then he must understand math very well.

In fact, when the learning took place often we find, that the students to solve problems related to daily life that require the use of mathematics and organize them into a mathematical model. Difficulties encountered can be seen from how students think critically in math problems in completing a given.

Based on the results of observation at SMA N 1 Berastagi, the learning process is still likely to be dominated by teachers so that when the teacher finished explaining the material almost no students who ask about such material. Many students were silent as if understood by delivered by teachers. Every teacher had the only question a few students that play an active role to answer questions the teacher. This shows that many students can't be posited answers, opinions or respond to questions of his teacher.

Next, the researchers gave a test of critical thinking to class X MIPA 5 in SMA N 1 Berastagi amounting 32 people. The question is designed to be projected may show indicators of critical thinking. Based on the results provided no one student have the critical thinking ability category very high or high. In the category currently there are 6 students (18.7%), 10 students in low categories (31.3%) and 16 students in the categories is very low (50%). Here is the problem and the results of the diagnostic ability of critical thinking students.

Problem

A cake maker had 8 kg of flour and 2 kg of white sugar. He wanted to make two different kinds of cakes there are pastries pancake and apem. To make the pancakes needed 10 grams of sugar and 20 grams of flour to make a cake while apem 5 grams of sugar and 50 grams of flour. If pancakes are sold at a price of Rp.300.00/fruit and pastries are sold at apem Rp.500.00/fruit, specify the maximum income that can be earned the cake maker!

Table 1.1 The result of student work

Student's answer	Error analysis
 <p>Penyelesaian 1 kg tepung → 8000 20 gula pasir → 2000 10 dodol 50 apem = 4 $20x + 50y = 8000$ $10x + 5y = 2000$</p>	<p>1. Analyze Students have been able to identify the elements of the problem</p> <p>2. Synthesize Students have not been able to make mathematical modeling or formulate the main issues</p>
	<p>3. Solve the problem Students have not been able to analyze and determine the strategy of completion correctly seen from the graphic image beside.</p> <p>4. Evaluate Students have not been able to provide the final answer correctly</p>

From the student's answer above, students haven't been able to separate the information in detail there are 72% or 23 students, 62% or 20 students haven't been able to combine those parts of the information into a form or order new, 87% or 28 students have not able to make mathematical modeling, 81% or 26 students haven't been able to evaluate and draw conclusions in solutions. From the critical

thinking tests given by the researchers at class X MIPA 5 in SMA N 1 Berastagi can note that the critical thinking ability of students still belongs to low.

The difficulties experienced by students in resolving the problem, the error of interpretation is done students, students are less able to translate everyday language into the language of mathematics, one of them in determining the layout of the angle of the problem of the story. In addition, students understand the basic concepts. Look at the time working on the student transcript book shuffling the problem and do not know the concept of formula/rules which should be used in solving the problem.

Learning that is generally exercised by the teachers a lot more emphasis on the aspects of knowledge and understanding. While the application aspects of analysis, synthesis, and evaluation of even only a small part of the learning is done. During this time many more teachers give lectures and exercises problems quickly without understanding the concept in depth. This causes less trained students to develop power his reason in solving problems and applying the concepts that have been learned in real life so that the critical thinking ability of students cannot develop by either.

It is therefore in the process of learning, teachers need to improve as a teacher professional and creative in developing the ability to teach so that students can achieve maximum results. The ability of teachers as one of the efforts of improving the quality of education in the school in which the teacher is an element in the school directly and actively affecting students, the ability of that question is the ability of teaching by applying the model learning the proper, effective and efficient.

To improve the ability of mathematical thinking of students, it takes a real effort of one of them is correct the learning process that occurs in the classroom through the use of the learning model. The use of appropriate learning model to the characteristics of the material he teaches will make teachers can communicate better with their students, opening up diverse thinking insights from all students, so students can learn the whole concept properly. For example, by using Discovery learning model and cooperative learning model type Make a match.

Discovery learning model and Make a match is a learning model that aims to increase the attractiveness of students in critical thinking.

