Improving Student Mathematics Achievement Through a Realistic Mathematics Approach

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ABSTRACT
This research aims to improve mathematics learning on the topic of plane geometry through a realistic mathematics approach of the 5th-grade students of SD Inpres Japing, Gowa Regency. This study is classroom action research proposed by Kemmis and Mc. Taggart consists of 2 cycles. The research subjects were 31 students of the 5th grade of SD Inpres Japing, Gowa Regency. The research data were obtained from observation and learning test results. The success indicator to be achieved is that students are said to be complete in learning if they get a score of 73 (Minimum Completeness Criteria), while classical completeness is said to be achieved if 75% of all students in the class reach the MCC score. The data were analyzed using quantitative statistical analysis. The results showed that a realistic mathematical approach to learning mathematics of the topic of flat shapes could improve the learning outcomes of 8th-grade students of SD Inpres Japing, where the average score of students' mathematics learning outcomes were 65.58, 66.88, and 80.22 in pre-action, cycle1, and cycle 2, respectively.

Keywords: *learning achievement in mathematics, properties of flat shapes, and realistic mathematics approach.*

1. INTRODUCTION

Learning outcomes are determined by the process of learning activities in the classroom and outside the classroom. Mathematics education in school is expected to provide students with knowledge and abilities to solve problems, use reasoning, apply concepts, and appreciate the use of mathematics in everyday life. These goals follow from Permendiknas No. 22 of 2006. In addition, learning mathematics in elementary schools is given to allow students to think logically, analytically, systematically, and critically with the ability to work together [1].

One of the characteristics of mathematics is that it has abstract objects. This abstract nature causes many students to have difficulty in mathematics. The mathematics achievement of Indonesian students both nationally and internationally has not been encouraging [2]. Some factors of the low learning mathematics outcomes in topic plane geometry are inappropriate learning methods, lack of media in classroom learning, low student motivation, and lack of student attention during lessons. In addition, teachers still dominate the mathematics learning process, where teachers still act as the main source and actors in learning. On the other hand, students only passively listen to the teacher's explanation, so they only like robots receiving information without deeper exploration of the information they have already obtained from their surrounding environment.

When delivering the topic of study, teachers do not care about the importance of learning media to help students understand mathematical concepts. The teachers only provide pictures and formulas on the blackboard, so that students tend only to draw and write those formulas on their notebooks. Consequently, students do not understand how those formulas are derived and how to solve problems. In addition, teachers are less interactive with students in the learning process, causing uncommunicative learning and rigidity in following lessons.

If the problems above are not solved immediately, the teaching and learning process will be less effective and ultimately affect the student learning

achievement continuously. To overcome these, the author is interested in studying an application of a learning approach. The realistic mathematics approach is among the learning approaches that can be an alternative to improve students' mathematics learning achievement, mathematical reasoning abilities, and student's interest in learning mathematics. With the realistic mathematics approach, students develop their understanding by exploring and solving problems set in contexts that engage their interests [3].

The realistic Mathematics Approach is a learning approach that emphasizes student activities where learning is human activity, and real context is used in learning. Therefore, learning mathematics using a realistic mathematics approach will bring mathematics closer to student learning activities o that they can examine problems relevant to real phenomena in everyday life.

This realistic mathematical approach follows the concrete operational stage of students' thinking because the teachers present the learning material close to students' daily lives. In other words, the teacher can present real objects according to the student's experience. Therefore, contextual problems experienced by students can be used as a starting point for learning mathematics to help students understand mathematics better. Particularly, this approach is appropriate to be applied in elementary schools and effectively assists students in understanding abstract concepts in mathematics [4].

Furthermore, in the realistic mathematics approach, problems are always presented step by step, beginning from the concrete one, then the semi-concrete one, and finally the abstract problems to solve. Besides using concrete objects, problems can also be given in the form of phenomena that students can identify in their daily lives. By recognizing the problem, it will be easier to understand the information and the goals provided in the problems and the goal of the problems [5].

According to Gravemeijer, Realistic Mathematics Education (RME) is originated from Freudenthal's view that mathematics is a human activity. If implemented, the basic philosophy of RME brings about a fundamental change in the process of teaching-learning mathematics in the classroom. The teachers in teaching and learning activities should no longer directly provide information to the students. Still, they should provide a series of problems and activities that the students can use to build their understanding of mathematical concepts leading to the formation of formal mathematical knowledge. Using this approach, students will learn mathematical concepts based on reality or the environment around them. It certainly can emphasize a student's process skills (of doing mathematics), discussion and collaboration, arguing, and communication with classmates. The application of Realistic Mathematics Education (RME) learning consists of 4 stages: understanding the contextual problem, solving problems, comparing and discussing answers, and concluding [6].

Based on the results of preliminary observations conducted on grade 5th students at SD Inpres Japing, there are some factors causing students not to understand the learning material on plane geometry. These causes include inappropriate learning methods, insufficiency of learning media application, low student motivation, and student lack of attention during the learning process. Therefore, this study aims to improve mathematics learning achievement on the topic of plane geometry through a realistic mathematics approach of the 5th-grade students of SD Inpres Japing, Gowa Regency.

