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Research Article

Implementation of a Realistic Mathematics Education to Improve Junior High School Students' Creative Thinking

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ABSTRACT

Based on observation results, students' low level of creative thinking in mathematics lessons is influenced by the use of inappropriate methods, so teachers are required to innovate using fun learning methods. One method that makes students interested in learning mathematics is a realistic mathematics learning method. This research aims to improve students' creative thinking abilities in positive whole number material using a Realistic Mathematics Learning approach. Based on the research results, it was found that students' creative thinking increased from 25.94% to 66.7% in the first cycle, and 80.96% in the second cycle. After conducting research on the Realistic Mathematics Education (RME) approach to improve students' creative thinking, it can be seen from the results of initial observations that there has been quite a significant increase until the second cycle process.

Keywords: RME; student's creative thinking; powered numbers

1. INTRODUCTION

Mathematics is the main and most universal subject in learning that is applied in life, because everything related to life requires mathematics. In accordance with the 2013 Minister of Education and Culture Regulation which states that Mathematics is a universal science that underlies the development of modern technology, has an important role in various scientific disciplines and advances human thinking. Sinaga (2017) said that, Mathematics is essential knowledge as a basis for lifelong work in the age of globalization, therefore a certain level of mastery of mathematics is required for all students so that later in life they will be able to do decent work, because in the era of industry 4.0 all jobs need math. This emphasizes that mathematics cannot be separated from everyday life even if one's job is only as a farm laborer. Therefore, in learning at school mathematics is always prioritized.

On the other hand, education is a learning requirement in the life of students' growth and development from an early age to an indefinite future, so that later students are able to think and reason individually. One of the goals of education is to train creative students (Sujana, 2019; Dwiputri & Anggraeini, 2021). In the 2013 Education Curriculum as stated in the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 69 of 2013 aims to prepare students to have the ability to become creative individuals. It can be seen that the ability to be achieved from the educational goals above is the ability to think creatively. Therefore, the ability to think creatively is very important for students in learning, especially in the field that will be studied, namely mathematics.

Mathematics is known as a basic science that deals with ideas for solving problems related to numbers or abstract concepts where the truth of concepts and statements is consistent. Mathematics is also a basic science that plays a very important role in our daily lives. Therefore, mathematics is taught seriously even in kindergarten, starting from Elementary School (SD), Middle School (SMP), and High School (SMA). Meanwhile, deepening mathematics learning can be done at college/university. Studying mathematics will train students' creative and systematic thinking skills. However, the role of mathematics is not limited to that, like other fields, namely economics and physics, it cannot be separated from the role of mathematics. However, researchers want to focus more on students' creative thinking abilities. So, students will have the ability to solve certain problems creatively.

Creativity is an ability where someone is able to give birth to something new in the form of a real work idea that has never existed before. According to Mursalin, et al (2018) in their research, every individual has the innate ability to think creatively, this ability must be developed so that passive potential does not occur. The ability to think creatively can also be called divergent thinking, which means thinking flows without sticking to a certain pattern. Creative thinking can also be interpreted as a combination of logical thinking and divergent thinking based on conscious intuition. Creative thinking is authentic and reflective and produces complex products. Thinking skills involve synthesizing ideas, constructing new ideas and determining their effectiveness. The thought process is characterized by strong and stable motivation and can be observed with high intensity over time. This kind of creative thinking ability is very important in learning mathematics.

Based on the reality, there are many students who do not understand the importance of mathematics in life, so many of them are not willing to study mathematics. This is similar to the reality at MTs Negeri 3 Pamekasan, especially class IX students, they think there is no point in studying mathematics, which is all about abstract numbers. From the results of direct observation, because abstract numbers also make students confused and ask questions, what are these numbers for, where do the numbers they learn come from, and why do they have to learn numbers they don't know? from where and for what.

In this case, researchers can conclude that there is something inappropriate in conveying learning by the teacher. From the results of direct observations with students, when researchers asked how the mathematics learning process was, students explained that they only listened when learning was taking place, so it was boring and made them lazy and sleepy. Some students also complained that too many assignments were given after the teacher had finished explaining. So the use of lecture methods and lots of assignments makes students lazy and bored, resulting in very low classical learning completion in the last exam, namely 25.94%.

Power numbers are one of the most basic materials after whole numbers. This is also a problem when interviewing teaching teachers, students find it difficult to determine the results of exponent numbers. So the researcher chose exponent numbers as research material to determine the increase in students' creative thinking. Previous research related to power numbers has been carried out by several researchers including Mayanti et al (2014) and Fernandes (2018). The two researchers conducted research related to numbers at high school level using the concept of practice method approach. Meanwhile, students admit that mathematics is boring because they encounter abstract numbers. So this time the researcher wants to bring a different conceptual approach from the two researchers above, namely the researcher wants to bring a realistic mathematical approach to make it easier for students to understand numbers with powers so that they can improve students' creative thinking. By applying realistic mathematics, it is hoped that students will no longer get bored, because what they find in this learning approach are concrete and real numbers in everyday life.

