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Implementation of Problem Based Learning (PBL) Learning Model to Improve Mathematical Critical Thinking Skills and Learning Motivation of Grade 5 Students at UPT SD Negeri Kutorejo 3 Tuban

Siti Nurul Khotimah[1], Tabitha Sri Hartati Wulandari[2]
[1,2]Department of Teacher Professional Education, Postgraduate Program, Universitas PGRI Ronggolawe Tuban, Indonesia
[1]nkhotimah334@gmail.com
[2]tabithawulandari7@gmail.com

ABSTRACT

This study aims to improve the mathematical critical thinking skills and learning motivation of 5th grade students of UPT SDN Kutorejo 3 Tuban through the application of the Problem Based Learning (PBL) learning model with material comparing and sorting fractions. This study uses a Classroom Action Research (CAR) approach consisting of two cycles. The subject of the study was grade 5 students with a total of 29 students. The instruments used in this study include tests to assess mathematical critical thinking skills, learning motivation questionnaires, and observation sheets of the learning process. The results showed a significant increase in students' mathematical critical thinking skills and learning motivation after the application of the PBL model. In the first cycle, 69% of students achieved completeness in the critical thinking test, while 31% of students did not complete it. Based on the results of the questionnaire, 40% of students showed low motivation to learn. In the second cycle, the percentage of completeness increased to 75.8%, with 22 students achieving completeness. In addition, students' motivation to learn also increased, with 87.84% of students showing higher motivation compared to the first cycle. Thus, it can be concluded that the application of the PBL model is able to encourage the improvement of mathematical critical thinking skills and learning motivation of 5th grade students at UPT SDN Kutorejo 3 Tuban.

Keywords: ***Problem Based Learning, Mathematical Critical Thinking Skills, Learning Motivation***

Corresponding Author:
Tabitha Sri Hartati Wulandari,
Universitas PGRI Ronggolawe Tuban,
Jl Manunggal No.61 Tuban, Indonesia.
tabithawulandari7@gmail.com

1. INTRODUCTION

In elementary schools, mathematics education plays a crucial role in shaping students' foundational understanding of mathematical concepts. Enhancing students' critical thinking skills is one of the significant challenges in mathematics learning. Facione (2015) states that critical thinking is a purposeful and directed thinking process used to justify statements, interpret information, and solve problems. One topic that requires critical thinking is comparing and ordering fractions. However, many students struggle with this topic, leading to low learning motivation.

At UPT SDN Kutorejo 3 Tuban, initial observations revealed that many fifth-grade students faced difficulties in understanding the topic of comparing and ordering fractions, coupled with low motivation, which hindered their learning outcomes. To address this, teachers need to implement learning models that encourage active participation and stimulate students' thinking to develop their critical thinking skills and motivation. Mathematical critical thinking involves analyzing and evaluating mathematical problems using logical principles and learned concepts. This skill is essential for solving complex mathematical problems, such as comparing and ordering fractions.

According to Hadi (2015), critical thinking is an individual's capacity to construct logical arguments and evaluate their validity through a systematic approach to form beliefs. Furthermore, this process includes analyzing and assessing information, enabling students to actively participate in decision-making (Umam, 2018). Learning motivation, on the other hand, is a driving force, either internal or external, that encourages students to engage enthusiastically in learning, leading to optimal outcomes (Afriansyah, 2022). This motivation must be continuously nurtured during classroom learning (Fadjriyah Hapsari, 2021), especially in challenging subjects like mathematics (Fauzan, 2023).

One learning strategy to address these issues is the Problem-Based Learning (PBL) model. PBL emphasizes solving real-world problems relevant to students' lives. Widiasworo (2018) explains that PBL is an instructional approach that presents authentic problems as stimuli to motivate learning. PBL

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also fosters collaboration, communication, and creative problem-solving. This study aims to identify improvements in mathematical critical thinking skills and learning motivation among fifth-grade students at UPT SDN Kutorejo 3 Tuban through the implementation of PBL in the topic of comparing and ordering fractions.

2. RESEARCH METHOD

This research is classified as a type of Classroom Action Research (CAR), which is a research method carried out by individuals and groups in their own classroom environment This research aims to improve and improve the quality of the implementation of the learning process in the classroom. The main objective of this study is to develop critical thinking skills in mathematics and increase students' learning motivation through the application of the Problem Based Learning (PBL) learning model. The subjects of this study are 29 5th grade students of UPT SDN Kutorejo 3 Tuban. Data collection techniques include critical thinking ability tests, learning motivation questionnaires, and observation of student activities during the learning process. The data obtained were analyzed using a qualitative descriptive approach to describe the changes that occurred during the study. This research was carried out in two cycles, with each cycle consisting of 2 hours of lessons (1 meeting). Each cycle in this study consists of four stages, namely planning, action, observation, and reflection. The flow of stages in each cycle of this research is presented in Figure 1 below.

