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Problem-Solving Approaches in Improving Students 'Mathematics Achievement in Elementary School

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ABSTRACT
This study aimed to improve student achievement in the multiplication and division materials through the problem-solving approach. This type is classroom action research, consisting of two cycles, each cycle consisting of two meetings. The procedures of this research include planning, implementing actions, observing and evaluating, and reflecting. Data collection techniques used observation sheets and evaluation of cycle tests. Data analysis techniques used descriptive analysis to calculate the percentage of teacher activity, student activity, and student achievement during the learning process. Data processing results illustrate the percentage of teacher teaching during the two cycles increased, namely the first meeting of the first cycle of 65.38% and the second meeting of 69.23%. The first meeting in the second cycle 78.84% increased to 92.30% at the second meeting. The percentage of student learning activities during the two cycles increased, namely the first meeting of cycle 1 67.85% and the second meeting amounted to 74.99%, while in the second cycle the first meeting amounted to 87.49% increased to 93.74% at the second meeting. Student achievement can be improved through the application of a problem-solving approach. This can be seen from the results of the first cycle test, the percentage of classical completeness of 60% with a mean of 59, an increase in the completeness of learning cycle 2 of 90% with a mean of 86.95.

Keywords: *problem-solving, student achievement, multiplication, division*

1. INTRODUCTION

Many people watch mathematics as the most difficult field of study, both primary and middle-class education. This can be seen from the low. Mathematics learning achievements obtained by students. One of the reasons for the very low learning outcomes of mathematics is the existence of abstract concepts that are not understood students. Mathematics is a science that deals with abstract ideas/concepts composed of hierarchical and deductive reasoning [1]. Ruseffendi says many students who learn the simple part of mathematics do not understand, many understand completely wrong. Often the concepts released in schools are still new to them [2].

The requirements above say mathematics is quite difficult. Therefore, learning needs to be adjusted to the cognitive development of children and needs to concretize abstract mathematical objects in order to be easily understood. Dienes states every concept or concept in mathematics that is presented in a concrete form will be well understood. Objects or objects in the form of games will be very suitable if used by using in mathematics [2]. Because in terms of psychological aspects, development can be done when children are still relying on primary education is the best time to instill healthy foundations, therefore education carried out at the level of basic education must be truly solid. In learning mathematics, a teacher must pay attention to students' cognitive development and can choose methods that are appropriate to the child's cognitive development. The method of organizing and presenting certain mathematics must be in accordance with student development, so students can learn mathematics effectively and efficiently [3]. Furthermore, students in elementary schools think that there are still concrete operations, so teachers are required to be able to provide learning experiences that are more contextual and useful.

The general objectives of mathematics education in elementary schools are students in structure of students' reasoning, and skills to apply mathematics, while one of the specific objectives is to grow and develop numeracy skills as a tool in student life. But in the end, the results of learning mathematics in elementary school are still low, specifically which presents the number counting operations. This is due to teacher

learning that is not approved by problems that occur and are still carried out by conventional, discussed in the teaching of teachers who are less supportive of students who mostly manipulate concrete objects, the teaching-learning process is more on the book package, teachers teach only use the lecture method only [4]. Teacher-oriented mathematics learning causes students to be passive in learning and who are better at solving problems. This is due to the lack of teacher knowledge about learning models that can increase students' creativity in thinking [5].

The researcher's experience revealed that the students still faced difficulties in completing the story discussing the number counting operations, the difficulty was seen from the problem that the students made at each step in solving the story problem. These difficulties are seen in: (1) discussing the meaning of the questions, students do not understand the questions that are recognized and asked in the questions, students are incomplete in understanding things that are understood and asked questions, students do not know the meaning, and the benefits that are questioned and asked in the problem, there is an assumption that the teacher does not provide a complete explanation about it, (2) making a mathematical sentence, students' mistakes in making mathematical models for story problems because students do not understand the understanding of mathematical models, there is a mathematical assumption for students, (3) doing calculations, errors in completing calculations, causing students to lack understanding of the concept of arithmetic operations. For example, negative integers are used in everyday life so students make mistakes in determining the outcome of a number operation , (4) students cannot access the answer model for the original question, while students cannot ask questions about the problem is the answer according to the question.

To overcome the problems above, one solution is to solve the problem. Problem-solving learning is one of the policies or conceptual teaching guides for training students to solve mathematical problems, using various strategies and problem-solving steps and can improve mathematics student achievement of principal material addition and reduction of fractions [6-7]. Apply problem-based learning (PBL) to improve mathematical problem solving and mathematical communication skills [8-9]. Other assistance that applies the guided discovery learning model to improve student achievement and problem-solving skills [10-11]. Problem-based learning that can improve student ‘mathematics achievement in elementary school.

