IMPROVING CREATIVE THINKING ABILITY AND MATHEMATICAL SOLVING OF STUDENTS THROUGH REALISTIC MATHEMATICS APPROACH (PMR) IN MAN ASAHAN

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Abstract

The low ability of students to solve problems and think creatively is inseparable from the learning strategies used during the learning process. Until now there are still many found, that the learning strategy in the classroom is still dominated by structuralism where the aim is for students to remember factual information. The purpose of this study was to see: (1) whether the increase in mathematical creative thinking skills of students using a realistic mathematical approach was higher than using ordinary learning; (2) whether the increase in mathematical problem solving abilities of students using realistic mathematical approaches is higher than using ordinary learning. This research is a quasi-experimental study. The population of this study was class X MAN Asahan. The samples in the study were class XA (experimental class) and class XB (control class). The instrument used was a test of creative thinking skills and problem solving. Data analysis was performed by t test and anava. The results of this study are: (1) Increased creative thinking skills of students who use PMR are higher than students who use ordinary learning; (2) Improvement of mathematical problem solving abilities of students who use PMR is higher than students who use ordinary learning.

Keywords: *creative thinking skills, PMR , problem solving skills, ordinary learning, structuralism*

A. Introduction

The importance of mastery of mathematics in improving the quality of human resources and its benefits in everyday life, it is only natural since elementary school and even since kindergarten mathematics lessons were introduced to equip students with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability cooperate. This competency is needed so that students can have the ability to obtain, manage, and utilize information to survive in an ever-changing and competitive situation. Increased ability to think creatively and problem solving is one of the focuses of mathematics learning.

However, mathematics is still a subject that students fear and shun. So it is not surprising that many students are not happy with mathematics. This is in accordance with the opinion of Zulkardi (2008) the emergence of negative attitudes of students towards mathematics because most mathematics teachers teach mathematics with an uninteresting method, the teacher explains and students take notes. This can reduce the level of student learning. One indication that students' mathematics learning achievements are still low, among others, can be seen from the results of the mathematics ranking of Indonesian students in the 2007 TIMSS survey placing Indonesia ranked 36th among 46 participating countries, 14 levels below Malaysia. The average score obtained by students is below the average of 397, while the value of all countries surveyed is 452.

The low ability of students to solve problems and think creatively is inseparable from the learning strategies used in the learning process. Until now there are still many found, that the learning strategy in the classroom is still dominated by structuralism or behaviorism or objectivism whose purpose is that students remember factual information (Lambertus, 2010). Learning objectives emphasize the addition of knowledge by memorizing concepts and procedures used to solve questions, and less to build students' understanding abilities, as a result students have difficulty completing questions that require creative thinking, for example about storytelling.

Sumarmo (2005) suggests reforming mathematical learning from learning to imitate (learning) approaches to learning which are based on the notion of knowing mathematics is doing mathematics, which is learning that emphasizes doing or process compared to knowing that. The student activation process is developed by getting students to use their thinking skills (logical thinking, critical and creative) to solve problems in each of their learning activities. Here it is seen the importance of training

and and improving students' thinking skills, namely creative thinking skills and mathematical problem solving abilities.

In the Realistic Mathematics Approach (PMR) students are required to be more active in developing the attitude of knowledge about mathematics in accordance with their respective abilities so as a result of giving more meaningful learning outcomes to students. Thus the Realistic Mathematics Approach (PMR) is a very useful approach in learning mathematics. Armanto (2001) further stated with the Realistic Mathematics Approach (PMR) in addition to students learning mathematics also they got a more meaningful understanding of the use of mathematics in various fields. Realistic Mathematics Approach (PMR) encourages students to learn more actively and more meaningfully means students are required to always think about a problem and they find their own way of solving, so they will be more trained to always use their knowledge skills, so that their learning knowledge and experience will be embedded for quite a long period of time.

In the learning process with PMR, the teacher must start learning from something real so students can engage in the learning process meaningfully. The role of the teacher is only as a guide and facilitator for students. Students cannot be seen as empty bottles that must be filled with water. Students are individuals who have the potential to develop knowledge in themselves. Students are expected to actively construct their knowledge.

Learning by using PMR is also expected that students are not just active themselves, but there is joint activity between them (interactivity). Of course activities like this will provide a great opportunity for all students including students who have moderate or low ability to be able to actively construct their knowledge. Thus students who have low abilities through a realistic mathematics learning process can improve their ability to think optimally, especially the ability to think creatively and solve problems.

Meanwhile for students who are highly capable through PMR will also increase their creative thinking skills and mathematical problem solving. However, the increase was allegedly less significant. This is based on the idea that for students who have high abilities, often the learning model that is applied is not a major factor to improve creative thinking skills and mathematical problem solving abilities. Therefore, it can be stated that when learning mathematics using PMR, it is likely that students who have low initial abilities will be helped to improve their learning outcomes. The statement in line with the results of the movement back to basic, which is

one reaction to modern mathematics (new math) concluded that, students with less or weak mathematical abilities will be helped through the movement back to basic, but 25% of students with mathematical abilities high will be sacrificed.