Based on the background explanation, it is necessary to use a realistic mathematics learning approach model to improve the creative thinking of class IX students at MTs Negeri 3 Pamekasan. Thus, research was carried out entitled "Implementation of a Realistic Mathematics Learning Approach to Improve Creative Thinking in Mathematics of Students at MTs Negeri 3 Pamekasan Class IX on Power Number Material.

2. RESEARCH METHOD

The research approach used by researchers is a qualitative approach because the data obtained is in the form of numbers from test results as well as a description of the object being studied. The type of research used is classroom action research. Class action research can be interpreted as research carried out in a class to determine the consequences of actions applied to a research object in that class (Arikunto, 2009). Mills (2000) also stated that action research (classroom action research) is action research that is systematic inquiry in nature, namely classroom action research carried out by educators (teachers and lecturers) and school principals or structural officials in higher education environments, because the head schools and structural officials have the functional position of educator, namely the obligation to teach students; so, school principals and higher education structural officials can conduct action research and classroom action research; while educators conduct classroom action research. Meanwhile, according to Tampubolon, Classroom Action Research is research carried out by educators in their own classes through self-reflection. The aim is to improve their performance as educators, so that students' creative thinking improves and, as a system, the quality of education in an education also increases.

Kurt Lewin was an American social psychologist and the first to discover the class action research design called the Kurt Lewin Model. Kurt Lewin's model is designed in the form of a cycle consisting of four stages, namely (1) action planning, (2) action implementation, (3) observation, and (4) reflection. Information:

- Action planning (planning) is a plan in the form of preparing learning tools based on the results of the evaluation of the results of the implementation of pre-research/initial reflection.
- Implementation of action (acting) is the implementation of learning in the classroom as a model teacher using planned learning tools.
- Observation is observing the implementation of the learning process in the classroom simultaneously as a researcher and observing changes in student behavior regarding learning actions carried out using data collection instruments.
- Reflection is a recommendation based on the results of data analysis evaluation to be followed up in the next cycle.

However, there are different stages between the Lewin and Kemmis models, namely the difference is in the acting and observing stages which are combined in one box, meaning that the implementation of the action is carried out simultaneously with observation, so the form is often called a spiral form; while Kurt Lewin's model has four stages consisting of four boxes.

The presence of the researcher in this research is very important, namely the researcher himself or with the help of others is the main data collection tool (Moleong, 2002). To obtain accurate data in this research, the researcher immediately went to the location of MTs Negeri 3 Pamekasan to obtain a lot of data. In this classroom action research, the researcher used a field study method.

During field studies, the researcher himself acts as a key instrument in collecting data because in classroom action research the main instrument is humans. In conducting research, researchers also use notebooks, paper, stationery and recording devices to assist in collecting data. The presence of researchers at the research location can support the validity of the data so that the resulting data meets originality standards. Therefore, researchers always carry out direct observations at research locations with a fairly high intensity of presence.

This research was conducted at MTs Negeri 3 Pamekasan, whose address is Pakong Village, Pamekasan Regency, and was carried out during the even semester learning in the 2021/2022 academic year. The subjects of this research were MTs Negeri 3 Pamekasan class IX students. Subjects were selected using the number of 18 students obtained during field observations.

Data collection techniques in this research are in the form of observation, tests and documentation studio.

1. Observation
   a. assessment of the implementation of the learning process in the classroom. A team of collaborators consisting of 2 people (teachers and students) carried out assessments based on observations of the implementation of learning carried out by researchers. Assessment of learning implementation is given in the form of a tick or checklist on the same instrument.
   b. Complete a questionnaire about learning motivation by students after learning is complete.
2. Assessment

   Carrying out assessments in the form of different essay questions each cycle to measure the achievement of the indicators presented by the researcher, as well as measuring the basic competency (KD) value.
3. Documentation Study

   Carrying out objective school data collection through a research format.

Classroom action research is assumed to be successful if actions are taken to improve the quality of learning, which will have an impact on improving student behavior and creative thinking. The order of indicators is logically/scientifically rearranged into:

1. Indicator of success in the quality of the learning process is at least 'good' (indicator for general research objectives);
2. Indicators of success in improving student behavior (for example, aspects of learning motivation, interest in learning, student activity, cooperation, etc.) are at least 'good'.
3. The indicator of success in classical creative thinking is at least 75% of the number of students who reach the specified KKM.

