



Application of the Problem Based Learning Model to Improve Students' Learning Outcomes and Critical Thinking Ability on Mathematics Lessons in Primary School

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ABSTRACT

This research was conducted at SDN 06402 Medan Tuntungan with the aim of improving critical thinking skills and student learning outcomes in mathematics subjects by using the Problem Based Learning learning model for fifth grade students at SDN 06402 Medan Tuntungan for the 2023/2024 academic year. This research is Classroom Action Research. implemented in two cycles. The subjects in this research were 30 class V students consisting of 13 female students and 17 male students. The data collection techniques used are observation and tests. The results of this research indicate that there is an increase in students' critical thinking abilities and student learning outcomes. This can be seen from the increase in students' critical thinking, namely in cycle I there were 12 students who got a pass mark or 40%, while 18 students who did not complete it or 60%. So, the second cycle of research was continued, namely 26 students who got a pass mark or 87%, while 4 students who did not get a pass mark or 13%, then there was an increase in cycle II compared to cycle I and they had fulfilled the predetermined completion. Thus, it can be concluded that using the Problem Based Learning learning model in mathematics lessons in class V of SDN 064025 Medan Tuntungan 2023/2024 can improve critical thinking abilities and student learning outcomes.

Keywords: problem based learning, critical thinking, learning outcomes, mathematics

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INTRODUCTION

Education is something that is very important for the life of a country. One thing that influences the progress of a country is the quality of education of the country itself, because improving the quality of education will reflect the learning outcomes of each student. Furthermore, student success or learning outcomes are influenced by good learning quality, because good learning quality can improve and advance the quality of education, so there is a need for development and renewal in the field of education.

In carrying out learning at school, a professional teacher is required to be able to follow and apply varied and interesting learning models in accordance with the steps that have been designed by the teacher, so that the learning process can take place with the aim of improving student learning outcomes. Good learning is when students are actively involved in the learning process. To achieve ideal learning outcomes, the teacher's ability to guide students' learning is highly demanded. If teachers are ready and have proficiency (high ability) in carrying out their obligations, the hope of creating quality human resources will certainly be achieved.

Minister of Education and Culture Regulation No. 103 of 2014 states that "Students are subjects who have the ability to actively seek, process, construct and use knowledge". For this reason, in the learning process students do not only receive the knowledge provided by the teacher, but students are required to be active in the learning process. Learning must provide opportunities for students to construct knowledge in their cognitive processes so that they truly understand and can apply their knowledge.

Students need to be encouraged to work to solve problems, discover things for themselves, and work hard to realize their ideas. So students must have critical thinking skills to understand learning and be able to solve problems. According to Fachrurazi in Rahmawati, et al. (2016:4), critical thinking is a systematic process that allows students to formulate and evaluate their own beliefs and opinions. The aim of learning to improve critical thinking skills is to form students who are able to think objectively and logically. The ability to think critically and creatively allows students to study problems systematically, face millions of challenges in an organized way, formulate innovative questions, and design problems that are considered relatively new. Furthermore, it is said that the teaching and learning process model can make students explore to collect and analyze data to think critically, analytically, systematically and logically Kurniawan (2014: 128). According to Duch (Shoimin, 2014: 130) stated "the meaning of the Problem Based Learning model is problem-based learning, with real problems as a context for students to learn critical thinking and problem-solving skills and gain knowledge". The Problem Based Learning model is a learning model that allows students to think critically to find solutions to the problems posed and uses real problems as the main focus, so that students gain essential knowledge and skills from what they learn. Problem solving is carried out using a collaborative pattern and using high-level thinking skills, namely analysis-synthesis skills, and evaluation or using discovery in order to solve a problem. Improving learning outcomes, teachers can organize the implementation of learning in the classroom by choosing a learning model that is appropriate and appropriate to the developmental characteristics of class V students who are at the concrete operational stage.

Based on information obtained by UPT SD Negeri 064025 Medan Tuntungan, the author found that student learning outcomes in Mathematics were still below the maximum completeness criteria (KKM) set by the school. Learning that is still teacher-centered can reduce students' activeness in learning. Low student learning achievement is caused by a lack of student enthusiasm for learning, the teacher's teaching model still revolves around lectures and is less interesting.

Based on information obtained by researchers from mathematics teachers in class V, mathematics learning outcomes are not optimal. This can be concluded from the students' achievement scores that have not reached the KKM value that has been determined at school. Like the table below.

