ANALYSIS OF CRITICAL THINKING ABILITY OF STUDENTS OF THE RSBI CLASS IN HIGH SCHOOL ON MATHEMATICS PROBLEM SOLVING

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Abstract

The purpose of learning mathematics in primary and secondary school is that students are expected to provide the arrangement of reasoning, critical thinking, attitude formation and the ability of application in their life and in learning various sciences (Depdiknas, 2004). Thus, students should be equipped with abilities to develop and evaluate arguments in problem-solving. One of the capabilities that must be developed to achieve these objectives is the ability to think critically.

A student has the ability to think critically if it is able to analyze facts, generalize and organize ideas, defend opinions, make comparisons, draw conclusions, examine arguments, and solve problems (Chance, 1986). In addition, critical thinking skills can improve in a systematic way of thinking, awareness of thinking, and have the ability to distinguish truth from error.On the other hand, the government or local government must has at least one unit of education at all levels of education to be developed into standard international school (RSBI). Goal of this program is RSBI graduate students are expected to compete with the global knowledge for the same level as graduates from other country.

Reality that mathematics teachers do not realize that students are also required to be able to think critically, so have a solid foundation for learning mathematics. To determine students' critical thinking skills through the learning of mathematics is not easy, teachers must have the courage to take the attitude by providing variation math problems, and one question that needs to be given is a mathematical problem in the real world. Polya (1973), said that problems in mathematics are the problems to find and the problem to proof. Both of these types have no specific rules but the students demanded to know the data and information from the problems. Based on the special features of mathematics and related issues with the purpose of the RSBI class in high school, it can improve students' ability for critical thinking, analytical, systematic, and logical in order to find alternative solutions to problems through the exploration of empirical data in order to cultivate a scientific attitude.

Key words : *critical thingking, RSBI class, mathematics problems*

1. Introduction

The general objective of granting the subjects of mathematics in primary and secondary educ... is to prepare students to be able to deal with changing circumstances in life that always develops through practice to act on the basis of thinking in a logical, rational, critical, provide the arrangement of reasoning, critical thinking, students attitude formation and the ability of application in their life and in learning various sciences (Depdiknas, 2004).

In addition to achieving the goals that exist in every matter of mathematics, students should be equipped also with certain abilities to be able to develop and evaluate arguments in a particula... problem-solving. One of the capabilities that must be developed to achieve these objectives is ... ability to think critically. But the reality on the ground indicates that mathematics teachers are not easy to improve critical thinking skills through mathematics. A student is said to have the ability to think critically if you have a systematic way of thinking, awareness of thinking, and have the ability to distinguish truth from error.

On the other hand, learning mathematics is expected to provide the arrangement of reason, the formation of student attitudes and abilities to apply in everyday life and in studying the various sciences. One important feature of mathematics is to have abstract objects, so that most students

think that mathematics is difficult. According Soedjadi (1999: 41), these abstract properties is one cause of the difficulty of a mathematics teacher to teach school.

To achieve abstract properties students should have the ability to learn independently and learn to solve problems. In the process of learning that takes place during this, the students were attending school by listening to stories from the teacher without understanding the material being studied so that their success in solving difficult problems materialized. To achieve this - things mentioned above, learning mathematics should reflect active learning, making teaching and learning activities can be run effectively.

Students still think that mathematics is difficult and difficulties in solving math problems one of the causes because students lack an understanding of mathematical concepts. With a lack of understanding of the concept, it will result in lower learning outcomes. According to Skemp (Dahar, 1988) states that the principle of learning mathematics includes: (1). the concept of higher and expected to be well understood by students, cannot be communicated just by definition alone. But it must be accompanied by example and not an example of the concept, (2). concepts in mathematics is always prepared on the basis of other concepts, it must be guaranteed that the previous concepts have been understood by students. From these two principles can be seen that to master a more complex concept which should start with a simpler concept mastery. So from these concepts students are able to provide examples of concepts and examples rather than concepts.