3. RESULTS AND DISCUSSION

3.1 Results

Based on the research results related to the problem formulation, they will be processed using descriptive analysis. Based on the description of classroom action research activities, there is a problem in student learning outcomes which are still lacking, as can be seen from the completeness of the students' final test scores which obtained 25.94% of the total students. In the first cycle, student learning outcomes after experiencing action increased, namely 66.7% of the total number of students who completed or met the KKM, while 6 people did not complete it. In the second cycle, 80.96% of the 21 students experienced improvement, although the ratio of students who did not complete was not too different, namely 4. However, the 4 students whose scores did not meet the KKM still experienced an increase between cycles 1 and 2. This can be seen from diagram data below.

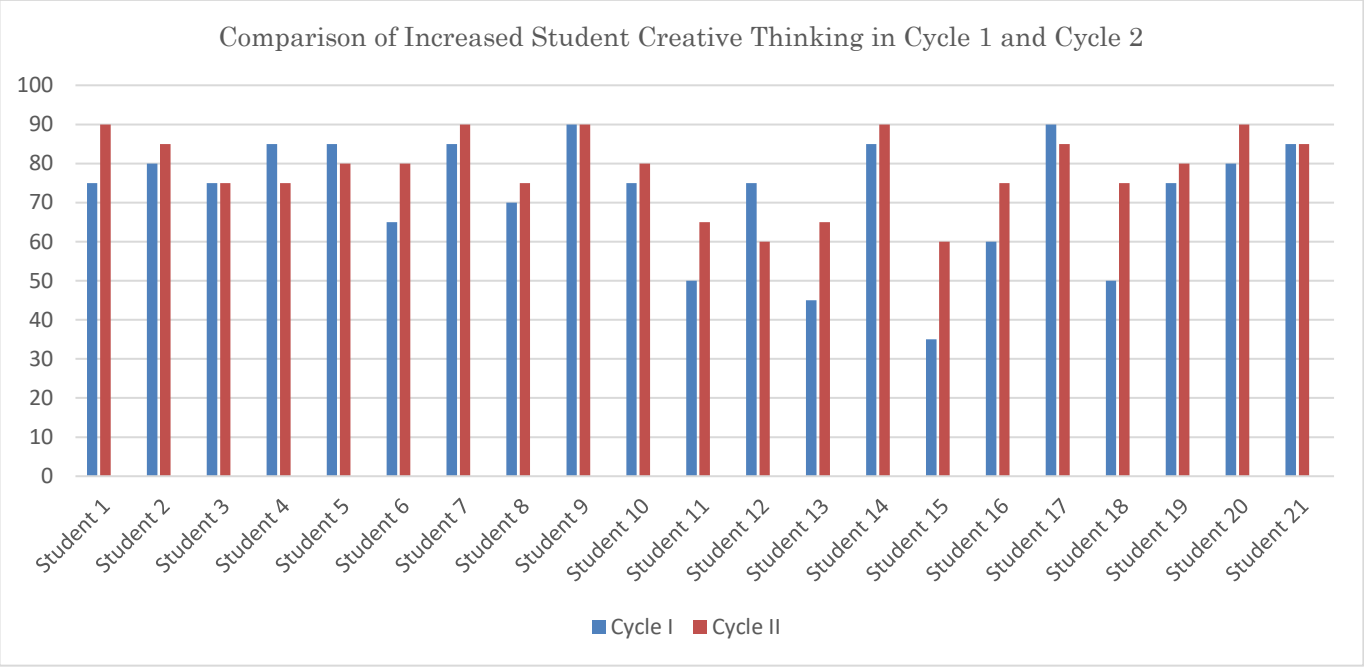

Figure 1. Comparison of Increased Student Creative Thinking in Cycle 1 and Cycle 2

Student 11 in cycle 1 got a score of 50 while in cycle 2 got a score of 65, Student 13 got a score of 45 in cycle 1 and 65 in cycle 2, while Student 15 in cycle 1 got a score of 35 and got a score of 60 in cycle 2. And one of 4 students here in cycle 1 actually met the KKM standards but in cycle 2 they experienced a decline. From the results of the interview, when asked, Student 14 admitted that he was sick and did not participate optimally in learning in the second cycle. However, the total number of students who meet the KKM standards is said to have passed the minimum indicator for research success. Data from observations of teacher and student activities in carrying out learning in cycle 1 can be seen in Table 1.

Table 1. Data from Observation of Teacher and Student Activities in Cycle 1

Type of Observation Object	Percentage	Observation Criteria
Average teacher activity	83%	Good
Observation of student activities	80%	Good

Based on the established value conversion criteria, teacher and student activities are in the good category (80% ≤ KN < 90%). When combined with these results, students' mathematics learning outcomes have not met the success criteria for the actions taken, so they need to be continued with cycle 2. Data from observations of teacher and student activities in implementing learning in cycle 2 can be seen in Table 2.

