

CHAPTER I INTRODUCTION

1.1 Problem Background

Thinking is a natural part of a human being's interaction with the world. The way of thinking will influence the daily actions. One of the thinking skill is critical thinking. The thinking skills will be learned by students in school through the content of material on mathematics.

Mathematics is not only a subject but a way of thinking. Baykul (in Biber, 2013 : 110) stresses that mathematics courses should aim to improve such skill as reasoning, critical thinking and problem solving in order to prepare students for life and further education.

Critical thinking is required to navigate the ever-complex environment in which they live. Critical thinking is defined as thinking that evaluates reasons and brings thought and actions in line with evaluations. If they do not invest any time in evaluating the information they use, their efforts often result in a low-quality product. Worse, failure to evaluate may result in unfavorable outcomes when teamed with bad decision-making based on flawed information.

Fisher (2011 : 11) defines that critical thinking is skilled and active interpretation and evaluation of observation and communications, information and argumentation. Indicator of critical thinking are : (1) The ability to identify the focus (the issue, question, or conclusion), (2) The ability to deduce and judge deductions, (3) The ability to consider and reason from premises, reasons, assumptions, positions, and other propositions with which one disagrees or about which one is in doubt without letting the disagreement or doubt interface with one's thinking ("suppositional thinking") (Ennis, 1996 : 169). Someone is said as critical thinker when they able to identify the focus (the issue, question, or conclusion), able to deduce and judge the deductions, and able to consider and reason from premises,

reasons, assumptions, positions, and other propositions with which one disagrees or about which one is in doubt without letting the disagreement or doubt interface with one's thinking ("suppositional thinking")

In fact, based on researcher's preliminary study of students in grade VIII at SMPN 2 Lima Puluh, the students are not able to fulfill the indicator of mathematical critical thinking ability from the problem given. It can be seen from student's answer sheet when the students have the test about student's mathematical critical thinking ability. For example, the problem number one is : if known the function $f(x) = ax - b$, $f(3) = 4$ and $f(-5) = -28$, then determine the value of a and b!

$$\begin{aligned}
 f(x) &= ax - b \\
 f(x) &= 3 + 4 \\
 &= 8 \\
 \\
 f(3) &= 4 \\
 f(3) &= 3 + 4 \\
 &= 7 \\
 \\
 f(-5) &= -28 \\
 f(-5) &= -5 + -28 \\
 &= -23
 \end{aligned}$$

Figure 1.1. Student's answer for The First Problem

From the above figure 1.1 can be seen that they can not identify the focus, where the important information is what known and asked. They can not deduce and judge deductions it seems by they do not giving reason and deduction. It means the student's mathematical critical thinking ability is low.

The problem number two is : if known $A = \{1,2,3,4\}$ and $B = \{a,b,c,d\}$, explain the set of ordered pair that show one-to-one correspondence from A to B!

$$A = \{1, 2, 3, 4\}$$

$$B = \{A, B, C, D\}$$

$$\{1A, 2B, 3C, 4D\}$$

Figure 1.2. Student's answer for The Second Problem

From the figure 1.2 can be seen that they can not consider and reason from the question. It means student's ability is low.

From preliminary study, it can be conclude that the student's mathematical critical thinking ability is still low and unsatisfactory. This happens because the learning habit of the students is passive learning, so they can not use their thinking ability to solve the problem.

In the process of learning, mathematical critical thinking skills are not yet fully developed expressly. It proved by the interview result with mathematics teacher in SMPN 2 Lima Puluh Mrs. Ningsih, she said that in the classroom, too most students is a passive activity because students only listening and will not build their own knowledge. So that the teacher do not want to take any other learning model but just direct method.

The importance of teaching and develop critical thinking skills should be viewed as something that is urgent and can not be ignored anymore. Mastery of critical thinking skills are not quite used as educational purposes only, but also as a fundamental process that allows students to cope with future uncertainties, Cabera (in Fachrurazi, 2011 : 77). It is very naive when critical thinking skills are ignored by teachers.

Connecting with this, the teacher was instrumental in encouraging the optimal learning process so that students learn actively. Sumarmo (in Fachrurazi, 2011 : 78)

says in order to maximize the learning process and outcomes of learning mathematics, teachers should encourage students to engage actively in discussions, ask and answer questions, think critically, explain any answers given and give reasons for any proposed answer.

The mathematics classrooms are encouraged to be a place where discussion and collaboration are valued in building a climate of intellectual challenge. Such reform oriented classrooms are described as communities of mathematical inquiry where students learn to speak and act mathematically by participation in mathematical discussion and solving new or unfamiliar problems.

The difficulties involved in teaching critical thinking, led down a path that resounds with common sense, namely if teachers can agree that critical thinking arises from the need to solve a complex problem by observing and forcing perspectives of the problem from many angles then it should follow that being presented enough unique problems, forcing repetition of unique problem solving then students can become a critical thinker.

The learning models that are considered can be used to improve critical thinking skills are models of Problem Based Learning (PBL). The following are some research based reasons for the importance of PBL that processing information at higher levels, such as with problem solving, critical thinking, inquiry strategies, and reflection on practice, leads to deeper understanding (Perkins in Barell, 2007 : 4).

At the commencement of a PBL learning activity, students are introduced to a problem or scenario. This, students will identify the focus of the problem. Basically, it permits students to question, as individuals, concern about why the problem is happening, what the sequence of events are, and how to go about finding a solution to the problem. Thus, in a PBL scenario, students accumulate information so as to be able to comprehend the problem in full, and therefore, possibly to consider, reason, and deduce it. Learning to think critically involves identify the focus, consider, and reason from problem, deduce and judge deductions.

