INCREASING THE MATHEMATICS OF STUDENTS MATHEMATICAL SKILLS THROUGH METAKOGNITIVE LEARNING MODEL

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ABSTRACT

Mathematics is a basic science that has become a tool for learning other sciences. Therefore, mastery of mathematics is absolutely necessary early on. One aspect that must be mastered in mathematics is the ability to solve problems. Problem solving is part of a mathematics curriculum that allows students to gain experience and use the knowledge and skills they already have to apply to non-routine problem solving. To be able to improve mathematical problem solving skills, strategic efforts are needed. One effort that can be done is to apply a metacognitive learning model. Metacognitive learning model is a model that gives students the opportunity to carry out metacognitive activities, namely: planning, controlling and reflecting all cognitive processes (thinking) that occur during solving a mathematical problem. When students are given a mathematical problem, students will first change it into mathematical sentences. Then students will plan their solution strategies. In this stage, students will look for data relationships with those asked. After the plan is formed, students will implement the plan. The last stage that students do is check again. In this case the student does not just stop working after getting results, but he must re-examine what he has done before. This is very important to avoid errors or errors in solving these mathematical problems. Thus, students indirectly learn to be more responsible with what they have done.

Keywords: Metacognitive, Problem Solving Skills

I. INTRODUCTION

Mathematics has a strategic role in forming human resources that have the ability to think critically, creatively, logically and systematically in the era of globalization. Prihandoko (2006: 1) says that "mathematics is a basic science that has become a tool for learning other sciences. Therefore, mastery of mathematics is absolutely necessary and mathematical concepts must be understood correctly and right from the start ". In addition, learning mathematics in school as stated by the Ministry of National Education (2004) has the purpose of: (1) practicing ways of thinking and reasoning in drawing conclusions, (2) developing creative activities involving imagination, intuition and discovery by developing divergent, original, sense want to know, make predictions and predictions, and experiment, (3) develop problem-solving skills, and (4) develop the ability to convey information and communicate ideas. Based on these two opinions, it can be concluded that mathematics as part of the basic education curriculum has a strategic role in shaping quality human resources capable of competing.

Given the strategic role of mathematics in the era of globalization, the effort to improve the quality of mathematics learning, especially

in the aspect of problem solving ability at the elementary school level is very necessary. This is because elementary school is the initial foundation for the formation of concepts in students that will continue to be developed at the next level.

Mastery of concepts possessed by students in elementary school will be related to students' next mathematics learning. This is in accordance with the opinion of Heruman (2008: 4) which states that "in mathematics learning there must be a connection between students' previous learning experiences with the concepts to be taught". The need for serious attention in terms of increasing the ability to solve mathematical problems is also based on the opinion of Suherman, et al (2003: 89) which states that "problem solving is part of a mathematics curriculum that is very important because in the process of learning and completion, students may gain experience using knowledge as well as the skills already possessed to be applied to non-routine problem solving. Based on these two opinions, it is known that problem solving in mathematics is a very important part because through problem solving students will be able to solve non-routine problems.

The need to improve the quality of mathematics learning, especially on aspects of problem solving is also based on several studies which explain that the ability to solve mathematics problems in schools has not shown satisfactory results. Ichrom (in Mahendra, 2007) states that "the mathematics learning patterns carried out so far are: (1) learning begins with brief material explanations by the teacher, students are taught theories, definitions, theorems that must be memorized, (2) giving examples of problems and (3) ends with practice questions ". Learning like this, does not accommodate the development of students' abilities in problem solving. A similar view is also expressed by Rasana (2009: 20) which states that students' ability to solve mathematical problems is still low. This cannot be separated from the learning done by the teacher is still dominated by conventional learning (teacher center). As a result, student activity in learning is very limited. This can hamper the understanding of students' concepts in learning. Students' understanding of a material or mathematical concept, certainly affects the ability of students in solving mathematical problems.

Weak ability of students in solving mathematical problems, has attracted the attention of educators and researchers of mathematics education as implied in the expression Henningsen and Stein (1997) which states that "much discussion and concern has been focused on limitation in conceptual understanding as well as on their thinking, reasoning, and problem solving skills in mathematics ". Attention to the weakness of the ability to solve mathematical problems is based on the possible consequences that will occur if the problem is not addressed. As a result it will indirectly affect student learning outcomes in mathematics lessons.

Weak ability to solve mathematical problems, is also feared will affect the less analytical students take decisions in everyday life. This is in accordance with what was stated by Budhayanti (2008: 1) which states that "problem solving is one of the important topics in learning mathematics". It is said to be important because solving mathematical problems is closely related to our daily lives. The statement, as well as what was stated by Nasution (2008: 171) that "solve the problem faced by every human in his life".

