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Improving Mathematics Learning Outcomes of Third-Grade Students on the Material of Calculating the Perimeter and Area of Flat Buildings through the STAD Type Cooperative Learning Model

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Abstract

The background of this study is based on the results of observations of third grade students of SDN Kuningan Barat 03 Pagi who have low learning outcomes or have not reached the KKM in Mathematics material on calculating the perimeter and area of flat shapes (square and rectangle). The purpose of this study was to improve learning outcomes in Mathematics lessons for third grade students on the perimeter and area of flat shapes at SDN Kuningan Barat 03 Pagi. This research uses a class action research method with a cycle system consisting of planning, implementation, observation, and reflection. The subjects used in this study were third grade students totaling 24 students consisting of 12 boys and 12 girls with different ability backgrounds. The results obtained in the pre-cycle with 45.83% completeness and in cycle I 66.67% while in cycle 2 there was an increase in learning outcomes, namely with 91.67% completeness. The conclusion of this study is that learning by using the STAD type cooperative learning model can improve the learning outcomes of third grade Mathematics students on the material of calculating the perimeter and area of flat shapes at SDN Kuningan Barat 03 Pagi.

Keywords: Improved student learning outcomes, STAD type cooperative learning model, perimeter and area of square and rectangle.

Introduction

Mathematics subject about calculating the perimeter and area of square and rectangle has been given in elementary school. The learning activities carried out have a goal, namely learning outcomes. Learning outcomes are the abilities that children have after receiving their

learning experience (Rosfiani et al., 2018; Rosfiani et al., 2019). Student learning outcomes about the material to calculate the perimeter and area of flat shapes in grade III elementary school are still low (Aam, Mallo, & Hadjar, 2015). Learning outcomes are one of the problems that need attention in the world of education because of the low results obtained by students, especially in Mathematics.

The learning outcomes obtained by students are still low so that teachers must improve the learning process and the learning model used must be appropriate to the material presented, the learning process is still teacher-centered so that students are less involved in learning, lack of active role of students in learning, so that many students do not understand the material to calculate the perimeter and area of squares and rectangles properly and the learning media used by teachers is not adequate.

To overcome this, the teacher must find the right method or way to make students love Mathematics lessons so that Mathematics lessons are not considered difficult and boring by students. To achieve learning objectives, it is necessary to develop a strategy so that the learning objectives are achieved optimally. Without a suitable strategy it is impossible for the goal to be achieved (Abdullah, 2008). Therefore, in this case the teacher uses cardboard and origami paper media to help facilitate the learning process so that students can understand and understand the material being taught.

Based on this, the purpose of this study is to improve the learning outcomes of third grade students in Mathematics lessons on the material of calculating the perimeter and area of squares and rectangles using the STAD type cooperative learning model for third grade students at Kuningan Barat 03 Pagi Elementary School.

Literature Review

A. Classroom Action Research (PTK)

1. Definition of Classroom Action Research

Mills (2000) in Wardani, (2016: 14) defines classroom action research as a "systematic inquiry" conducted by teachers, principals, or school counselors to gather information about their various practices. This information is used to improve perceptions and develop reflective practices that have a positive impact on various school practices including improving student learning outcomes.

Ebbut 1985 in Hopkins 1993 in Kunandar (2016) states that action research is a systematic study of efforts to improve the implementation of educational practices by a group of teachers by taking actions in learning, based on their reflection on the results of these actions.

According to Wardani, et al. (2005:8) the benefits of PTK for teachers include:

1. Helps teachers improve learning.
2. Helps teachers develop professionally.
3. Increase teacher confidence.
4. Allows teachers to actively develop knowledge and skills.

2. Link between PTK and PKP

The competencies that students are expected to master after participating in PKP (improving the quality of learning) are the ability to improve and improve the quality of learning in the field of study or thematic learning taught in elementary schools by applying the principles of classroom action research (PTK) more broadly. To achieve this ability, students study various concepts related to improving or increasing the quality of learning and PTK as well as signs of planning, implementing, and reporting improvements and / or improving the quality of learning.

B. Learning Outcomes

Ernest R. Hilgard in Sri Anita. W, et al (2014: 2.9) state that learning is a process of changing behavior through practice. The change is caused by the support of a positive environment that causes educational interaction.

