

CHAPTER I INTRODUCTION

1.1 Background of the Research

Mathematics provides a powerful means for understanding and analyzing the world. Mathematics help people to insight and give idea about the world in systematic ways with describing and representing quantities, shapes, space, and patterns. Some of these mathematical systems become a fundamental part of people's life. For example, counting systems and methods of measurement which they may not recognize the complexity of the ideas underpinning them. (Christopher,T. 2009:21) In fact, the mathematical ideas are suitable for everyone and every grade to reveal a surprising intricacy and complexity when they are examined in depth.

Mathematics called as a queen of science. It means mathematics is a main key of other sciences. Mathematics is also basic sciences that have a main action in developmental of science and technology. Therefore, dominated and made technologies in the future needed mastery of mathematics early. Mathematics is one of subject matter that should be given to students in every level of education.

The same thing is expressed in the content of standards for primary education and secondary mathematics units in Minister of Educational Number 22 Year 2006 May 23rd 2006 about manual standards (Gumilar, 2010) has stated that mathematics subject matter should be given to all students begin at primary education to equip students with the logical ability, analytical ability, systematical ability, critical ability and creative ability as well as cooperate ability.

The function of mathematics is as a tool, paradigm, and science or knowledge (Kilpatrick,J. 1998:79). Mathematics is learned by formal education has an important role for students as knowledge equipped to make their paradigm. By learning mathematic expected that: 1) students can calculate and does the other calculate 2) students have pre requirement to study the others 3) calculation

became more simply and practice 4) students expected become a diligent, critic, logic and be a responsible person in solving a problem (Ruseffendi, 2006 : 208).

The statement above tells how important mathematics in daily life. However, in real life students still and maybe always make assumption mathematics is difficult and less favorite. They do not realize the actual learning objectives to the future. Generally for children, mathematics is exact science constitute aversion lesson. Most of students said that mathematics is a difficult lesson to understand because base on their opinion formula and definition in mathematics too much. So that not a few students do not prepare the material will be studied before.

There are some problems which make mathematic is too difficult to understand for students: 1) conceptual understanding ability of students in mathematics is low 2) the student has low a logical mind to link one problem to other problems in mathematics way 3) learning approach is not enough to give chance for student to expand their self potential 4) student's opinion always thinks mathematic is difficult (Yusefendi,2010).

Meanwhile, one of the basic ability should be reached in mathematics is conceptual understanding ability, that also one of aim in learning mathematics in the school. In KTSP manual (Depdiknas, 2006) is:

Siswa mampu memahami konsep matematika, menjelaskan keterkaitan antara konsep dan mengaplikasikan konsep atau algoritma secara luwes, akurat, efisien, dan tepat dalam pemecahan masalah.

From the statement above students must be able to understand mathematical concepts, explain the link between the concept and apply the concept or algorithm is flexible, accurate, efficient, and appropriately in problem solving.

In fact, students still haven't good ability to understand concept of mathematics. The other also showed if students have a mathematics problem that needed high thinking and logical reasoning, students feel difficult to do it. This is caused by students only learning mathematics in algorithm and calculation concept without emphasis in conceptual understanding, so the consequent of that students only able to solve routine problems. If students really understanding concept. However the type of question, students will be able to solve it.

Quadrilateral is one of the sub topics in mathematics that are closely related to daily life. This can facilitate student active to construct their own concept and also fun. It is not easy thing to realize students discover and construct their own concept of quadrilateral through experience, then concluded in a common formula. But if not done at all, there will be no change in learning practices that aim to enhance students' cognitive development, conceptual understanding and creativity. Thus required an effort to locate, establish and develop appropriate learning activity and accordance with the conditions of student learning, that is active, creative, effective and fun.

One of effort can be done to solve problem is selecting learning strategies, approach, model, or effective learning method to teach mathematics and expected mathematics concept can be understood by students is better. One of key in learning mathematical successfully is creativity and innovation of teacher in learning.

To improve students conceptual understanding in mathematics needed a learning that can explore a problem so it can show understanding reached from the problem. So students can explain relevance between concept and application of concept or algorithm in flexible, accurate efficient and precise. Two of many approaches in learning to improve conceptual understanding ability in mathematics are Creative Problem Solving (CPS) and Problem Based Learning (PBL).

Creative Problem Solving (CPS) is represent process dimensions in a natural, rather than in a contrived way, undergo a transformation from a prescriptive to a descriptive approach, become more flexible and responsive to task, contextual, personal, methodological and meta-cognitive consideration. CPS make the concept is more dynamic and interactive. In CPS, students become more skilled, a more dynamic approach becomes possible because they have internalized the procedures (Karen,L. 2004.<http://www.uh.edu/>).

The main component of CPS is conceptual understanding which includes a systematic effort to define, construct, or formulate a concept from problem. That

can be seen by steps in CPS. The steps are clarification of the problem, brainstorming, evaluation/selection and implementation.

