APPLICATION OF *PROBLEM-BASED LEARNING MODEL* ON MULTIPLICATION AND DIVISION MATERIAL TO IMPROVE STUDENT LEARNING OUTCOMES IN GRADE III SD NEGERI 4 BANDA ACEH

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Abstract

In SD Negeri 4 Kota Banda Aceh, a significant issue has been identified: students' low performance in mathematics, specifically in multiplication and division. To address this, the Problem Based Learning (PBL) model was implemented, creating an engaging learning environment. This study utilized Classroom Action Research (PTK) with 23 Grade III-B students from SD Negeri 4 Banda Aceh City as participants. Data were collected through observation, documentation, and learning outcome assessments. Analysis involved descriptive statistics and individual student performance data. The findings from three cycles of research revealed notable improvements: (1) Student engagement increased progressively, with activity ratings rising from 82% to 98% in the "good" to "very good" categories. (2) Learning outcomes in multiplication and division also improved significantly, with classical completeness criteria increasing from 34% to 91%, and average scores improving from 57.39 to 84.34. In conclusion, the application of the Problem Based Learning model effectively enhanced the mathematics learning outcomes of Grade III-B students at SD Negeri 4 Banda Aceh City.

Keywords: Learning Outcomes, Problem Based Learning *Models,* Multiplication and Division.

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A. Introduction

Education is one of the main pillars of a country, where the quality of a country can be seen from the quality of education. Considering how important an education is. Because education can support the progress of the country. In addition, education plays an important role in shaping individuals, namely individuals with character, insight, and professionals.

In the teaching and learning process, teachers try to convey information to students. But conveying information to students is not easy. Because it is influenced by various things, such as media, models, approaches, learning strategies used by teachers in the learning process.

The success of a learning process begins with careful planning. The planning includes determining strategies, models, sources and learning media. If the teacher can arrange it well, it can be said that success in learning has been half fulfilled, the next success is the teacher's ability to present the teaching material

As educators, teachers need to choose the right model to convey a concept to students. One of them is by choosing the *Problem Based Learning* (PBL) learning model. The *Problem Based Learning* model is a learning model that is centered on students by confronting students with various problems faced in their lives. The *Problem Based Learning* model is a way of presenting learning materials by making problems as a starting point for finding solutions or answers by students (Nata, 2009: 243).

Mathematics as one of the sciences of education has developed a lot today. According to Supriyanto (2014: 36) "Mathematics functions to develop the ability to calculate, measure, find and use mathematical formulas that can support the understanding of students' concepts in everyday life". Learning mathematics is not enough to know concepts, but can use these concepts to solve problems, both problems related to mathematics and problems encountered in everyday life.

Mathematics for most students is considered a difficult subject to understand, especially on flat material, because so far teachers lack in providing meaningful learning concepts to students. Teachers more often explain the concepts of multiplication and division by the lecture method. So that it makes students forget faster in remembering the concepts of multiplication and division. This is one of the causes that mathematics learning outcomes are still not satisfactory.

Based on initial observations with grade III B teachers conducted at SDN 4 Banda Aceh. Researchers collected some information, namely the problem faced in the learning process is that there are still many students who are not focused and lack in understanding the concepts of multiplication and division material.

Based on the background of the problems that have been described, researchers are interested in conducting research entitled "Application of Problem Based Learning Learning Models on Multiplication and Division Material to Improve Student Learning Outcomes in Grade III SD Negeri 4 Banda Aceh".

B. Methods

The type of research used in this study is Classroom Action Research (PTK). The subjects of this study amounted to 23 students of grade III-B SD Negeri 4 Banda Aceh, data collection techniques were carried out by observation, documentation, and learning outcomes tests. Student ability test data was analyzed using the Minimum Completeness Criteria (KKM) reference level used in SD Negeri 4 Banda Aceh.

C. Results and Discussion

1. Research Results

Classroom Action Research (PTK) is conducted in three cycles. Each cycle consists of four stages: planning, implementation, observation, and reflection. This study used the *Problem Based Learning* (PBL) model in 23 students of grade III-B SD Negeri 4 Banda Aceh.