Learning mathematics in schools is heavily influenced by the philosophy of constructivism. Soedjadi (2007: 28) states that the flow of constructivism tend to argue that the knowledge necessary personal or self-constructed by the curious or need to understand it. This means that students in learning must individually discover and transform complex information, examine the existing rules and revise if necessary.

Mathematical problem by Polya (1973), divided into two kinds, namely the problem of finding and the problem to prove . The problem to find at its core student is expected to determine whether a solution or answer to one or more answers. Problem to prove students are expected to show the truth of a statement. In this paper, the mathematical problem into focus is a second type of problem to prove.

Solving the problem, both to discover and to prove is something very important and should be studied. Through solving problems, students can become skilled in selecting, identifying relevant knowledge, making generalizations, making plans, and organizing skills already possessed. However, in mathematics in high school mathematics to solve the problem cannot always be done easily, and require students to do this line of thought with the ability to think critically. The ability for critical thinking to provide accurate guidance in think and work, assist in determining linkages something with others with more accuracy. Therefore, the ability to think is needed in solving critical problems or finding solution, and project management.

Development of critical thinking skills are integrated with parts of development capabilities, such as observation, analysis, reasoning, assessment, decision making, and persuasion. The better development of these capabliities, than students will be more to take some problem or overcome and with satisfactory results, including the student's ability in solving mathematical prolems. On the other hand, in the Rule No. 20 of 2003 on National Education System, which includes explaining "the government and or local government held at - least one unit of education at all levels of education to be developed into an international educational unit."

This is currently implementing a number of schools willing to be developed into standard international (RSBI), with a variety of reasons, among others, are the demands of competitiveness capabilities in the form of technology, management and human resources. Thus we are ready and able to grow and win in every competition. The school in which there is the National Education Standards includes the competence of graduates, content, process, educators and education personnel, funds, management and appraisal are accumulated by a factor of development, expansion and enrichment and deepening of gained through imitating of educational standards within and outside the country that ultimately quality of the school is recognized internationally.

In line with the objectives given in high school mathematics, namely, among others, as a means to train students to think logically, and also in line with the characteristics of a matter of proof that is full of definitions and theorems with strict axiomatic deductive structure, then the

level of formal reasoning ability of students to be used as a guide in answering questions and solve math problems.

On that basis, then the role of teachers in the learning process is dominant for high school students' critical thinking skills in class RSBI can be run in accordance with its intended purpose. Especially in the learning of mathematics in the classroom or RSBI need to be developed and optimized a learning in accordance with the global era of learning approaches solve math problems.

2. Discussion

Critical Thingking Ability

Discussing the critical thinking skills can not escape from thinking in general terms that have been widely reviewed by experts. Some experts have given the notion of thought, including. Jones et.all (1987) equate the meaning of learning by thinking. According to him, learning is thinking. Beyer (1987) characterize as an investment thinking perceptions, past experience, manipulation of consciousness, and intuition. In the dictionary on line Wikipedia (available in http://wikimediafoundation.org/fundraising) (January 19, 2010), thinking is defined as the manipulation of information at the time of forming a concept, while engaged in problem solving, reasoning, and draw a conclusion at that time.

Integrating critical thinking skills in learning objectives, it is necessary to set out some definitions of critical thinking that is used as a reference in this paper further. The definition of critical thinking given by some experts as follows:

1. Ability to analyze facts, generalize and organize ideas, defend opinions, make comparisons, draw conclusions, examine arguments, and solve problems (Chance, 1986).
2. Thinking analytically for the purpose to evaluate what is read (Hickey, 1990).
3. Conscious and deliberate process that is used to interpret and evaluate information and experiences through a set of abilities and attitudes that drive reflective thoughtful beliefs and actions (Mertes, 1991).
4. Active and systematic process to understand and evaluate arguments (Mayer & Goodchild, 1990).
5. Critical thinking is a mental activity to evaluate an argument or proposition and make decisions for themselves can be developed (Ennis, 1992)