Assessment concerns the level of achievement of certain competencies by students, so there are a number of steps in the assessment (evaluation) of learning outcomes as stated in Sudijono (2009: 59), namely:

1. Develop a learning outcome evaluation plan.
2. Collecting data.
3. Perform data verification.
4. Organize and collect data.
5. Provide interpretation and draw conclusions.
6. Follow-up evaluation.Tindak lanjut evaluasi.

C. The Nature of Mathematics Learning in Elementary School

1. Learning Mathematics in Elementary School and Its Scope

Russefendi (in Heruman, 2012: 1) states that mathematics is a symbol language, a deductive science that rejects inductive proof, a science of organized patterns of order and structure. And in the process of learning Mathematics, Bruner (1982 in Gatot Muhsetyo, et al 2016: 2.9) states the importance of emphasizing the ability of students to think intuitively and analytically will educate students to make predictions and be skilled in finding patterns and relationships (relations).

The Scope of Mathematics Learning in Elementary School includes aspects of numbers, geometry and measurement, and data processing (relations).

2. Learning Objectives of Mathematics in Elementary School

The general purpose of learning mathematics in elementary schools is for students to be able and skilled in using mathematics. In addition, learning mathematics can emphasize reasoning in the application of mathematics. And the specific purpose of learning Mathematics

in elementary school is to equip students with the ability to think logically, anallitis, systematically, critically, and creatively, as well as the ability to work together.

3. Square and Rectangle Perimeter and Area Materials

a. Perimeter and Area of a Square

1) Perimeter of a square

The perimeter of a square can be determined by calculating the sum of the lengths of its four sides. Take a look at the following picture!

The perimeter of square ABCD is equal to the sum of the lengths of its four sides. Remember, a square has equal sides. Suppose, the side length of square ABCD is S, then its perimeter can be determined in the following way:

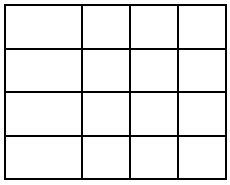
Perimeter of square ABCD = AB + BC + CD + AD
= S + S + S + S
= 4 x s

So, the perimeter of a square can be written as follows.

K = 4 x s

2) Square Area

The area of a square is the size of the area bounded by its four sides. Take a look at the picture below! The area of a square can be expressed as the number of unit squares that make it up. So, the area of the square is 16 unit squares.



Now, look at the sides of the square. The length of the vertical and horizontal sides of the square is 4 unit squares each. If we multiply the lengths of the vertical and horizontal sides, we get 4 x 4 = 16 unit squares. So, the area of the square can be written as follows.

L = S x S

b. Perimeter and Area of a Rectangle

1) Perimeter of a Rectangle

The perimeter of a rectangle can be determined by adding the lengths of its four sides. Take a look at the following Rectangle! Remember in a Rectangle, the opposite sides are equal in length.

Suppose, the lengths of sides PQ and RS are p and the lengths of sides QR and PS are l. The perimeter of a rectangle can be determined in the following way.

Perimeter of a Rectangle = PQ + QR + RS + PS
= *p* + l + *p* + l

$$= (2 \times p) + (2 \times l)$$

So, the perimeter of a rectangle can be written as follows:

K = 2 x (p + l)

to determine the length and width of a rectangle if the kelilling is known is as follows:

Mencari panjang persegi panjang:

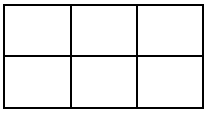
$p = \frac{K}{2} - l$

mencari lebar persegi panjang:

$l = \frac{K}{2} - p$

2) Rectangle Area

Look at Rectangle ABCD on the side!



AB = DC (long side)

AD = DC (short side)

The number of unit squares is 6, so the area of rectangle ABCD is 6, unit squares. If you notice, the rectangle has a length of 3 units and a width of 2 units. If the length and width are multiplied, the result is 6 unit squares.