Learning outcomes tests are used to find out student improvement data after applying the PBL model. For the presentation of data in this study, researchers grouped into 4 (four) stages, namely the pre-cycle stage, cycle I, cycle II and cycle III. The following is a description of the results of stage research in each cycle carried out in learning, namely:

a. Pre-Cycle

This pre-cycle activity is an activity carried out before carrying out cycle I, cycle II and cycle III. The activities carried out by researchers are collecting preliminary data through *pre-tests*. Pre-test is given to students in the form of objective questions as many as 5 questions. Based on the results of the pre-test, it is known that there are

several problems behind the low mathematics scores of students, including: not understanding the concepts of multiplication and division, monotonous learning methods, and students consider mathematics a difficult subject.

Number of students present   : 23 students

Complete   : 0 learners

Incomplete   : 23 learners

To find the average grade point and the percentage of classical completeness obtained by students can be calculated by the following formula:

Class Average $= \dfrac{Student\ grade}{Total\ number\ of\ learners}$

$= \dfrac{860}{23}$

$= 37.3$

Percentage of completeness $= \dfrac{Number\ of\ completed\ students}{Total\ number\ of\ learners} \times 100\ \%$

$= \dfrac{0}{25} \times 100\ \%$

$= 0\ \%$

Based on the percentage of student completeness, no students have reached the Minimum Completeness Criteria (KKM) on multiplication and division material in class III-B determined by the school. The results of the data that have been obtained show that there is a need for corrective actions in learning so that student learning outcomes increase.

b. Cycle I

Cycle-I has 4 stages, namely planning, action, observation, and reflection which will be described as follows:

a) Planning Phase

At this stage carry out the following activities:

(1) Compile RPP adjusted to KD and Indicators on multiplication and division material using the PBL model. The RPP designed was then validated by Mrs. Ruhani, S.Pd as a validator.

(2) At this stage, researchers design student worksheets in accordance with the indicators compiled in the RPP in the form of written tests, namely 10

multiplication and division questions, with 5 multiplication questions and 5 division questions.

(3) Prepare and compile validated student activity observation sheets.

b) Action

At this stage researchers carry out the process of learning activities in accordance with the planning stage that has been prepared before. This activity will be held on May 2, 2023 at 08.00 – 12.00 WIB. The implementation of these actions includes preliminary activities, core activities and closing activities.

c) Observation

Observations or observations in this study were made to determine the extent to which the application of the *Problem Based Learning* (PBL) model can be implemented properly. In addition, it is also to find out changes in learning outcomes that occur in class III-B students on multiplication and division material. The observation data that will be presented in this study includes, student observation data and student learning outcome test data with the following results:

(1) Student Activities

To find the percentage of student activity can be calculated as follows:

$$\text{Average} = \frac{Amount\ of\ earnings}{Number\ of\ aspects}$$

$$= \frac{434}{23}$$

$$= 18.86$$

$$P = \frac{f}{n} \times 100$$

$$= \frac{18,86}{23} \times 100$$

$$= 82\ \%$$

Based on observation data made by observers on student activities, the number of scores obtained was 434 and an average of 18.86. Thus, the percentage of average marks is 82%. This means that the level of success of student activities based on observation is included in the good category.

(2) Student Learning Outcomes

To find the average grade point and the percentage of classical completeness obtained by students in the table can be calculated by the following formula:

$$\text{Class Average} = \frac{Student\ grade}{Total\ number\ of\ learners}$$

$$= \frac{1320}{23}$$

$$= 57,39$$

$$\text{Percentage of completeness } = \frac{Number\ of\ completed\ learners}{Total\ number\ of\ learners} \times 100\ \%$$

$$= \frac{8}{35} \times 100\ \%$$

$$= 34\ \%$$

To find out the learning outcomes of students, it is tested with 10 multiple-choice questions. As many as 8 students completed the post-test questions while the remaining 15 students did not complete the learning with the *Problem Based Learning* (PBL) model on multiplication and division material.