Critical thingking is a cognitive activity associated with the use of reason. Learning to think criticaly means using mental processes, such as attention, categorizing, selection, anf asses or decide. According Setiono (http://agustinussetiono.wordpress.com/2009/09/25), students' critical thinking means: (1) find where the best evidence for the existence of the subject under discussion., (2) evaluate the strength of evidence to support different arguments (3) concluded on the basis of the evidence that has been determined, (4) build reasoning that can lead listeners to the conclusions that have been determined based on the evidence that supports it, (5) choose the best example to better explain the meaning of the arguments that will be delivered, and (6) provide evidence to illustrate this argument.

Based on the above definition of critical thinking, it can be concluded that a students' critical thinking with the characteristics: (1) search for meaning that involves the mental processes to understand an experience, (2) analyze the facts, generalize, organize ideas, draw conclusions to solve problems , (3) active, systematic to understand and evaluate arguments.

In order to improve critical thinking skills it involves the mental processes, such as attention, grouping, selecting, deciding, and draw conclusions. It is, necessary because of the critical thinking skills to provide accurate guidance in taking action, think, work, and assist in determining the relationship between something with others are accurate. Therefore, the ability to think critically is crucial to the students in solving math problems on either the type of open or diverging and math problems.

According to Ennis (Mulyanto, 2008) details the 12 aspects that characterize the critical thinking skills as follows:

1. Capable to grasp the meaning of a question;
2. Capable to assess confusion (ambiguity) in the line of reasoning;
3. Capable to assess whether the questions that revealed conflict with each other;
4. Capable to assess whether the decision or conclusion it was time to be taken;
5. Capable to assess whether a statement is clear and specific enough to be disclosed;
6. Capable to assess whether there are certain principles of application in a statement
7. Capable to assess whether a statement from a reliable observation;
8. Capable to assess whether an inductive conclusion of a phenomenon can be recognized truth;
9. Capable to assess whether a problem is identified;
10. Capable to assess whether a statement is the assumption or not;
11. Capable to assess whether a formulation of the definition is adequate;
12. Capable to assess the statements expressed by experts, either agree or not agree, with the underlying argument.

Based on the consideration above, it can be concluded that the increased ability of critical thinking can be done with the learning process involving students actively, proposing a challenging problem, and students take their own conclusions. One of the lessons that will be critical thinking skills students are learning mathematics, especially relating to the settlement of a matter of proof. If a student can do solving the problem of proof and have 10-12 abilities as mentioned above, it is said these students have a high level of critical thinking skills. While students who only have 6-9 abilities, capable of critical thinking is being said. If the ability they have less than six, then the critical thinking skills, including the category of less.

Characteristics and Model Development RSBI

The National Education System explains that "the government and or local government held at - least one unit of education at all levels of education to be developed into an international educational unit." Therefore, today several schools in the city of Hyderabad and other places willing implement an international pilot schools (SBI), by reason of: (1) demands in competitive ability in the form of technology, management and human resources, and (2) for students are ready and able to grow and win in every competition.

Based on the results of research conducted at the Gandhi Memorial School in Jakarta, Jakarta Jubile School, Mountainview, Salatiga (Mandikdasmen, April 2007), has acquired some characteristics of SBI can be implemented, namely: (1) the focus should be clear by using the 'sharing' between citizens of the school , (2) have high standards, (3) Effective School Leadership (Effective Schooll Leadeship), (4) curriculum and evaluation of learning more than the National Standards, (5) staff development of educators and education personnel are focused, (6) learning environment that supports, and (7) the role of the family and high society.

In the implementation, there are four RSBI development models :
i. New School Model (Newly Developed SBI), in this model RSBI established with all the contents and the facilities are new. To become a new RSBI must have all the international standards, good teachers, students, principals, facilities, funding, and curriculum that will be applied.
ii. Existing Model School Development (Existing Developed SBI), purpose is the development RSBI to the existing school, which is a special school that already has principals and teachers who are professional, adequate infrastructure facilities for development into an international level.
iii. Integrated model, is integrated with the construction of the elementary school, junior school, high school and vocational school in one complex and one management. With this model the

school to lead by 1 (one) the head of school for the entire education units or 1 (one) education unit headed by 1 (one) the head of school.

iv. Partnership model, this model is expected RSBI selected from existing schools to partner with one of the schools abroad which has an international reputation.