Table 1. Daily Test Scores for Class V Mathematics Learning on Multiplication of Decimal Fractions Material

No	KKM	Student scores	The number of students	Percentage	Information
1	70	45-55	11	37%	Does not meet KKM
2	70	56-69	14	47%	Does not meet KKM
3	70	70-80	5	16%	Complete
Amount			30	100%	

Data source: SD Negeri 064025 Medan

Based on table 1.1 of student learning outcomes data, it is known that the minimum completion criteria (KKM) that has been determined is 70. The average grade V exam score is 60. 5 students or 16% of students who achieved the KKM completed it and 37% of students who did not complete it students or 47% of the 30 students who did not complete class V at SD Negeri 064025 Medan. Looking at the facts that have been presented, it is necessary to improve learning so that student learning outcomes increase after knowing the problems above, there is a need for appropriate solutions and follow-up to improve student learning outcomes in class V Mathematics learning at SD Negeri 064025 Medan Tuntungan. Low results Learning mathematics is influenced by many aspects, including the learning process, students, teachers. Researchers obtained this data after conducting interviews with teachers at the school. (1) low

student learning achievement is caused by a lack of student enthusiasm for learning. (2) the teacher's teaching model still revolves around lectures and is less interesting, (3) the learning process is still dominated by the teacher. To overcome this problem, efforts need to be made to update the learning model. In this case, researchers are interested in conducting research using the Problem Based Learning (PBL) learning model. The Problem Based Learning (PBL) learning model is a problem-based learning model, where students work in groups, they help each other in overcoming various problems or problems given by the teacher so that they understand each other and understand the lesson.

Based on the brief description above, the researcher is interested in conducting research entitled "Application of the Problem Based Learning Model to Improve Mathematics and Critical Thinking Learning Outcomes for Class V Students of UPT SD Negeri 064025 Medan Tuntungan Academic Year 2023/2024".

LITERATURE REVIEW

Problem Based Learning Learning Model

The Problem Based Learning model is a learning model that has long been developed by experts in order to instill in students the habit of always trying to overcome the problems they face. Therefore, he tried to find ways to carry out his main duties.

According to Anugraheni (2018:11) The Problem Based Learning learning model in the problem-based learning model is a learning model that involves students in learning activities and prioritizes real problems in the home, school and community environment as a basis for acquiring knowledge and concepts through observation skills. student activities during the learning process. Meanwhile, tests in the form of questions containing learning indicators are intended as a measuring tool for improving student learning outcomes in the form of multiple choice questions. The Problem Based Learning model is a learning model that focuses on problems that exist in the real world as something that must be solved by students in the learning process. by building critical thinking abilities and skills in solving problems, as well as connecting existing knowledge and concepts from the ongoing lesson material. The problem based learning model focuses existing learning on problems authentically, relevantly and presented based on the problems provided so that the learning process can run effectively and the learning objectives can be achieved with maximum results.

According to Fravitasari (2018:158-159) The Problem Based Learning Model is a problem-based learning model, where this learning provides real problems or those experienced by students, then students solve or resolve these problems independently or in groups, so that they are able to discover their own knowledge. and students can think actively in the learning process.

Characteristics of the Problem Based Learning Model

The characteristics of the Problem Based Learning model are revealed Rusman (2017:232) are as follows:

1. Problems become starting points in learning,
2. The problems raised are problems that exist in the structured real world,
3. Problems require multiple perspectives,
4. Problems challenge the knowledge possessed by students, attitudes and competencies which then require, identification of learning needs and new areas of learning,
5. Learning self-direction is the main thing
6. Utilizing diverse knowledge sources, their use, and evaluation of information sources is an essential process in PBL.
7. Learning is collaborative, communicative and cooperative
8. Developing inquiry and problem solving skills is as important as mastering the content of knowledge to find a solution to a problem.
9. Process openness in problem-based learning includes synthesis and integration of a learning process,
10. PBL involves evaluating and reviewing student experiences and learning processes.

Strengths and Weaknesses of the Problem Based Learning Learning Model

The advantages of the Problem Based Learning model according to Handoko (2018:56) is to make education at school more relevant to life outside of school, train students' skills to be able to solve problems critically and scientifically, and train students to think critically, analytically, creatively and comprehensively, because in the learning process students are trained to see problems from various aspects.