The percentage of overall student learning outcomes in cycle I is 34%. Based on this fact, it can be concluded that the *Problem Based Learning* (PBL) model is not active, because the completeness results obtained by students classically are less than the predetermined criteria, which is 80%. In the next stage, it is hoped that students can be better at answering questions so that the percentage of learning achievement can increase.

d) Reflection

The successes that have been achieved in the first cycle are as follows:

1. The activities of students who are already good are answering greetings and showing enthusiasm, listening to teacher explanations, forming study groups, answering teacher questions, working, conducting discussions, collaborating in making discussion reports, conducting group presentations and doing final tests.
2. The learning outcomes of students have been completed as many as 10 of the 25 students present with a percentage of 100%.

c. Cycle II

The results of reflection in cycle I show several obstacles that cause learning to take place less optimally. Therefore, corrective steps will be taken to the learning process that will be carried out in cycle II. The implementation of research to be carried out in cycle II is the same as the previous cycle, which consists of four stages which include, planning, implementing actions, observation and reflection. The following is an explanation of each stage carried out in cycle II.

a) Planning Phase

To improve learning outcomes in cycle II, researchers use the results of reflection as a consideration to determine corrective steps, which researchers do at the planning stage of cycle II are as follows:

1) Improve the Learning Implementation Plan (RPP) in accordance with the results of reflection in cycle I. Overall RPP has not changed much, changes only lie in the steps of learning activities, for the evaluation questions given are almost the same as the evaluation questions in cycle I, it's just that the numbers are different.

2) Prepare instruments to analyze data related to processes and action results. The instruments used include, observation sheets of student activities, and test questions on student learning outcomes.

b) Action

The implementation of cycle II actions on May 9, 2023 at 08.00 – 12.00 WIB. The learning process carried out refers to the lesson plans that have been prepared at the planning stage with improvements in accordance with the results of reflection in cycle II. The implementation of these actions includes preliminary activities, core activities and closing activities.

c) Observation

Observations or observations in this study were made to determine the extent to which the application of the *Problem Based Learning* (PBL) model can be implemented properly. In addition, it is also to find out changes in learning outcomes that occur in class III-B students on multiplication and division material. The observation data that will be presented in this study includes, student observation data and student learning outcome test data with the following results:

(1) Student Activities

To find the percentage of student activity can be calculated as follows:

$$\text{Average} = \frac{Amount\ of\ earnings}{Number\ of\ aspects}$$

$$= \frac{449}{23}$$

$$= 19.52$$

$$P = \frac{f}{n} \times 100$$

$$= \frac{19,52}{23} \times 100$$

= 84 %

Based on observational data made by observers on student activities, the number of scores obtained was 449 and an average of 19.52. Thus, the percentage of average marks is 84%. This means that the level of success of student activities based on observation is included in the good category.

(2) Student Learning Outcomes

To find the average grade point and the percentage of classical completeness obtained by students can be calculated by the following formula:

Class Average $= \dfrac{Student\ grade}{Total\ number\ of\ learners}$

$= \dfrac{1650}{23}$

= 71,73

Percentage of completeness $= \dfrac{Number\ of\ completed\ learners}{Total\ number\ of\ learners}$ x 100 %

$= $ x 100 %$\dfrac{16}{23}$

= 69 %

To find out the learning outcomes of students, tested with 10 multiple-choice questions. A total of 16 students completed the post-test questions while the remaining 7 students did not complete the learning with the *Problem Based Learning* (PBL) model on multiplication and division material. The percentage of overall student learning outcomes in cycle II is 69%. From the results of the second cycle test, it can be seen that the learning outcomes of students have increased by 35% which is complete from cycle I. Thus, cycle II has not reached the expected performance indicators, the percentage of student success increases to 80%. With that, it is necessary to make improvements and improve in the next cycle.

d) Reflection

The successes that have been achieved in cycle II are as follows:

(1) The activities of students who are already good are answering greetings and showing enthusiasm, listening to teacher explanations, listening to learning videos, conducting discussions, collaborating in making discussion reports, conducting group presentations and doing final tests.