Fig 1. Flow of Stages in Classroom Action Research

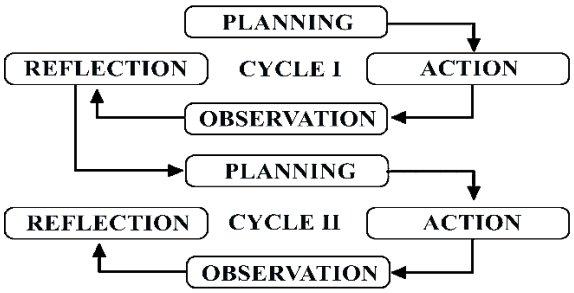

Figure 1 shows the Flow of Stages in Classroom Action Research (CAR). The instruments used in this study include tests to measure mathematical critical thinking skills, questionnaires to assess learning motivation, and observation of student activities during the learning process. The data obtained was then analyzed by reflecting on the improvement of the results of the mathematical critical thinking ability test and the results of the learning motivation questionnaire during the two learning cycles. The success criteria in this study include the achievement of classical completeness in critical thinking skills through the PBL model, namely at least 75% of the total students obtained a score of ≥ 70, the percentage of students with low learning motivation did not exceed 25%, and there was an increase in mathematical critical thinking skills and learning motivation in each learning cycle.

3. RESULTS AND DISCUSSION

The Problem Based Learning (PBL*)* learning model has been applied in the learning activities of grade 5 students at UPT SDN Kutorejo 3 Tuban as an effort to evaluate the extent to which the model is able to improve students' mathematical critical thinking skills. The application of this model is based on the assumption that problem-based learning can encourage students to be more active, independent, and engaged in higher-level thinking processes, including the ability to analyze, evaluate, and infer information from the problems presented.

Before the research activity is carried out, the researcher first coordinates and discusses intensively with the teacher who understands the characteristics of the students in the school, as well as the supervisor who has a role as a director in the preparation of the research design. This discussion aims to formulate learning tools that are in accordance with the needs of students and relevant to the research objectives. The learning tools that are prepared include various important components, such as teaching modules that contain PBL-based learning steps, teaching materials that support students'

understanding of the mathematics material being taught, and interactive learning tools and media to support the process of delivering material visually and contextually.

In the implementation of the research, the researcher also prepared a number of instruments to collect relevant data. The instrument includes test questions designed to measure students' critical thinking skills based on certain indicators, questionnaires to explore information about students' learning motivation levels before and after the application of the PBL model, and observation sheets used to record and analyze student activities during the learning process. All of these instruments are used to support the analysis of the effectiveness of the PBL model in improving the quality of mathematics learning in the classroom.

A. Cycle I

Cycle I was carried out in one meeting session with a total of 2 hours of lessons. The evaluation of the Problem Based Learning (PBL) learning process is carried out using observation sheets filled in by teachers during learning activities. The research at this stage involved 29 students as research subjects. At the end of the first cycle, a test was carried out to measure students' mathematical critical thinking skills as a form of evaluation of the application of the PBL model. Based on the results of the test, it is known that as many as 9 students have not reached the expected level of completeness, so it is necessary to make improvements through the implementation of cycle II. The percentage of student completeness in the mathematical critical thinking test reached 69%, or a total of 20 students, while the other 31% or as many as 9 students have not succeeded in reaching the completeness criteria. This achievement shows that the percentage of student completeness is still below the set success standard, which is at least 75% of the total number of students. The results of the evaluation of students in this cycle can be detailed as follows.

Table 1. Analysis of Mathematical Critical Thinking Ability Test Results in Cycle 1

Score (Percentage)	Category	Many Students
$1\% \leq x < 25\%$	Not Good	0
$25\% \leq x < 50\%$	Pretty Good	4
$50\% \leq x < 75\%$	Good	5
$75\% \leq x < 100\%$	Excellent	20

Based on the results of the analysis presented in Table 1 regarding the mathematical critical thinking ability test of grade 5 students, it can be seen that there are no students who are classified as poor. A total of 4 students were recorded in the fairly good category, while 5 students showed results in the good category. The majority of students, namely 20 people, managed to achieve the excellent category in the measurement of mathematical critical thinking skills. These findings indicate that most students have demonstrated high mastery of concepts and critical thinking skills after participating in learning with the Problem Based Learning (PBL) model.

Meanwhile, based on the results of a questionnaire that aims to measure the level of student learning motivation, data was obtained that 40% of students still show a low level of learning motivation. On the other hand, the other 60% of students are classified as having high motivation to learn. This data was collected through a questionnaire that was filled out directly by the students after following the learning process, with results showing variations in their levels of enthusiasm and internal drive to learn. The details of the data are presented in the following section as a basis for consideration in designing strategies to increase learning motivation in the next cycle.