According to Arends (2011 : 411), the syntax of Problem Based Learning are orient students to the problem, organize students for study, assist independent group investigation, develop and present artifacts and exhibits, analyze and evaluate the problem-solving process.

Other learning model is cooperative learning model Think-Pair-Share (TPS) type. Think-pair-share is a cooperative learning technique which involves presenting students with a task or question and giving them time to think by individually. Then in pairs, they report their individual findings, discuss their own thoughts and then refine their individual work if they see fit in order to come up with a consensus on the question or task. Then after pairs have had time to discuss, the class reconvenes and members of the different pairs share their thoughts with the class. Think-pair share encourages student participation in discussing and promotes forming and critiquing arguments both in small and large groups (Sampsel, 2013 : 3).

Think-Pair-Share is a cooperative learning strategy that can promote and support higher-level thinking. The teacher asks students to think about a specific topic, then pair with another student to discuss their thinking and, after that, share their ideas with the group. Benefits of Think-Pair-Share (Lyman, 1987 : 2) :

1. When students have appropriate “think time”, the quality of their responses improves.
2. Students are actively engaged in thinking.
3. Thinking becomes more focused when it is discussed with a partner.
4. More critical thinking is retained after a lesson in which students have had an opportunity to discuss and reflect on the topic.
5. Many students find it easier or safer to enter into a discussion with another classmate, rather than with a large group.
6. No specific materials are needed for this strategy, so it can be easily incorporated into lessons.
7. Building on the ideas of others is an important skill for students to learn.

Lyman (in Fisher and Frey, 2007 : 30) and colleagues, there are three stages of student action, think, pair, and share.

Exposure above shows that Problem Based Learning and Think-Pair-Share have the potential to develop student's mathematical critical thinking ability. From these two model, researcher want to know whether student's mathematical critical thinking ability in Problem Based Learning classroom is better than student's mathematical critical thinking ability in cooperative learning model Think-Pair-Share (TPS) type classroom because of steps of PBL it seems can more enrich mathematical critical thinking ability. Then the researcher intends to do research with the title "The Difference of Student's Mathematical Critical Thinking Ability taught by Problem Based Learning Model and Cooperative Learning Model Think-Pair-Share (TPS) Type in SMPN 2 Lima Puluh."

1.2 Problem Identification

Based on the background above, some problems can be identified as :

1. Consciousness about the important of student's mathematical critical thinking ability is still low
2. Learning habbit of the students is passive learning
3. Learning model which used by teacher has not been proper with the student's mathematical critical thinking ability.

1.3 Problem formulation

Problem formulation in this research is :

Is student's mathematical critical thinking ability in Problem Based Learning classroom better than student's mathematical critical thinking ability in cooperative learning model Think-Pair-Share (TPS) type classroom?

1.4 Problem Limitation

This research needs to bound the problem to get precise target of expectation.

The limitation of this research are :

1. The model used were Problem Based Learning (PBL) model and Cooperative Learning model Think-Pair-Share (TPS) type.
2. The student's mathematical critical thinking ability in this research is bounded in the student's mathematical critical thinking ability at determine the surface area of cube and cuboid matter in grade VIII semester II.
3. This research is conducted at SMP Negeri 2 Lima Puluh.

1.5 The Objective of Research

The objective in this research is :

To know whether student's mathematical critical thinking ability in Problem Based Learning classroom is better than student's mathematical critical thinking ability in cooperative learning model Think-Pair-Share (TPS) type classroom at SMPN 2 Lima Puluh.

1.6 The Benefit of Research

1. For teacher, especially mathematics teacher, this can be as consideration in selecting one of alternative model or approach in mathematics learning to improve mathematical critical thinking ability at school.
2. For the candidate of teacher, this can be as proper consideration for handle problem which often appears at school so can be the next professional teacher.
3. For the student, this can makes students have enthusiasm to improve mathematical critical thinking ability.
4. For the research, to enrich the research's knowlege about problems which occur at school.

5. For the school, this can be consideration and suggestion to improve the quality of teacher and learning system at class.

1.7 Operational Definition

Operational definition emphasize to things which will be standard or indicator of variable. So, operational definition in this research are :

1. The indicator of student's mathematical critical thinking ability which will be measured are :
 - a. The ability to identify the focus (the issue, question, or conclusion)
 - b. The ability to deduce and judge deductions
 - c. The ability to consider and reason from premises, reasons, assumptions, positions, and other propositions with which one disagrees or about which one is in doubt without letting the disagreement or doubt interface with one's thinking ("suppositional thinking")
2. The syntaxes of PBL like the following :
 - a. Phase 1 : Orient students to the problem.
Teacher go over the objectives of the lesson, describes important logistical requirements, and motivates students to engage in self-selected problem-solving activity.
 - b. Phase 2 : Organize students for study
Teacher help students defined and organize study tasks related to the problem.
 - c. Phase 3 : Assist independent group investigation
Teacher encourage students to gather appropriate information, conduct experiments, and search for explanations and solutions.
 - d. Develop and present artifacts and exhibits
Teacher assist student in planning and preparing appropriate artifacts such as areports, videos, and models and helps them share their work with others.
 - e. Analyze and evaluate the problem-solving process

Teacher helps students to reflect on their investigations and the processes they used.

3. The syntaxes of TPS like the following :
 - a. Think. The teacher engages students; thinking with a question, prompt, reading, visual, or observation. The students should take a few minutes (not seconds) just to think about the question.
 - b. Pair. Using designed partners, students *pair* up to discuss their respective responses. They compare their thoughts and identify the responses they think are the best, most intriguing, most convincing, or most unique.
 - c. Share. After students talk in pairs for a few moments, the teacher asks pairs to share their thinking with the rest of the class.