Enhancement Students' Mathematical Connection Ability and Self-Efficacy through Problem Based Learning

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Abstract: This research is motivated by the importance of mathematical connection skills and students' Self-Efficacy in learning mathematics. This study aims to examine the literature on mathematical connections and student Self-Efficacy through problem-based learning. Through a mathematical connection between material and other material, it is hoped that students can reach several aspects of problem-solving. Self-Efficacy is one of several character values that are cultivated in learning. To deal with a problem requires an attitude of confidence in one's abilities known as Self-Efficacy. This attitude can affect student motivation and performance in mathematics learning. Thus, mathematical connection ability and Self-Efficacy have an important role in mathematics learning. Data collection was carried out by reviewing research from experts in several journals. The data analysis technique was carried out qualitatively by quoting the appropriate opinions.

Keywords: Problem Based Learning, Mathematical Connection, Self-Efficacy.

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INTRODUCTION

Mathematics is a compulsory subject in the world of formal education, from elementary school, middle school to tertiary level. The characteristic of mathematics is that it is not partitioned into various separate topics, but mathematics is one unit. Apart from that, mathematics cannot be separated from other sciences other than mathematics and the problems that occur in life. Given how great the use of mathematics is in everyday life, mathematics should be conveyed and taught by emphasizing what students experience in their lives. According to the National Council of Teachers of Mathematics (2000), learning mathematics must be able to develop several skills, namely: (1) mathematical problem-solving; (2) mathematical reasoning and proof; (3) mathematical communication; (4) mathematical connection; (5) mathematical representation.

Based on this description, one of the important abilities that every student must have is the ability to connect mathematically. Namely, students must be able to use mathematics in other fields of science, be able to relate mathematics to other mathematical concepts, and with other disciplines as well as mathematics with everyday life. Through mathematical connection skills, students can solve math problems and apply them in their daily lives. This is by the essence of mathematics, that mathematics is a science that is closely related to the daily life of students.

Apart from cognitive aspects, students also have psychological aspects, one of which is Self-Efficacy. Several studies have shown that Self-Efficacy is important in determining academic achievement. For example, Bouchey and Harter (2005) stated that the achievement achieved by a student in a certain field is influenced by the individual's self-efficacy in that field. A student who feels capable of doing something will have an impact on the success of the student in completing what he does well.

To create students who have mathematical connection skills accompanied by good Self-efficacy, a learning process is needed that can support the formation of these cognitive and affective aspects. Learning that can stimulate or train students' cognitive abilities is also inseparable from the role of implementing the learning model. One learning model that is deemed suitable is problem-based learning.

METHOD

The method used by researchers in this study is a literature study. A literature study is often referred to as a bibliographic study which is the process of tracing written sources in the form of books, reports, research, journals, and the like related to the problem under study.

According to Sugiyono (2012), a literature study is related to theoretical studies and other references related to values, culture, and norms that develop in the social situation under study, besides literature study is very important in

research because research will not be separated from the kinds of literature scientific.

RESULTS AND DISCUSSION

Mathematical Connection Capability

Mathematical connection ability is the ability of students to relate events/incidents in everyday life with subject matter and link between concepts in mathematics itself. Linkages in external and internal contexts make learning more meaningful because students can see real problems in learning and can solve these problems according to the mathematical concepts in them.

Mathematical connection skills need to be trained in students at school. If students can relate mathematical ideas, the mathematical connection will be deeper and last longer because they can see the relationship between topics in mathematics, with contexts other than mathematics, and experiences of everyday life (NCTM, 2000).

Herdian (2010) argues that the mathematical connection can be interpreted as a linkage between mathematical concepts internally, namely relating to mathematics itself or externally, namely mathematics with other fields both in other fields of study and with everyday life. This is in line with Bruner's theory which states that in mathematics every concept is related. Likewise, with others, for example, propositions and propositions, between theory and theory, between topics and topics, or between branches of mathematics and other branches of mathematics. Therefore, for students to be more successful in learning mathematics, many opportunities must be given to see these linkages.

Looking at mathematics as a whole is very important in learning and thinking about the connections between topics in mathematics. The connection rule from Bruner and Kenney states that every concept, principle, and skill in mathematics is connected with other concepts, principles, and skills. The connection structure that exists between the branches of mathematics enables students to do mathematical reasoning analytically and synthetically. Through this activity, students' mathematical abilities develop. The most important form of connection is looking for connections and relationships between various structures in mathematics. In mathematics learning the teacher does not need to help students in studying the differences and diversity of structures in mathematics, but students need to be aware of their connections between various structures in mathematics. The structure of mathematics is concise and clear so that through mathematical connections, learning mathematics becomes easier for children to understand.

Sugiman (2008), mathematical connections are not only important, but awareness of the need for connections in learning mathematics is also important. If examined, no material in mathematics stands alone without any relation to other material. The relationship between material in mathematics can be understood by children if children experience learning that trains their connection skills. With a mathematical connection, mathematics becomes more meaningful.

NCTM (2000) formulates that when students can connect mathematical ideas, their understanding of mathematics becomes deeper and more durable. Students can see that mathematical connections have an important role in mathematics topics, in contexts that connect mathematics to other subjects, and in everyday life. Through learning that emphasizes the link of ideas in mathematics, students not only learn mathematics but also learn to use mathematics.