The advantages of implementing PBL have been explained by Novianti et al (2020:20) are as follows:

1. Students better understand the concepts being taught because they themselves determine these concepts;
2. Actively involving students in solving problems that require higher thinking skills and curiosity;
3. Knowledge is embedded based on schemata owned by students, so that learning is more meaningful;
4. Students can feel the benefits of learning because the problems they solve are directly related to real life. This can increase students' motivation and interest in the material they are studying;
5. Make students more independent and mature, able to give aspirations and accept other people's opinions, and instill positive social attitudes with other students;
6. Conditioning students in group learning who interact with each other and their friends, so that students can achieve complete learning.
7. It is also believed that PBL can develop the creative abilities of students both individually and in groups, because almost every step requires student activity;
8. PBL will result in meaningful learning. Students learn to solve a problem so they will apply the knowledge they have or try to find out the knowledge needed.
9. Learning can become more meaningful and can be expanded when students are faced with situations where concepts are applied;
10. In PBL situations, students integrate knowledge and skills simultaneously and apply them in relevant contexts;
11. PBL can improve critical thinking skills, foster students' initiative in working, internal motivation to learn and can develop interpersonal relationships in group work.

According to Shoimin (2017:132) The weaknesses of the Problem Based Learning (PBL) learning model are as follows: a) It requires a lot of time to implement. b) PBL cannot be applied to every lesson material, there are teachers who play an active role in distributing the material. PBL is more suitable for learning that demands certain abilities related to problem solving.

Steps in the Learning Model: Problem Based Learning Model

According to Tan (Kodariyati and Astuti, 2016:96) the learning process using Problem Based Learning consists of several steps, namely: (1) finding problems; (2) analyze the problem; (3) discover and report; (4) presenting solutions and reflecting; and (5) look back, evaluate and learn independently. According to Minister of Education and Culture Regulation Number 22 of 2016, the work steps (syntax) of the Problem Based Learning (PBL) Model in learning are as follows:

- 1) Student orientation to problems;

The teacher presents the problem that will be solved in groups. The issues raised should be contextual

1. Students can find problems themselves through reading materials or activity sheets. Groups of students observe and understand problems presented by the teacher or obtained from recommended reading materials.
2. Organizing students to study; The teacher ensures that each member understands their respective assignments. Students discuss and divide tasks to find the data/materials/tools needed to solve the problem.
3. Guiding individual and group investigations; The teacher monitors student involvement in collecting data/materials during the investigation process. Students carry out investigations (search for data/references/sources) for group discussion material.

4. Develop and present work results; The teacher monitors the discussion and guides the preparation of reports so that each group's work is ready to be presented. Groups of students hold discussions to produce solutions to problem solving and the results are presented/presented in the form of work.
5. Analyze and evaluate the problem solving process. The teacher guides the presentation and encourages groups to give awards and input to other groups. The teacher and students conclude the material. Each group of students makes a presentation, the other groups give appreciation. The activity continues by summarizing/making conclusions based on input obtained from other groups.

According to Rusman (2019:243) Steps for Problem-Based Learning Teacher Behavior Indicator Phase 1. Student orientation to the problem Explaining the learning objectives, explaining the logistics required, and motivating students to engage in problem-solving activities. 2. Organizing students to study Help students identify and organize learning tasks related to the problem. 3. Guiding individual/group experiences. Encourage students to collect appropriate information, carry out experiments to obtain explanations and solve problems. 4. Develop and present the results of the work. Assist students in planning and preparing appropriate work such as reports, and assist them with various assignments with their friends. 5. Analyze and evaluate the problem solving process. Help students to reflect or evaluate their investigations and the processes they used.

METHOD

This research was conducted at UPT SD Negeri 064025 Medan Tuntungan for the 2023/2024 academic year in the odd semester, at the address Jl. Flamboyan Raya, Tanjung Selamat, Medan Tuntungan District. The method used in this research is the classroom action research method. According to Arikunto (2017: 124) "Classroom Action Research (CAR) or in English called Classroom Action Research (CAR) is action research carried out by teachers with the aim of improving the quality of learning practices in their classes."

This research aims to improve students' critical thinking skills and student learning outcomes through the Problem Based Learning model. The subjects of this research were 5th grade students at SD Negeri 064025 Medan Tuntungan for the 2023/2024 academic year which was carried out in two cycles, where each cycle carried out four stages, namely planning, implementation, observation and reflection. This research was characterized by action. This action was carried out not only once. However, over and over again until the PTK goal is achieved. The data collection techniques used are tests and observations, using qualitative and quantitative data analysis.