According to Adelia & Surya (2017) that Discovery learning is an activity or learning is designed so that students can find the concepts and principles through their own mental processes. It is similar with the opinions of Herman (Silalahi, 2015) that, Discovery learning is a model for how to develop the students actively investigate and find out for yourself, then the results obtained will be durable in memory and will not easily forget by students. Furthermore according to Nur (Adelia & Surya, 2017), that in discovering the concept, students perform observations, classifying, make conjectures, describe, draw conclusions and so on to find some concepts or principles

Model of cooperative learning type Make A Match is a model of learning to find a partner developed by Lorna Carrant. Application of this model starts from the technique that each student gets a card, then immediately find a matching match with the card he holds. Make A Match learning atmosphere will be noisy but very fun and fun. The cards consist of cards containing questions and other cards containing answers to these questions. This type of Make A Match cooperative learning model is able to create an active and fun learning atmosphere, learning materials that are delivered more attract the attention of students, and able to improve student learning outcomes to achieve the level of learning completeness in a classical way. Through the model of cooperative learning type Make A Match is able to develop children's critical thinking that is when all students are ordered to find a partner card which is a question or answer.

Exposure above shows that Discovery Learning and Make a Match have the potential to develop student's mathematical critical thinking ability. Then the researchers are interested to conduct research by title: **"The Difference of Student's Mathematics Critical Thinking Ability by Discovery Learning and Cooperative Learning Model with Make a Match Type"**

1.2 Problem Identification

Based on analysis of the background above, some problem identification in this research are :

1. Students ' math skills are low
2. Learning methods are used less various
3. Students tend to write the final result directly from the given question the teacher without a clear and systematic way
4. Low level of critical thinking ability of students in solving math problems

1.3 Problem Limitation

Based on background and problem identification that told above, there are differences position between discovery learning model and cooperative learning model type make a match for students' mathematical critical thinking ability. In order the writer focuses on the research problem so, the problem is limited to:

1. The students' mathematics critical thinking ability in tenth grader semester I SMA N 1 Berastagi T.A 2018/2019
2. Learning model used is Discovery learning and cooperative learning type Make a match
3. Lesson material is System of Equation in Three Variable

1.4 Problem Formulation

Problem Formulation in this research as follow: Is there the difference of students' critical thinking ability between Discovery learning model and cooperative learning model Make a match type on system of equation in three variable in grade X MIPA SMA Negeri 1 Berastagi T.A 2018/2019?

1.5 Research Objective

Research objectives in this research are: To find out whether there is difference of students' critical thinking ability by using Discovery learning and cooperative learning model Make a Match type in SMA Negeri 1 Berastagi.

1.6 Research Benefit

This research aims to provide meaningful input to the learning activities in class, especially in an effort to increase students' mathematical critical thinking ability, there are:

1. For researchers, information, and material as the handle for researchers in carrying out the task of teaching as a prospective teacher in the future
2. For students, through this learning model can help improve students' critical thinking ability
3. For teachers, can expand the knowledge of model learning Discovery Learning cooperative learning model and type Make a match to help students in enhancing students' critical thinking ability.
4. For the school, can be used as consideration and input to school in improving the quality of teacher and classroom learning system and improvement of education quality.
5. For the reader, as material information to perform similar research

1.7 Operational Definition

As for operational definitions in this research are:

1. Critical thinking ability of mathematics is the ability of students to identify a problem; formulate the problem of trees; analyze/detect any bias based on differing viewpoints ' unveil concept; the theorem or definition that is used to solve the problem, as well as evaluating the relevant arguments in the solve a problem particularly related to mathematics.
2. Discover Learning Model is a model of learning which train students in active learning poses. The principle of the lesson where students receive no direct material learning but had to find out for yourself by completing a given question the teacher. The application of Discovery Learning model is expected to overcome the difficulties of the students in learning mathematics and students can develop the ability to think, critical analysis by finding its own resolution of problems in every day.

3. Cooperative learning model types make a match is a cooperative learning where students study in pairs while studying a concept or subject matter. Cooperative learning model type makes a match (learning looking couple) learn while playing badly needed in learning mathematics are serious so that learning becomes fun for the learners. Learning of mathematics will be enjoyable for the students because the learning process is carried out while playing.



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