(2) The learning outcomes of students have been completed as many as 17 of the 25 students present with a percentage of 100%.

d. Cycle III

The results of reflection in cycle II show several obstacles that cause learning to take place less optimally. Therefore, corrective steps will be taken to the learning process that will be carried out in cycle III. The implementation of research to be carried out in cycle III is the same as the previous cycle, which consists of four stages which include, planning, implementing actions, observation and reflection. The following is an explanation of each stage carried out in cycle III.

a) Planning Phase

To improve learning outcomes in cycle III, researchers use the results of reflection as a consideration to determine corrective steps, which researchers do at the planning stage of cycle III are as follows:

(1) Improve the Learning Implementation Plan (RPP) in accordance with the results of reflection in cycle II. Overall, RPP has not changed much, changes only lie in the steps of learning activities, for the evaluation questions given are almost the same as the evaluation questions in cycle II, it's just that the difficulty level of the questions is at C2.

(2) Prepare instruments to analyze data related to processes and action results. The instruments used include, observation sheets of student activities, and test questions on student learning outcomes.

b) Action

The implementation of cycle II actions on May 19, 2023 at 08.00 – 11.00 WIB. The learning process carried out refers to the lesson plans that have been prepared at the planning stage with improvements in accordance with the results of reflection in cycle II. The implementation of these actions includes preliminary activities, core activities and closing activities.

c) Observation

Observations or observations in this study were made to determine the extent to which the application of the *Problem Based Learning* (PBL) model can be implemented properly. In addition, it is also to find out changes in learning outcomes that occur in class III-B students on multiplication and division material. The observation data that will be presented in this study includes, student observation data and student learning outcome test data with the following results:

1) Student Activities

To find the percentage of student activity can be calculated as follows:

Average $\quad=\dfrac{Amount\ of\ earnings}{Number\ of\ aspects}$

$\qquad\quad=\dfrac{520}{23}$

$\qquad\quad=22.60$

$P\qquad=\dfrac{f}{n}x\ 100$

$\qquad\quad=\dfrac{22,60}{23}\ x100$

$\qquad\quad=98\ \%$

Based on observation data made by observers on student activities on the number of scores obtained 520 and an average of 22.60. Thus, the percentage of average marks is 98%. This means that the level of success of student activities based on observation is included in the very good category.

2) Student Learning Outcomes

To find the average grade point and the percentage of classical completeness obtained by students in the table can be calculated by the following formula:

Class Average $\qquad\qquad=\dfrac{Student\ grade}{Total\ number\ of\ learners}$

$\qquad\qquad\qquad\quad=\dfrac{1940}{23}$

$\qquad\qquad\qquad\quad=84,34$

Percentage of completeness $=\dfrac{Number\ of\ completed\ learners}{Total\ number\ of\ learners}$ x 100 %

$\qquad\qquad\qquad\quad=\dfrac{21}{23}$ x 100 %

$\qquad\qquad\qquad\quad=91\ \%$

To find out the learning outcomes of students, tested with 10 multiple-choice questions. as many as 21 students completed the post-test questions while the remaining 2 students did not complete the learning with the *Problem Based Learning* (PBL) model on multiplication and division material. The percentage of overall student learning outcomes in cycle III is 91%. From the results of the cycle III test, it can be seen that the learning outcomes of students have increased by 22% which is complete from cycle II. Thus, cycle III has reached the expected performance indicator that the percentage of student success increases to 80%.

d) Reflection

The successes that have been achieved in cycle III are as follows:

1. The activities of students who are good are answering greetings and showing enthusiasm, listening to teacher explanations, listening to learning videos, conducting discussions, collaborating in answering questions with multiplication and division smart board media games, collaborating in making discussion reports, conducting group presentations and doing final tests.

2. The percentage of student activities with the very good category reached 92% which was included in the very good category.

3. The learning outcomes of students have been completed as many as 23 of the 25 students present with a percentage of 100%.

Based on these results, it can be seen that all performance indicators are achieved in cycle III. Researchers concluded there was no need to make improvements in the next cycle.

2. Discussion

This research was conducted to improve student learning outcomes by using *the Problem Based Learning* (PBL) model on multiplication and division material. From the results of classroom actions, it shows that the use of the *Problem Based Learning* (PBL) model can improve student learning outcomes on multiplication and division materials. To find out the activities of students during the study, observation sheets and learning outcomes were used using learning evaluation sheets.