2. RESEARCH METHODS

This type is classroom action research. This research is a form of study that acts as a reflection by the perpetrators of the actions in the implementation procedure which is carried out with an assessment process consisting of four people: doing, doing, testing, evaluating, and reflecting.

The data obtained in the form of qualitative and quantitative data. To obtain data on students' mathematics achievement in one cycle is to conduct tests on the material that has been approved. While the data of student and teacher activities are obtained from observations. Qualitative data is the result of observation of teacher activities with students in learning while quantitative data is a test of student learning outcomes in each cycle of learning action. Data that have been collected are then implemented using descriptive statistics by calculating the average asking grade for students in each cycle.

The learning indicators in this study are: (1) The agreed learning process about the success of teacher teaching and the percentage of successful learning activities of students achieving $\geqslant$ 80% of learning is carried out following the learning plan, (2) completeness of student learning can be minimized if at least 70% of students get grades $\geqslant$ 65 according to the minimum criteria determined by the school.

3. RESULTS AND DISCUSSIONS

3.1 Cycle 1

This research was conducted in the process of learning in class in class IV SD 09 Kendari students on multiplication and number division material. Material multiplication and division of numbers in general students do not understand very well, so it is necessary to apply a problem-solving approach in teaching the operation of multiplication and division of numbers.

The teacher writes the material and the objectives to be achieved in learning on the board. The teacher explains the activities carried out in learning that is learning by using a problem-solving approach. Before entering the core activities, the teacher divides students into four groups, each group consisting of five people. The teacher distributes a worksheet that contains a number multiplication story to each group for discussion with group friends.

The teacher gives a problem by writing the example on the blackboard for example Aldi has 2 packages containing bread. Each package contains 12 breads. How much bread does Aldi have? With the guidance of the teacher, students are guided to complete the story problem according to the problem-solving steps on the board as follows:

1. Understand the problem

Known:

- Aldi has 2 packages containing bread

- Each package contains 12 pieces of bread

Asked: How much bread is Aldi entitled?

Students make a completion plan and make a mathematical model.

2. Make a solution plan

For example:

a = 2 packs of bread
b = each packet contains 12 breads

Then to count the many pieces of bread is:

multiplication 2 packs of bread with each pack of bread (12 pieces). The mathematical model is:

c = a x b

The teacher asks students to discuss in their respective groups to find the results of calculations according to the plan that has been made. Student learning in carrying out learning activities and guiding students who discuss difficulties in learning. After conducting a discussion, students with the guidance of the teacher report the results of their calculations on the board.

3. Calculation

Calculation results:

c = a x b
c = 2 x 12
c = 24

So, the amount of bread Aldi has = 24 packs of bread.

The teacher asks students to re-read matters relating to calculations. After making sure the students' answers are correct, then the teacher tells students to complete examples of other problems contained in the worksheet at the end of the activity, the teacher answers the students back to each group and gives grades. Furthermore, students with teacher guidance receive subject matter. The teacher asks students to practice a lot at home to solve story problems related to the multiplication of integers.

The results of teacher teaching observations using problem-solving questions in the first cycle of learning the first meeting amounted to 65,38% while the second meeting amounted to 69,23%. The percentage of student activity during the learning process at the first meeting was 67,85%, while at the second meeting 74,99%. The first cycle test is carried out at the end of learning at the second meeting. This activity is carried out to see how far students understand the material that has been learned through problem-solving. Based on the test results showed that students who are in the range of grades 0-64 as many as 8 people from 20 students or 40% while students who are in the range of grades 65-100 as many as 12 people or by 60%. With an average value of 59. This shows that students understand the material that has been verified is still relatively low because it does not meet the minimum completeness standard set by the school that is 65.

The researcher and the observer discuss the weaknesses that exist in the implementation of the Cycle 1 action which will be corrected in Cycle II. In Cycle 1 action, the application of problem-solving learning in mathematics learning has not been maximally implemented. Most students do not pay attention to the teacher's explanation and there are still many students who do not actively work together in doing the tasks on the worksheets in the group. Students do not dare to ask the teacher because they have concerns if the questions are not understood by the teacher so they choose to save their own problems [12]. This will be the teacher's attention when carrying out Cycle 2 actions. the teacher must be involved in raising students so they are brave enough to express what they don't understand. Based on the deficiencies that exist in the implementation of the action and the results of the first cycle test that does not meet the indicators in this study, the research is conducted on the Cycle 2 action.