RESULTS AND DISCUSSION

Description of Initial Conditions

This research was carried out at SDN 064025 Medan Tuntungan. This school is located at Jl. Flamboyan Raya District. Medan Tuntungan Academic Year 2023/2024. The number of students in class V is 30 students consisting of 13 male students and 17 female students. The type of research used is PTK (Classroom Action Research) with the application of the Problem Based Learning Model to improve students' critical thinking skills in mathematics subjects. At the initial stage, observations were carried out to obtain information about the implementation of Mathematics learning in class V at SDN 064025 Medan Tuntungan. Observations were carried out to obtain an overview of the implementation of the learning process and student learning outcomes. The value of the Mathematics subject is still relatively low, so corrective action needs to be taken using the Problem Based Learning on multiplication of fractions.

This research was carried out in 2 cycles which included planning, implementation, observation and reflection. In carrying out this research, researchers and teachers collaborate, where the researcher acts as a teacher and the teacher acts as observing the activities of teachers and students in the teaching and learning process. The teaching and learning process aims to

improve students' critical thinking skills in mathematics subjects. An important factor that determines the success of a student's learning process is the learning model used when teaching material to students, meaning that learning must be interesting and not one-way.

Comparison of Action Results Between Cycles

Comparison of the Results of Teacher Activities Between Cycles

Based on data obtained from observations of teacher activities in cycle I and cycle II, it can be seen that there has been an increase. In cycle I, teacher observations obtained 60% (Good) and in cycle II it increased to 92% (Very Good). Based on the increase in these two cycles, it can be seen that cycle I to cycle II experienced an increase. For more clarity regarding observing teacher activities, see the picture below.

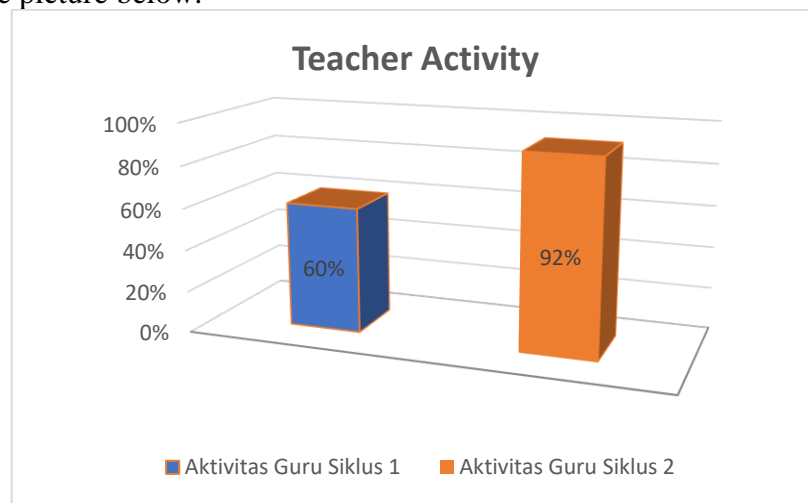


Figure 1. Comparison of Teacher Observation Results in Cycle I and Cycle II

Comparison of the Results of Student Activity Actions Between Cycles.

Based on the data obtained from student activities in cycle I and cycle II, it can be seen that there has been an increase. Where in cycle I the results of observing student activities were 60% with good criteria and in cycle II it increased to 92% with very good criteria. Based on this second increase it can be seen that:

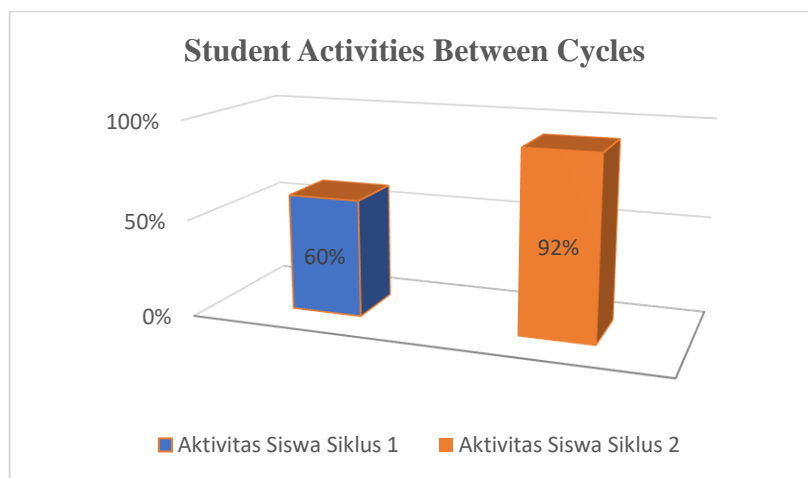


Figure 2. Comparison of Student Observation Results in Cycle I and Cycle II

From observations of learning outcomes or learning completion starting from the pretest, posttest cycle I and posttest cycle II, it was seen that there was good improvement achieved by students. This proves that the research hypothesis, namely the Problem Based Learning learning model in the learning process, has been implemented optimally and in accordance with the expected objectives. Based on the pretest analysis, cycle I and cycle II can be seen in the following table:

Table 1. Comparison of individual students' critical thinking abilities between cycles

No	Student's name	PreTest	Cycle I	Cycle II	Information
1	Subjek 1	28	76	91	Increase
2	Subjek 2	60	38	66	Still
3	Subjek 3	72	84	91	Increase
4	Subjek 4	24	76	83	Increase
5	Subjek 5	48	76	91	Increase
6	Subjek 6	80	46	83	Increase
7	Subjek 7	40	53	75	Increase
8	Subjek 8	56	61	83	Increase
9	Subjek 9	44	84	91	Increase
10	Subjek 10	32	69	75	Increase
11	Subjek 11	36	76	83	Increase
12	Subjek 12	40	84	91	Increase
13	Subjek 13	44	30	83	Increase
14	Subjek 14	48	23	75	Increase
15	Subjek 15	52	76	83	Increase
16	Subjek 16	40	30	66	Still
17	Subjek 17	32	46	91	Increase
18	Subjek 18	76	23	75	Increase
19	Subjek 19	36	46	66	Still
20	Subjek 20	76	15	58	Still
21	Subjek 21	60	61	75	Increase
22	Subjek 22	64	76	83	Increase
23	Subjek 23	68	46	75	Increase
24	Subjek 24	40	76	91	Increase
25	Subjek 25	76	53	91	Increase
26	Subjek 26	32	38	83	Increase
27	Subjek 27	52	76	83	Increase
28	Subjek 28	48	30	75	Increase
29	Subjek 29	76	61	83	Increase
30	Subjek 30	40	76	83	Increase

Amount	1460	1705	2422	
Average value	48	56.86	80.73	Increase
Number of Completed Students	6 Students	12 Students	26 Students	Increase

From the table above, it can be seen that the increase in pretest results has an average value of 48%, in cycle I the average value was 56.86% and in cycle II there was an average value of 80.73%. So it can be concluded that learning using the Problem Based Learning learning model on fraction multiplication material can improve student learning outcomes.

Classical Comparison of Students' Critical Thinking Ability Scores Between Cycles.

After summarizing the mastery of individual student learning, then the classical student learning results are obtained which can be seen in the following table:

Table 2. Comparison of Classical Learning Results

No	Test Scores			Information
	Pretest	Cycle I	Cycle II	
1	20%	40%	87%	Increase

For more clarity regarding this comparison, you can see the graph below.

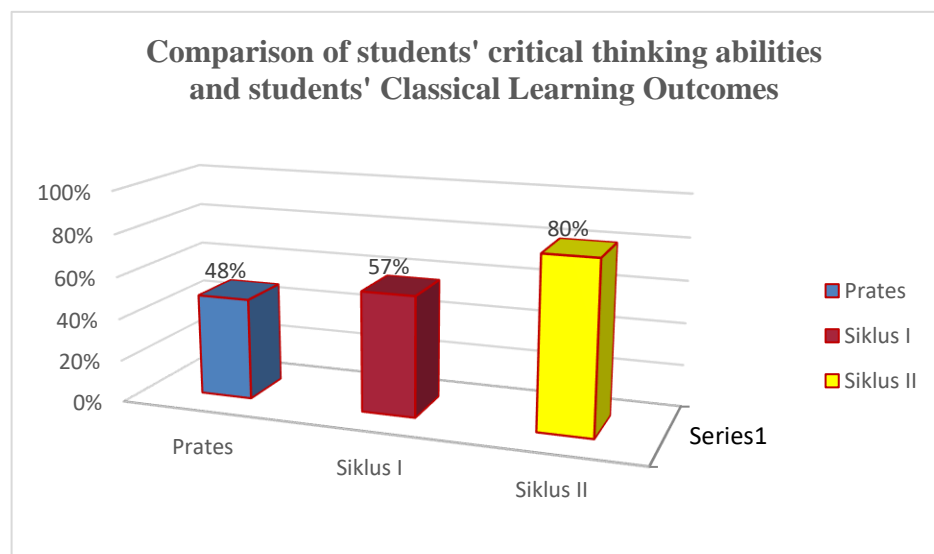


Figure 3. Diagram of Improving Students' Critical Thinking Completeness of Student Learning Results in PreTest, PostTest Cycle I and PostTest Cycle II

It can be seen from the graph above, it shows a classical increase of 20%, in cycle I it increased by 40% and in cycle II there was also an increase of 87%. This proves that using the Problem Based Learning learning model can improve learning outcomes.