2. RESEARCH METHODS

A type of this research is Classroom Action Research research conducted using the Kemmis and Mc. Taggart to improve learning achievement in mathematics on the properties of flat shapes with a realistic mathematics approach for the 5th grade of SD Inpres Japing, Gowa Regency, which consists of 2 cycles. The research implementation phases consisted of four components: planning, action, observation, and reflection. Furthermore, the four components were linked in a cycle of activity [7]. The subjects of this study were all students of class 5th SD Inpres Japing academic year 2015/2016, which amounted to 31 students, consisting of 13 male students and 18 female students. The instrument of this study used a test. The research data were obtained from observation and learning test results. Observation is used to observe the symptoms that appear in the learning process about the seriousness of students when participating in learning, the frequency of students asking questions, the willingness, and the ability of students to respond to classmates' questions. The success indicator to be achieved is that students are said to be complete in learning if they get a score of 73 (Minimum Completeness Criteria), while classical completeness is said to be achieved if all students in the class complete learning as much as 75%. The data from the research on the material of flat shapes were analyzed descriptively quantitatively.

This study is classroom action research conducted using the Kemmis and Mc. Taggart model to improve learning achievement in mathematics on the topic of plane geometry through a realistic mathematics approach of the 5th-grade students of SD Inpres Japing, Gowa Regency. This research was conducted in 2 cycles. The phases of implementation of each cycle consisted of four stages, namely planning, action, observation, and reflection. Furthermore, the four components were linked in a cycle by activity.

The subjects of this study were all students of grade 5th of SD Inpres Japing, consisting of 13 male students and 18 female students or 31 students in total. The data in this study were obtained through observation written tests. The observation was used to examine the indicators in the learning process about student eagerness to participate, the frequency of students asking questions, the ability of students to respond to their classmates' questions.

The data were analyzed with descriptive statistical analysis. The success indicators in this study are that students are said to be complete in learning if they get a score of at least 73 (Minimum Completeness Criteria), and classical completeness is said to be achieved if 75% of all students reach the Minimum Completeness Criteria score.

3. RESULTS AND DISCUSSION

3.1 Results

The observation result of the learning process in each cycle can be seen in the following table.

Table 1. Observation results of each cycle

Cycle I	Cycle II
Some students were not disciplined in the learning process. They did some activities which were not related to the topic they were learning, such as talking to each other during the lesson.	Students were enthusiastic about discussing in the group and solving the problems presented in the student worksheet.
Some students were not confident in presenting their discussion results in front of their classmates.	The presentation was more interesting due to the interaction through asking and answering questions among groups.
Students were still not interested in understanding the contextual problems since the teacher demonstrated the media in front of the class.	Students were more interested in understanding given contextual problems by using learning tools and working together in a team with awards.
Conclusion: Overall implementation of the Realistic Mathematics Approach in cycle II is better than in cycle I.	

Table 2. Frequency distribution of students learning outcomes before giving the treatment

Scores	Frequency
21-30	1
31-40	0
41-50	3
51-60	5
61-70	12
71-80	7
81-90	3
91-100	0

Table 3. Frequency distribution of students learning outcomes after cycle 1

Scores	Frequency
21-30	0
31-40	9
41-50	1
51-60	1
61-70	0
71-80	12
81-90	5
91-100	2

Table 4. Frequency distribution of students learning outcomes after cycle 2

Scores	Frequency
21-30	0

31-40	1
41-50	1
51-60	2
61-70	0
71-80	16
81-90	2
91-100	9

Table 5. Percentage of learning completion of Students

Learning Completion	Pre-Action	Cycle I	Cycle II
Complete	32,25 %	64,52 %	87,10 %
Incomplete	67,75 %	35,48 %	12,90 %

3.2 Discussion

3.2.1. Pre-action

From the analysis of students' learning outcomes before the implementation of the treatment, it is found that the lowest score was 23, the highest score was 88, the average score was 88, and the percentage of learning completion was 32,25%. Therefore, there was still a need to improve the learning process.

3.2.2. Cycle I

From the analysis of students' learning outcomes after the implementation of learning cycle I, it is known that the lowest score was 33, the highest score was 100, the average score was 66,88, and the percentage of learning completion was 64,52%.

By this result, we can see an increase in the student's learning outcomes after the implementation of learning process cycle 1. However, some students had not reached the Minimum Completeness Criteria score, so improvements in the learning process were still needed to be continued in cycle II.

3.2.3. Cycle II

From the analysis of students' learning outcomes after the implementation of learning cycle I, it is known that the lowest was 33, the highest score was 100, the average score was 80,22, and the percentage of learning completion was 87,10%.

By this result, it can be seen that there was an increase of 13,33% from the acquisition of learning outcomes after the implementation of the learning process cycle 1. In the improvements of the learning process, realistic mathematical approaches were given combined with group work methods and awards. However, there were still 4 students who got scores below the Minimum Completeness Criteria score since their ability in understanding the mathematics concept was really low.

4. CONCLUSION

Based on the research results and discussion, it can be concluded that applying a realistic mathematical approach in learning mathematics on the topic of flat shapes can improve the learning outcomes of the 5th-grade students of SD Inpres Japing Pattallassang District, Gowa Regency. This is evidenced by the increase in learning outcomes from pre-action, cycle I, and cycle II.

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