Based on the description above, it is necessary to attempt to uncover whether PMR and ordinary approaches have different contributions to the ability to think creatively and to solve students' mathematical problems. That is what drives a research that focuses on the application of realistic mathematical approaches to the ability to think creatively and solve mathematical problems of students in MAN Asahan Range in terms of students' initial mathematical abilities.

B. Method

The population of this study were all students of class X of the 1/20 Range of Academic Year 2017/2018 which consisted of six classes. While the samples in this study were randomly selected, namely students of class X A and X B, which amounted to 34 students each where the level of student ability was heterogeneous. students of class X A are designated as experimental classes and X B is defined as the control class.

The instruments in this study were tests of creative thinking skills and tests of mathematical problem solving abilities. The two tests of mathematical abilities were in the form of pretest and posttest in the material of the Two Variable Linear Equation System (SPLDV).

The data analyzed were to see an increase in creative thinking skills and mathematical problem solving between PMR class students and ordinary class students who were tested using the t-test while the interaction between learning and early mathematical abilities (KAM) of students towards creative thinking skills and mathematical problem solving was tested by Two-way ANAVA. All statistical calculations use the help of the SPSS 17. The data are not only analyzed using statistics but also analyzed descriptively to find out how the process of solving students' answers in terms of creative thinking skills and mathematical problem solving between students who get PMR learning and ordinary learning learning

C. Research Finding

Based on the testing using the t test, the results obtained from creative thinking skills and mathematical problem solving students with a significance level of α = 0.05 obtained t-count value of creative thinking skills of 10.494 with a significance value (sig.) = 0.000 smaller than α = 0.05 , so that H0 is rejected. Then it can be concluded that the average increase in mathematical creative thinking skills of students who get PMR learning is higher than students who get regular learning. So it was concluded that the problem solving process in terms of mathematical creative thinking ability of students who get PMR learning is better than students who get regular learning.

While the mathematical problem solving ability obtained by the value of t_count of 9,051 with a significance value (sig.) = 0,000 smaller than α = 0.05, so that H0 is rejected. Then it can be concluded that the average increase in mathematical problem solving abilities of students who get PMR learning is higher than students who get regular learning. And there were also many PMR class students who solved the problem with good categories in every aspect of the indicator students' mathematical problem solving abilities were 22 students more than the number of ordinary learning class students who only numbered 7 students who were able to solve the problem in a good category. So it was concluded that the problem solving process in terms of mathematical students' mathematical problem solving abilities of students who get PMR learning is higher than students who get regular learning.

D. Discussion

Based on the data analysis, it was found that in general, the increase in creative thinking skills and mathematical problem solving between groups of students whose learning using PMR (experimental group) was higher than the group of students who attended learning using ordinary learning (control group). The contribution given by the PMR shows that learning using PMR is superior compared to learning using ordinary learning in improving students' creative thinking skills. Because learning that uses PMR provides the widest opportunity for students in building knowledge accompanied by manipulating real objects in the learning process, making it easier for students to understand the concepts given as new knowledge for them. In this way the ability to spark and express ideas, statements, and answers (problem solving) will

develop, because here the independence of students is trained. Through intertwinment thinking activities, linking new knowledge with other knowledge or with contextual problems can provide opportunities for the development of decomposition, namely the ability to develop an idea, add or detail in detail an object, idea, and situation, while also strengthening the survival of mathematical knowledge in memory students.

Through discussion, learning takes place interactively, students explain and give reasons for the answers given, understand the answers of other students, express agree or disagree with the answers of other students, and look for other alternative solutions. Here flexibility or ability produces various kinds of ideas, questions, and answers that can develop. Learning using PMR views students as human beings who have a set of knowledge and experience gained through interaction with their environment. Students also have the potential to develop this knowledge for themselves. In mathematical learning it is recognized that students can develop/shape knowledge and understanding of mathematics when given space or opportunity for it. The development or formation of knowledge is a process of change which includes addition, creation, modification, refinement, rearrangement, and rejection. This is something new (originality), namely the ability to provide unique and extraordinary responses from students to grow and develop.

Learning with PMR also familiarizes students with solving problems (questions) by following the steps of problem solving systematically through stages: (1) understanding the problem; (2) develop a strategic plan or method of settlement; (3) perform calculations or workmanship; and (4) re-examine the correctness of the way or steps of completion and answer. The ability of students to develop informal models which are then directed at formal mathematical models with teacher guidance also contributes to improving problem solving skills. Learning with PMR where students start from the contextual questions, try to decipher with language and symbols that are made by themselves, then solve the problem, this process is known as horizontal mathematicization, which then continues the learning process to vertical mathematics. With this process each child can use their own methods that may be different from others. Here the knowledge of each individual can develop optimally. Even this method will create a learning atmosphere in a democratic class, students are free to be active in the learning process, not afraid to make mistakes if they ask or answer questions.

E. Conclusion

Based on the formulation of the problem, the results of the research and discussion are concluded as follows:

1. Increased creative thinking ability between students taught with realistic mathematical approaches is higher than students taught through ordinary approaches.
2. Increasing the ability to solve mathematical problems between students taught with realistic mathematical approaches is higher than students taught through ordinary approaches.
3. The process of solving students in solving problems of creative thinking ability and mathematical problem solving in realistic mathematics learning is better than ordinary learning. In the ability to think creatively, the best aspects are fluency aspects and in solving problems the best aspects are aspects of understanding problems

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