Schools are implemented standard international school have many problems, both the preparation of human resources, learning facilities, as well as software and hardware. In addition to the problem, we want to know about the positive impact after the RSBI implemented with particular regard to the ability of their students. The ability of students who need to be assessed not only the ability of the value of the test or tests ssemester final exam, but also the ability to think and reason.For it is necessary to study in depth about the ability RSBI graders in critical thinking process.

Mathematical Problems

We can not escape from the problems encountered, because this condition is realized or not require an act of completion and not available a way to resolve the issue. If the soon to cope with and immediately obtain a certain way that can be used to find the answer, it is no longer an issue.

Bell (1978) suggests the definition of the problem as follows: "a situation is a problem for person if he or she aware of its existence, recognizes That it requires action, wants or needs to act and does so, and is not Immediately Able to resolve thesituation ". A specific condition is a problem for someone, when he realized there was, knowing that need answers, eager to act, and not immediately to resolve the condition.

Problems in mathematics in general form math problems, but not all math is a problem. In looking at a math problem, then there are some things that might happen, namely: (a) directly know or have the method of solution but have no desire (interest) to solve these problems, (b) has a method to resolve and intention to solve it; (c) had no method of resolution, but wishes to solve these problems, and (d) had no method of solution and is unwilling to resolve the matter.

If students are on the possibility (c), it is said that the question it is a problem for students. So, for a math problem is a problem for students requires two conditions: (1) students do not know the method of the answers about it and (2) we are willing or willing to solve these problems (Sutawijaya, in Nurdi: 2008). Under these two conditions can be concluded that a question that includes a problem or not for a person to be relative to that person. A problem is a problem for student A is not necessarily a problem for students who are similar in size with student A.

According to Polya (1957) there are two kinds of problems that is the problem of finding and a problem to prove. The problem to find either a theoretical or practical, abstract or concrete, including hide and seek (guess). We must look for the problem variables. We tried to obtain produce or construct any type of object that can be used to solve the problem. The main part of the problem are: (1) whether the search, (2) how the data are known, and (3) how the conditions. All three are the foundation for solving the problem of this type.

Problem to prove is to show that a statement is true or false, not both. The main part of the problem of this type is the hypothesis and conclusion of a theorem to be proved true. The two main parts are the foundation to be able to solve problems of this type.According Hudojo (2003) problem to find a more important role in elementary mathematics, while the problem to prove more important in advanced mathematics.

Simple understanding of problem solving is the process of acceptance of the problem as a challenge to complete. In line with the above understanding, Cooney (1975) argued that problem solving is the process of accepting the problem and try menyelsaikannya. While Polya (1957) defines problem solving as an attempt to find a way out of a difficulty Based on some understanding of the above, it can be concluded that problem solving in mathematics is an activity to look for solutions of mathematical problems encountered by using an integrated all mathematical knowledge stock already owned.

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3. Conclusion

Learning math in school is supposed to use the model to suit the needs of children and to meet the demands of the times. So the classic problem of children can be overcome, which in turn liked math students. One model related to the child and possible improve critical thinking skills are solving mathematical problems.

Through mathematical problem solving in high school RSBI class, then the mathematical topics that are presented to give students the opportunity to experience the process and find and relate math concepts. If this is done in mathematics teacher on a regular basis and plans, it will give other effects that can enhance students' critical thinking skills.

Such a pattern of learning, if done optimally, it can support the success, especially in schools that international standart (RSBI). This is consistent characteristic of the SBI are: (1). have a clear vision, easy to understand and be understood and based on the needs of students and schools, (2). subjects research-based teaching strategy.

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