Research criteria for student activity observation sheets by filling in the number of students who carry out activities in the column provided. Data processing in this study was carried out by examining all data obtained through student learning outcomes as well as student activities and teacher activities. The results of this study are as follows:

1. Application of *the Problem Based Learning* (PBL) Model to Increase Student Activities on Multiplication and Division of Class III-B Material of SD Negeri 4 Banda Aceh

The use of the *Problem Based Learning* (PBL) model is suitable to be applied in multiplication and division material in class III-B SD Negeri 4 Banda Aceh during the three cycles, because this strategy makes students think more actively,

independently and creatively in solving problems. So that students are enthusiastic to learn because it is supported by a fun approach. The *Problem Based Learning* (PBL) model has been shown to increase in cycle I to cycle III. With existing constraints, it becomes an improvement in the next cycle.

In observation, student activity for three cycles increased in cycle III. In cycle I student activity was at a percentage of 82%, cycle II was at a percentage of 84%, and cycle III was at a percentage of 98%. Based on existing data, the application of problem-based learning models is proven to increase student learning activities.

2. Improving Student Learning Outcomes on Multiplication and Division of *Problem Based Learning* (PBL) Models in Class III-B SD Negeri 4 Banda Aceh

Based on the results of research from pre-cycle data, cycle I, cycle II and cycle III in class III-B, it is known that every action has increased. The results of pre-cycle data can be known in advance from 23 students, none of the students obtained scores reaching KKM.

So, it can be concluded that with a completeness percentage of 0%, it is included in the category of incomplete learning outcomes obtained by students. The results of the pre-cycle data of multiplication and division material obtained are still very low, therefore researchers take action so that student learning outcomes can increase. It is known that there is an increase in learning outcomes on multiplication and division material after applying the *Problem Based Learning* (PBL) model.

Based on the data above, it can be seen that the results obtained there is a percentage of completeness of students increasing every cycle. This is supported by reflections on each cycle and the results of discussions with the pamong teacher. The results of pre-cycle data values are very low, this is because students still do not understand the concepts of multiplication and division.

In the first cycle, there was an increase of 23 students, 8 students who were completed and 15 students who were still said to be incomplete with a percentage of 34%. This is because there is still a lack of reinforcement of multiplication and division material. So, the researchers again followed up to cycle II.

At the percentage level of learning outcomes in cycle II has increased from cycle I by 34% with a percentage gain in cycle II which is 69%. Despite the increase, the criteria indicators are still sufficient so that researchers continue to cycle III.

After doing cycle III saw a significant improvement with a success percentage of 91% which is included in the very good category. This is due to improvements made both from teacher activities using smart board media and student activities that are active in playing multiplication and division games using smart board media and the application of *Problem Based Learning* (PBL) models well.

Therefore, the III cycle actions carried out can improve learning outcomes on multiplication and division material in class III-B SD Negeri 4 Banda Aceh by applying the *Problem Based Leaning* (PBL) model has succeeded in achieving excellent performance indicators and researchers do not need to do the next cycle.

D. Conclusion

Based on the results of research and discussions that have been carried out at PTK regarding improving learning outcomes on multiplication and division materials using the *Problem Based Learning* (PBL) model in grade III-B students of SD Negeri 4 Banda Aceh, it can be concluded that the use of the *Problem Based Learning* (PBL) model in multiplication and division material in class V / B SD Negeri 4 Banda Aceh has been implemented well. This is evident in the results of cycle I observation of student activity cycle I get a percentage of value 82% (good), in cycle II observation of student activity gets a value of 84% (good), and in cycle III observation of student activity gets a value of 98% (Very Good).

The learning outcomes of grade III-B students of SD Negeri 4 Banda Aceh on multiplication and division material have increased after using the *Problem Based Learning* (PBL) model. This is proven by the results of cycle I the percentage of completeness of 34% (less), the results of cycle II the percentage of completeness of 68% (sufficient) and the results of cycle III the percentage of completeness of 98% (very good).

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