Responding to the problems that have been explained, a strategic effort is needed to improve the mathematical problem-solving abilities possessed by students. One effort that can be done by the teacher is to apply a metacognitive learning model. Through these efforts it is expected that students' problem-solving abilities can continue to be improved

so that they can improve the analytical ability of students to make decisions in their daily lives.

II. DISCUSSION

2.1 Characteristics of Metacognitive Learning Models

Metacognitive was first proposed by John Flavell, (in Sudiarta, 2010: 24) states that "literally metacognitive means thinking about thinking (thinking about thinking)". In this case students are not just thinking, but more than that students are invited to learn to think about how to solve a problem, from planning, implementing, to reflecting on the activities that have been done.

Through knowledge and metacognitive skills, students are aware of their strengths and limitations in learning. If the student feels himself wrong, then he will immediately realize it and look for ways to improve it. Metacognitive learning models provide opportunities for students to carry out metacognitive activities, namely: planning, controlling and reflecting all cognitive processes (thinking) that occur during solving a mathematical problem.

Learning with metacognitive models focuses on student learning activities (student centered). The teacher only acts as a facilitator and student guide, if they find difficulties in learning.

Learning with a metacognitive model is preceded by giving a problem that must be solved by students. Then proceed with metacognitive activities to plan, control, and reflect on the entire set of problem solving activities carried out. So that through metacognitive learning students will be accustomed to solving problems in learning and in their daily lives. Metacognitive learning in solving mathematical problems is not solely aimed at finding the right answers, but aims to improve the speed and accuracy of all cognitive processes used to construct all possible rational and logical solutions. Sudiarta (2010: 30) added that "metacognitive learning is believed to make learning more meaningful and students' understanding more profound".

In addition, metacognitive models also have the potential to produce students who have a high level of mathematical competence beyond conventional learning, because every cognitive process that is stimulated through the learning process is accompanied by thinking activities planning, monitoring and reflecting all cognitive processes that occur, so what is done can be controlled optimally. Through this ability one is possible to have a high level of ability in problem solving.

2.2 Increased Ability to Solve Mathematical Problems through Metacognitive Learning Models

Unlike conventional learning models which are still dominated by teachers in learning activities so that students' activities in learning are very limited and have the potential to inhibit students' understanding of concepts in learning, then the metacognitive learning model emphasizes students' activities in learning. Sudiarta (2010: 26) states that "the metacognitive learning model in its application in the classroom, directs students to be able to solve problems correctly. Then proceed with metacognitive activities to plan, control, and reflect on the entire set of problem solving activities carried out ". This can foster students' problem-solving ability in learning mathematics and developing learning activities to be student-centered as well as students becoming active in individuals and groups. The teacher in the metacognitive model is only as a facilitator, namely providing learning resources, encouraging students to learn to solve metacognitive problems, giving rewards and providing assistance to students in order to learn and construct their knowledge optimally.

Likewise according to Polya (in Budhayanti, 2008) which states that "in

learning with a metacognitive model encourages students to play an active role and dominate learning activities. In this case students are able to solve mathematical problems, which include several stages, namely: (a) understanding, (b) planning, (c) implementation, and (d) checking back ". When students are given a problem, especially a math problem, students will first understand the problem or mathematical problem that is given and change it into mathematical sentences. Then students will plan their solution strategies. In this stage, students will look for data relationships with those asked. Students will look for concepts that support the problem solving process. After the plan is formed, students will implement the plan. The last stage that students do is check again. In this case the student does not just stop working after getting results, but he must re-examine what he has done before. This is very important to avoid errors or errors in solving these mathematical problems. Indirectly students learn to be more responsible with what they have done.

The application of metacognitive learning models can also improve students' thinking skills in mathematics learning. This statement is supported by research conducted by Maulana (2008) which states that "the critical thinking ability of students who take mathematics learning using a metacognitive approach is significantly better than conventional students." In addition, the use of metacognitive learning models can also potentially produce students who have high-level thinking skills in learning. This is in accordance with Sudiarta's opinion (2010: 26) which states that "metacognitive activity has the potential to produce students who have high-level thinking competencies". This is because every metacognitive activity carried out by students is always accompanied by high-level thinking activities, namely thinking to plan, monitor and reflect all cognitive activities that occur, so that what is done can be optimally controlled.

III. CLOSING

Based on the discussion above, it can be concluded that the metacognitive model can be one of the strategy solutions in an effort to improve the ability to solve mathematical problems. Not only can it improve problem-solving skills, the metacognitive learning model also has the potential to produce students who have high-level thinking skills in learning.

Suggestions that can be submitted based on the conclusions above are: (1) It is recommended to teachers in elementary schools to create an innovative learning atmosphere by applying more innovative learning models, such as metacognitive learning models. So that students are more happy in learning and can improve students' ability to solve problems. (2) To students, the implementation of the metacognitive learning model is expected to be able to be creative in solving mathematical problems.

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