Table 2. Data from Observation of Teacher and Student Activities in Cycle 2

Type of Observation Object	Percentage	Observation Criteria
Average teacher activity	84%	Good
Observation of student activities	82%	Good

Based on research conducted by a realistic mathematics learning approach to improve students' mathematics learning outcomes on the subject of numbers with powers. during two cycles it was found that students in the first cycle of action research were less enthusiastic in participating in learning activities. This was seen during apperception, only a small number of students answered the teacher's questions regarding the previous material and also what would be taught, the majority of students felt confused in filling out the worksheet because they had never learned to use worksheets like the researchers did. During discussion sessions in groups, only the chairman and some members were active in working on problems on the LKS, when presenting the results of group work represented by the chairman and a member from each group from one of the groups, the other groups did not show any activeness, for example in the form of responses, instead of listening, sometimes even ignored and choosing to sleep in his chair.

Meanwhile, in the second cycle of action research, students were starting to be interested and enthusiastic about participating in learning at the preliminary stage, most of the students simultaneously answered the teacher's questions correctly, students looked enthusiastic in solving the problems given by the teacher with the direction given by the group leader, the group was clearly visible. in working together and making the class atmosphere feel more lively, although not completely, at least the changes are much greater than in cycle I, student activity both in groups and when presenting the results of their discussions has increased compared to the previous cycle. Student test results during cycle II were better than observation data and cycle II and during the interview session students found it easier to answer the researcher's questions.

Based on the research findings, it can be concluded that there are differences in the results of action research cycle I and action research cycle II using the Realistic Mathematics Learning (PMR) approach in improving the learning outcomes of class IX students at MTs Negeri 3 Pamekasan which can create change, both in terms of learning outcomes. students or the student learning process in the classroom. This is in line with expert opinion regarding the benefits of realistic mathematics education. Soedjadi (2001) stated that PMR is basically the use of reality and the environment that students understand to facilitate the mathematics learning process so as to achieve the goals of mathematics education better than in the past, while according to Suparno (1997) states that the benefits of learning through realistic mathematics education include the following, (1) students become more active and creative. They ask questions, express their ideas to solve the problems given, (2) students' understanding of mathematical concepts is stronger and deeper. This happens because these concepts are constructed by students themselves, (3) students are increasingly interested in learning because the material studied is related to students' experiences, (4) mathematics learning is more meaningful, because what is learned is linked to students' previous knowledge.

3.2 Discussions

From the research results related to the problem formulation, they will be processed using descriptive analysis. Based on the description of classroom action research activities, there are problems in students' lack of conceptual understanding, as can be seen from students' work on questions. From the results of students' work, it appears that students have not been able to recognize and use the relationships between ideas in mathematics, students have not been able to understand the relationship between mathematical ideas and form ideas or with others so as to produce a comprehensive relationship, and students have not been able to write down the concepts underlying the answers, and students are not yet able to explore and apply mathematics in contexts outside mathematics. Data analysis includes several aspects, namely data from observations of student activities and test results. Data analysis from various aspects can be described as follows:

Results of Student Conceptual Understanding

Test questions are given at the end of learning in each cycle. The aim of giving these test questions is to determine students' conceptual understanding which is supported by the interview session. The indicator of success in this research is when the selected subject experiences an increase in category based on indicators of conceptual understanding. In cycle I, the target of success had not been achieved because some subjects experienced a decline in conceptual understanding. However, improvements in cycle II produced quite significant results. Where all subjects experienced an increase in

conceptual understanding indicators.

Learning activity

Observations of student activities were carried out by five observers. Where each person becomes an observer for 1 group. This observation is carried out during the learning process. The results of observing student activities in cycle I had an average for cycle I in subject I of 1.3 at the first meeting and 1.7 at the second meeting. Subject II 1.3 at the first meeting and 1.5 at the second meeting. Subject III 1.5 at the first meeting and 2 at the second meeting. Subject IV 1.3 at the first meeting and 1.5 at the second meeting. For cycle II in subject I 2 at the first meeting and 2.3 at the second meeting. Subject II 2.3 at the first meeting and 2.8 at the second meeting. Subject III 2.5 at the first meeting and 3.2 at the second meeting. Subject IV 1.5 at the first meeting and 2 at the second meeting.

4. CONCLUSION

Based on the research results, it was found that students' creative thinking increased from 25.94% to 66.7% in the first cycle, and 80.96% in the second cycle. After conducting research on the Realistic Mathematics Learning (PMR) approach to improve students' creative thinking, it can be seen from the results of initial observations that there has been quite a significant increase until the second cycle process.

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