CPS offers a unique opportunity to bridge practical application with conceptual and theoretical problems. Creative Problem Solving (CPS) is a learning approach that has concerned in conceptual understanding to train problem solving skills. Students are directed to use mathematics conceptual understanding to solve simple or complex problem. So that students are accustomed to communicate their ideas, critical thinking, systematic and logical thinking and interact with others. Not only memorize without thinking. In CPS, learning is not only memorized but also experience. So that students' conceptual ability in mathematics will increase.

Problem-based learning (PBL) also has been advocated as an alternative, more progressive model to instruction and one that is premised on offering opportunities for exercising understanding, creativity and for its development (Tan, 2009:19). Problem-based learning is focused, experiential learning (minds-on, hands-on) organized around the investigation and resolution of messy, real-world problems (Torp, 2002: 15). PBL can be used holistically to cater to curiosity, inquiry, self-directed learning and collaborative learning. Such key ideas as design of problems, design of learning environments, coaching and facilitation techniques, implementation models and assessment in PBL are addressed (Tan, 2003:5).

PBL can make students have systematical idea from problem fact to make connections through reflection; articulation and can develop cognitive connection. So students' conceptual understanding could be built systematically.

CPS and PBL approach provides authentic experiences that foster active learning, support knowledge construction, and naturally integrate in school learning and real life. Students are engaged problem solvers, identifying root of problem and conditions needed for a good solution, pursuing meaning and understanding, and becoming self-directed learners.

Characteristic of CPS and PBL refers to constructivism learning ideology, where learning is active process to develop its knowledge. By using CPS and PBL approach to improve conceptual understanding in mathematics,

students not only accept information from teacher, because in this case teacher as a motivator and facilitator to give instruction and make students get actively in learning process. Learning process begin from problem relate to concept of study.

Based on the explanation above, so researcher has interest to make research about “The Comparison of Conceptual Understanding Ability of Students Using Creative Problem Solving (CPS) Approach and problem Based Learning (PBL) Approach on Quadrilateral Topic in VII Grade at SMP Muhammadiyah 1 Medan”.

1.2 Identification of Problems

Based on background above, the problems of this research is:

- Students have low ability in mathematics’ conceptual understanding in quadrilateral topic.
- Students’ conceptual understanding in quadrilateral topic still in level of instrumental understanding.
- Learning quadrilateral still oriented to teacher.
- Learning approach seldom applied by the teacher in the school.

1.3 Scope of Problem

Based on identification of the problems above, the scope of problem in this research is mathematics’ conceptual understanding ability of students. The learning material of this research is quadrilaterals and the sub material is rectangles and squares on quadrilateral topic in VII grade at SMP Muhammadiyah 1 Medan academic year 2011/2012.

1.4 Research Question

Based on the background and identification of problem above, the research questions are:

1. Is CPS approach can improve conceptual understanding ability of students in mathematics on quadrilateral topic in VII grade at SMP Muhammadiyah 1 Medan academic year 2011/2012?

2. Is PBL approach can improve conceptual understanding ability of students in mathematics on quadrilateral topic in VII grade at SMP Muhammadiyah 1 Medan academic year 2011/2012?
3. Is the difference of students' conceptual understanding ability in mathematics using creative problem solving (CPS) better than problem based-learning (PBL) on quadrilateral topic in VII grade at SMP Muhammadiyah 1 Medan academic year 2011/2012?

1.5 Objective of the Research

The objective of this research is:

1. To find out the improving of conceptual understanding ability of students in mathematics by creative problem solving (CPS) on quadrilateral topic in VII grade at SMP Muhammadiyah 1 Medan academic year 2011/2012.
2. To find out the improving of conceptual understanding ability of students in mathematics by problem based learning (PBL) on quadrilateral topic in VII grade at SMP Muhammadiyah 1 Medan academic year 2011/2012.
3. To find out the difference students' conceptual understanding ability in mathematics using creative problem solving (CPS) is better than problem based-learning (PBL) on quadrilateral topic in VII grade at SMP Muhammadiyah 1 Medan academic year 2011/2012.

1.6 Benefit of The Research

1. For students, as an effort to improve students' conceptual understanding ability in mathematics.
2. For teacher, input or suggestion of teacher to improve mathematics learning quality in school.
3. For institution, the learning equipment document can be useful as information at the university and then as a reference to another teacher in learning process in the school. It is also can be used as an information to the next research.
4. For researcher, as an input and science stock for researcher in learning mathematics in the future.

1.7 Operational Definition

To avoid the difference understanding, there are some terminology that used and to make more easy to explain. So there are some terminologies:

1. Conceptual Understanding in mathematics is the students' skill in knowing, interpreting, and concluding a mathematical concept based on the formation of its own knowledge, not just memorize.
2. Creative Problem Solving (CPS) is learning approach has concerned in conceptual understanding to train problem solving skills, that followed by creativity reinforcement. CPS approaches have 4 phases, they are: (1) Clarification (2) Brainstorming (3) Evaluation and Selection (4) Implementation is applying the temporary solution of steps has been involved and doing in a large application as a strategic of problem solving.
3. Problem Based Learning (PBL) is an approach educational methodology that emphasizes real-world challenges, higher order thinking skills, interdisciplinary learning, independent learning, information-mining skills, and teamwork also communication skills.