So, Area of rectangle ABCD = length x width

= 3 units x 2 units

= 6 square units

Rectangle Area = length x width

D. Characteristics of Primary School Students

Sardiman (2011: 120) states that there are 3 kinds of characteristics or conditions that exist in students that teachers need to pay attention to, namely:

1. Characteristics or circumstances relating to students' initial abilities. For example, intellectual ability, thinking ability, and others.
2. Characteristics or circumstances of students with regard to background and social status.
3. Characteristics or circumstances of students with regard to personality differences such as attitudes, feelings, interests, and others.

According to Piaget in Isjoni (2010: 36) children's cognitive development goes through four stages, namely:

1. The sensorimotor stage lasts from 0-2 years old
2. Preoperational stage is age 2-7 years

3. The concrete operational stage is 7-11 years old
4. Formal operational stage which takes place from the age of 11 years and above.

The characteristics of each student are different, so teachers need to understand the character of each student. This is done to help teachers in carrying out the learning process in the classroom and students also feel that they really get good attention from the teacher. Also to avoid discrimination against students so that they feel comfortable and not inferior in learning.

E. Cooperative Learning Model STAD Type

1. Definition of Cooperative Learning Model

Suprijono, Agus (2010:54) "cooperative learning model is a broader concept covering all types of group work including teacher-led or teacher-directed forms". Cooperative learning is empirically able to improve students' cooperation while increasing students' academic content (Rosfiani et al., 2024), cooperative learning can also be adopted to improve students' 21st-century skills, however, differences in students' characteristics, backgrounds, and learning readiness need to be taken into consideration (Rosfiani et al., 2023). The findings of this study suggest that teachers consider using the cooperative learning model for less challenging subjects for students (Busahdiar et al., 2022). Cooperative learning has also been proven to be able to improve pedagogical content knowledge and verbal communication skills (Sudin et al., 2020), encouraging students' involvement in learning, training students' higher-order thinking skills, and promoting behavior collaboration to complete the task (Rosfiani el al., 2020).

Slavin isjoni, (2011:15) "in cooperative learning methods, students work together in four member teams to master material initially presented by the teacher". This means that cooperative learning is a learning model where the system learns and works in small groups of 4-6 people collaboratively so that it can stimulate students to be more passionate about learning.

The cooperative learning model was developed to achieve at least three learning objectives, namely:

1. Academic achievement
2. Tolerance and acceptance of diversity
3. Development of social skills (Richard I. Arends, 2013: 5)

This model is a learning model that is formed in groups of 2-5 people. Learning is not teacher-centered but students are required to be active during the learning process. It also teaches students to work together with their group.

2. Definition of Student Teams Achievement Distributions (STAD)

STAD learning is one of the simplest and easiest types of cooperative learning. STAD learning is done by creating learning teams of 4 students.

Steps of the STAD Learning Model:

1. Prepare the materials to be taught and the discussion worksheets.
2. Formation of study groups and learning process.

3. Carrying out the learning process with the group
4. Giving quizzes to each student.

3. Learning Planning

In the planning stage, a teacher as well as a researcher must do important points in learning, such as preparing lesson plans, preparing media, and contacting colleagues who will be appointed as supervisors 2, determining the learning model to be used, mastering teaching materials, and understanding student characteristics.

Research Method

This study uses a class action research design with a cycle system consisting of planning, action, observation, and reflection.

The planning stage of the teacher must determine the learning model that will be used in planning the implementation of learning, namely preparing lesson plans, preparing media, and contacting peers who will be appointed as supervisor 2, namely Mrs. Zun Nuroniah, S.Pd.

The action stage in improving Mathematics learning consists of three activities, namely initial activities, core activities, and closing activities. The core activities consist of 6 phases. Where these phases are important steps in the implementation of learning so that learning activities run well.

For observation, (Sudin et al., 2020) said that observers record teacher teaching actions and student learning behavior. This observation is a classroom observation technique in which the researcher is also a teacher, or as a participant in a project. This method is the most widely used for research. So, this researcher asked supervisor 2, namely Mrs. Zun Nuroniah, to obtain information on the suitability of learning with implementation and researchers can measure the ability of student learning outcomes in the form of giving group assignments through this observation sheet which contains aspects that will be assessed during the learning process carried out by the teacher.