3.2 Cycle 2

Learning cycle 2 about the distribution of material two-digit numbers. The teacher starts learning by giving perception to students who are asked to return to students about the previous material, which is a doubling of numbers. Then in the core activity, the teacher approves the problem by giving examples of how to count number 2 when writing examples on the blackboard 30: 6 = ...? By using problem-solving, students can make a number 30: 6 = 5. After building student understanding, the teacher invites students to solve problems on a worksheet. The teacher asks students to discuss and work together in groups to answer the questions asked. The teacher appoints groups I and II to discuss the results of changes in group work. Group I answer question number 1, group II answers question number 2, and so on, but does not answer their question. The teacher guides the class discussion and connects students to align the wrong answers based on the results of the discussion. The students are enthusiastic enough to pay attention to the teacher and respond well to working on story problems. The teacher motivates students to actively discuss and work together in groups.

Students look compact with their group mates. A sense of togetherness and responsibility has been given in the spirit of doing the task, not all students' answers are correct. Activities carried out by students. After the work activities are completed in accordance with the specified time, the teacher appoints representatives of each group to present the results of their group work in turn. The teacher guides the class discussion. Other groups produce the work of the presenter groups, and members of the

presenter group also dare to give an explanation of their group's imperfect work. The teacher continues talking during the discussion and directs students to correct the wrong answers based on the results of the discussion. Then the teacher asks students to draw conclusions from the material they have learned. The teacher calculates learning by giving a cycle 2 test.

In general, the results of observations of teacher activities in the implementation of the second cycle are getting better than the first cycle. This can be seen from the results of observations of the comparison of teacher activities at the first meeting of 78,84% while the second meeting of 92,30%. The percentage of student activity at the first meeting was 87,49% while at the second meeting was 93,74%. Figure 1 below shows the graph Improved student learning outcomes from cycle 1 to cycle 2.

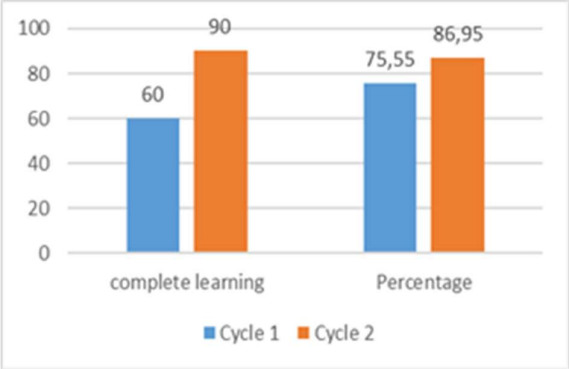

Figure 1. Improved students 'mathematics achievement

The results of the evaluation conducted in the two learning cycles increased, both increased student learning outcomes and the increased average value obtained by students in the two learning cycles. The percentage of students' mathematical achievements in cycle 1 by 60% increased to 90% in cycle 2 (an increase of 30%) with a mean of 75.55 increasing to 86.95 in cycle II with an increase of 9, so this study returns to two cycles because the indicators are predetermined agreed.

Improved student achievement is caused by students who fix the weaknesses they encounter when learning. Students are able to solve problems given by the teacher in accordance with problem-solving. In addition, having the ability to learn has a low ability. They do not ask questions and communicate about what is asked about the problem given by the teacher. Communication is the most important thing in solving problems, sharing ideas, and ensuring the expected results for others [13]. The problem given by the teacher in the worksheet helps students to practice solving the added problem [14]. With the worksheet, students increasingly understand and increasingly solve problems.

4. CONCLUSIONS

Based on the analysis and discussion, it can be concluded that: (1) the percentage of teacher teaching activities during the two improvement cycles, namely the first meeting of the first cycle was 65,38% and the second meeting was 69,23%, whereas at the first meeting of cycle 2 by 78.84% it increased to 92.30% at the second meeting, (2) the percentage of students learning mathematics during the two cycles increased, namely the first meeting of the first cycle 67.85% and the second meeting amounted to 74.99%, while the first meeting of cycle 2 amounted to 87.49% increased to 93.74% at the meeting second, (3) mathematics achievement can be improved through the application of problem-solving. It can be seen that the success means of a cycle I am 60% with a mean of 75.55, increasing to 90% (cycle 2) with a mean of 86.95.

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