Mathematical connection skills need to be developed in every student, both students, and students because this ability does not just appear. Especially for students majoring in mathematics education who are prospective teachers, developing mathematical connection skills becomes the basis for mastering various materials and forms of solving mathematical problems. With good mathematical connection skills, it will make it easier for teachers to transfer their knowledge and develop the mathematical connection skills of their students.

From the description above, it can be concluded that mathematical connection ability is the ability to connect mathematical concepts both between the mathematical concepts themselves and with other subjects and with real life.

Self-Efficacy

Self-efficacy is a self-assessment of someone's ability to organize and carry out a series of actions to achieve expected goals, be able to measure one's ability to take various actions according to level, generality, and strength in various situations/circumstances. Self-efficacy includes three dimensions, namely: (a) Magnitude, in which students assess their own beliefs and abilities in overcoming various difficulties in solving threes. In this dimension of magnitude, students are faced with a variety of mathematical problems with different levels of difficulty. Individuals who have a high level of

Self-Efficacy have the belief that they can do difficult tasks while individuals who have low Self-Efficacy have the belief that they are only able to do easy tasks, (b) Generality (generalization), meaning that individuals assess self-confidence in certain activities. Generalization has different dimensions that vary, including a degree of activity similarity; ability capital showed through attitude, cognitive, and affective; describe the real situation; shows the characteristics of individual behavior. In the context of generality, this is the feeling of students towards their ability to solve various kinds of task situations or different task contexts from the teacher, (c) Strength (strength/resistance), this dimension is the resilience and tenacity of individuals/students in fulfilling their duties. Students who have strong confidence and stability in their ability to complete a task will continue to survive in their business despite experiencing many difficulties and challenges.

So, can be concluded that Self-Efficacy in mathematics is a student's or individual belief in his or her ability to organize and carry out mathematics learning activities to achieve certain goals by predicting how much effort is needed to achieve these goals which are contained in the dimensions of magnitude, level, and strength. (Bandura, 1997).

Bouchey and Harter (2005) revealed that a student who has good academic self-efficacy in mathematics affects individual achievement. Syah (2002: 132) argues that student learning success is influenced by 3 factors, namely:1) Internal factors, namely the state/condition of the student's physical and spiritual. The spiritual state of the student includes Self-Efficacy, etc.; 2) External factors, namely environmental conditions around students; 3) The learning approach factor, namely the type of student learning efforts including the strategies and methods used by students to carry out learning activities of the subject matter.

Based on the above statement, it is known that one of the student success factors is internal factors and one of them is Self-Efficacy. Students' self-confidence and level of confidence are still lacking when asked by the teacher to solve math problems. For example, when the teacher appoints a student to work on a problem on the blackboard, the student does not want to come forward for fear of being wrong and is not sure whether his job is correct. The results of the work of several students shown by the teacher to the researcher seemed hesitant in writing down the completion steps even though the initial concept of completion was correct. This shows the presumption that students' self-efficacy is still low.

From the explanation above, can be concluded that self-efficacy is an attitude that exists in a person which is used to assess the ability that exists in him to complete a specific task

Problem Based Learning

Problem-based learning (PBM) is a translation of Problem-Based Learning (PBL) which was previously known as Problem-Based Instruction (PBI) or Problem-Based Teaching. Problem-based learning is a problem-centered learning activity. The term centered means a theme, unit, or content as the main focus of learning (Mustaji, 2005). Ibrahim (in Trianto, 2007) revealed that problem-based learning was developed to help students develop thinking skills, problem-solving, and intellectual skills.

Problem-solving is a process of finding an appropriate response to a situation that is unique and new to the problem solver. Problem-based learning is not designed to help teachers provide as much information as possible to students such as direct learning and lectures, but problem-based learning is developed to help students develop thinking skills, develop problem-solving skills, intellectual skills, and become independent students (Trianto, 2007)

According to Arends (in Trianto, 2007), problem-based learning has the following characteristics:

1. Asking questions or problems
2. Focusing on interdisciplinary linkages
3. Authentic inquiry
4. Produce products and show them off
5. cooperation

Problem-based teaching consists of 5 main steps starting with a problem situation and ending with the presentation and analysis of student work. The five steps are:

1. Stage 1 (student orientation to the problem)
2. Stage 2 (organizing students to learn)
3. Stage 3 guides individual and group investigations)
4. Stage 4 (developing and presenting the work)
5. Stage 5 (analyzing and evaluating the problem-solving process)

When students carry out investigations and find solutions on their own, students are assisted by problem-solving steps consisting of a) understanding the problem; students determine what they know and ask, b) plan; students relate their previous knowledge or similar problems that have been solved before with what is known

and asked in the questions so that they can make a solution plan, c) carry out the student's plan to do calculations (computation), and d) check again; students make re-corrections about solving the problems made (Polya, 1973).

CONCLUSION

Based on this explanation, the authors hypothesize that theoretically, Problem Based Learning can improve students' connection skills and self-efficacy. Therefore, this learning can be an alternative that can be done by teachers to improve students' mathematical connection skills and self-efficacy.

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