At this stage of reflection, both researchers and supervisors jointly discuss the strengths and weaknesses in the implementation of cycle II. In cycle II, the teacher has implemented mastery learning. Based on cycle II, it was obtained that the students' learning outcomes had met the school's KKM standards by more than 80%. Then this class action research is said to have been completed or successful and the cycle is dismissed.

The subjects used in this study were third grade students of SDN Kuningan Barat 03 Pagi, totaling 24 students consisting of 12 male students and 12 female students with different ability backgrounds.

This research was conducted for 3 months, from February to April. This research consists of pre-cycle, cycle 1, and cycle 2. Pre-cycle was carried out on March 12, 2018, cycle

1 was carried out on March 19, 2018 where in this cycle students' learning outcomes had not yet reached the KKM, and cycle 2 was carried out on March 26, 2018 which showed that 80% of students' Mathematics learning outcomes had reached the KKM.

How to find the average student learning outcomes:

$$\textbf{Average value} = \frac{sum\ of\ all\ students'\ scores}{total\ number\ of\ students}$$

How to determine the completeness of student learning outcomes

The formula used to find the completeness of student learning outcomes is as follows:

$$\mathbf{P} = \frac{\sum students\ who\ completed\ learning}{\sum student}\ x\ 100\%$$

Data analysis in this research includes:

1. Qualitative Data

   Qualitative data is information data in the form of verbal sentences not in the form of numerical symbols or numbers. Qualitative data is used by researchers to collect and obtain information and its acquisition cannot be obtained directly.

2. Quantitative Data

   Quantitative data is information data in the form of numerical symbols or numbers. Data collection is obtained by collecting student data, clarity of elements, and results accompanied by graphs, tables, and data charts in the form of values.

Results and Discussion

A. Pre-cycle

From the results of the learning evaluation carried out in the pre-cycle, the following values were obtained:

Students who obtained the KKM score were 10 students with a percentage of completeness of 41.67% while students who scored below the KKM were 14 students with a percentage of completeness of 58.33%. From the results obtained in the pre-cycle, it shows that learning improvements need to be made by the teacher and continued in cycle I.

B. Cycle I

From the results of the learning evaluation conducted in cycle I, the following student scores were obtained:

Students who have reached the KKM are 16 students with an average score of 68.04 and a percentage of completeness of 66.67% while students who have not reached the KKM are 8 students with a percentage of completeness of 33.33%. Based on the percentage of

completeness in cycle I, it can be concluded that the research still has to be continued to cycle II because the percentage of completeness set is 80%.

C. Cycle 2

From the results of the learning evaluation carried out in cycle II, the following student scores were obtained:

Students who have reached the KKM score are 20 students with an average score of 79.79 and a percentage of completeness of 91.67% while students who have not reached the KKM are 4 students with a percentage of completeness of 8.33%. Based on the completeness criteria, the learning outcomes obtained in cycle II have reached the KKM, which is more than 80%. Therefore the research has been successful and must be stopped.

Conclusion

Based on the results of research that has been conducted by researchers in pre-cycle, cycle I, and cycle II activities, it can be concluded that the learning outcomes in the pre-cycle average value of students is 63.75 with a percentage of completeness reaching 45.83% has reached KKM and 58.33% has not reached KKM. Whereas in cycle 1, the average value of 68.04 was obtained with a presentation of completeness reaching 66.67% having reached KKM and 33.33% had not reached KKM and in cycle II, the average value of students was 79.79% with a percentage of completeness reaching 91.67% or 20 students had completed and 8.33% had not reached KKM.

Using the STAD-type cooperative learning model in learning Mathematics can improve student learning outcomes, especially in the material of the perimeter and area of squares and rectangles. This can be seen from the comparison of the results of student learning completeness in the pre-cycle, cycle I, and cycle II. Thus this research was stopped in cycle II because the percentage of completeness reached 91.67% and exceeded the minimum completeness of 80%. These results further support the idea of Hermawan et al. (2020) that the use of STAD can significantly improve students' learning outcomes in mathematics. STAD-type cooperative learning in collaboration with the use of audio-visual learning media is proven to be able to improve student learning outcomes, improve student understanding, and be able to increase student motivation to discuss in small groups, allow students to understand a concept through visualization quickly (Rohmah et al., 2022).

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