Increase in Students' Critical Thinking Ability on Average Between Cycles

To determine whether the actions carried out in the research were successful or not in accordance with the research objectives, the average value in the class in cycle I and cycle II was also looked for in the table below:

Table 3. Improvement of students' critical thinking abilities and students' average scores

No	Test Scores			Information
	Pretest	Cycle I	Cycle II	
1	48	56.86	80.47	Increase

For more clarity regarding this comparison, you can see the graph below:

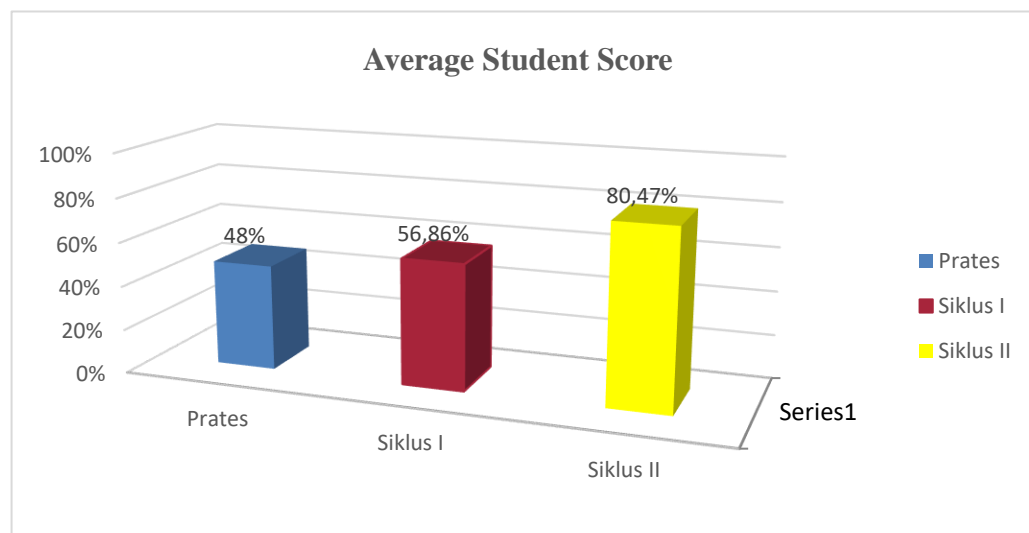


Figure 4. Graph Increasing Students' Critical Thinking Abilities and Student Average Grades

From the table and graph above, it shows that there was an increase in the class average score, where in the pretest it was 48, then in cycle I it increased to 56.86, then it increased by 80.47 in cycle II. This proves that using the Problem Based Learning model can improve student learning outcomes.

CONCLUSIONS AND RECOMMENDATION

Based on the results of research and discussion regarding the Application of the Problem Based Learning Model to Improve Mathematics and Critical Thinking Learning Outcomes for Class V Students of UPT SD Negeri 064025 Medan Tuntungan, it can be concluded that:

1. The implementation of learning using the Problem Based Learning learning model on the multiplication of decimal fractions material for the 2023/2024 academic year is categorized as good. This can be seen from the results of teacher activities in cycle 1 which was 64% and in cycle II it increased by 80%.
2. The implementation of learning using the Problem Based Learning learning model on multiplication of fractions material for the 2023/2024 academic year is categorized as good. This can be seen from the results of observing student activities in cycle I which was 62% and in cycle II it increased to 92%.
3. By using the Problem Based Learning learning model in the mathematics subject of multiplication of decimal fractions in class V of SD Negeri 064025 Medan Tuntungan for the 2023/2024 academic year, it can improve students' critical thinking skills. This can be seen in the learning outcomes obtained by



students, namely the pretest with an average score -an average of 52% in cycle I increased with an average score of 64% and classical completeness of 43%. Meanwhile, in cycle II the average score was 80.47% with classical completeness reaching 87%. This shows that in cycle I and cycle II there was an increase.

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