Table 2. Analysis of the Results of the Level of Learning Motivation in Cycle I

Category	Many Students
Tall	6
Keep	15
Low	8

The factors influencing these results were revealed through a series of observations made during the implementation of classroom learning. This observation process is carried out by researchers together with pamong teachers, who observe each stage of learning from beginning to end. Before learning begins, the atmosphere in the classroom shows a high level of interest and enthusiasm from the students. This is evident when students welcome the teacher into the classroom, especially when

they see the teacher bringing the tools and learning materials used in the activity. The existence of interesting and relevant learning media can affect students' motivation to actively engage in the learning process, which is a positive indication of their attitude towards the learning to be carried out. However, the implementation of learning did not go as planned because there were several students who seemed sleepy. This condition is most likely caused by a lack of rest time the night before, as well as the student's lack of attention to the material being taught. Some students also seem to be not focused on the material being discussed, so teachers need to implement a more interactive and innovative approach to retract their attention and optimize the learning process. Nonetheless, students complete the assignments given by the teacher well through group discussions. However, there are still several groups who come to the teacher to ask how to do the task. During the discussion activities, most of the students have already shown good cooperation in their groups.

B. Cycle II

Cycle II was carried out in one meeting with a total duration of 2 hours of lessons. Learning assessment using the PBL model is carried out through observation sheets filled out by teachers during the learning process. A total of 29 students were subjects in the research in this second cycle. The activity in the second cycle ended with a critical thinking ability test to evaluate the success of learning using the PBL model. Based on the results of the mathematical critical thinking ability test in Cycle II, there was an increase even though there were still 7 students who had not completed it. The percentage of students who managed to achieve completeness in mathematical critical thinking skills was 75.8%, or as many as 22 students. Meanwhile, 24.2% of students, namely 7 students, are still incomplete. This indicates that the number of students who have achieved completeness has met the specified success standard, which is at least 75% of the total number of students. This achievement was obtained based on the results of the evaluation of students with the following details.

Table 3. Analysis of Mathematical Critical Thinking Ability Test Results in Cycle II

Score Presentation	Category	Many Students
1%≤x<25%	Not Good	0
25%≤x<50%	Pretty Good	2
50%≤x<75%	Good	5
75%≤x<100%	Excellent	22

Based on the analysis contained in Table 3 regarding the results of the mathematical critical thinking ability test for grade 5 students, it can be concluded that no students are in the poor category. A total of 2 students were recorded in the fairly good category, 5 students were included in the good category, and the majority of students, namely 22 people, managed to reach the very good category. This achievement shows a significant improvement in students' mathematical critical thinking skills after participating in learning.

In addition, the results of the questionnaire used to measure the level of student learning motivation revealed that 22.16% of students had relatively low learning motivation. On the other hand, another 87.84% of students showed a higher level of motivation. These results reflect an increase in student learning motivation compared to the previous cycle, demonstrating the effectiveness of the learning model in increasing student engagement and drive to learn. Thus, the results of this study have met the success indicators that have been set, namely a significant increase in both aspects, namely mathematical critical thinking skills and student learning motivation.

Table 4. Analysis of the Results of the Level of Learning Motivation in Cycle II

Category	Many Students
Tall	6
Keep	19
Low	4

The results obtained in this study are influenced by a number of factors identified through observation of the implementation of learning in the classroom. The observation was carried out by the researcher together with the pamong teacher, who monitored each stage of learning from the beginning

to the end of the session. Before learning begins, students are seen showing high enthusiasm and interest in learning activities. This can be seen when they welcome the arrival of teachers who enter the classroom while bringing various tools and learning materials that will be used in the learning process. In cycle II, there was a significant increase where no students looked sleepy or lost focus during the lessons. To raise the students' enthusiasm before starting learning, the teacher provides ice breaking activities that successfully increase students' energy and readiness to follow the lesson with attention. In addition, learning activities run smoothly in accordance with the plan that has been prepared in the implementation of learning. The available facilities and infrastructure are also quite supportive, without any significant disruptions, such as power outages that can interfere with the learning process. The facilities used in learning, such as comfortable classrooms, projectors, laptops, speakers, and smooth internet access, all play an important role in creating a conducive learning atmosphere. With this condition, students become more focused and able to actively participate in group discussions. Students who have understood the material before also play a role in explaining to their group friends, so that the discussion process runs two-way and is more dynamic. This makes students rarely ask questions directly to the teacher because they feel that they understand enough of the material being discussed. In addition, students also show an active attitude in providing responses or questions when other groups present the results of their discussions, which indicates an increase in their involvement in learning.

4. CONCLUSION

The application of the Problem Based Learning (PBL) model has been proven to be effective in improving the mathematical critical thinking skills and learning motivation of 5th grade students at UPT SDN Kutorejo 3 Tuban. The increase in critical thinking skills can be seen from the percentage of student completeness which was originally 69% in the first cycle increased to 75.8% in the second cycle. In addition, an increase also occurred in the aspect of learning motivation, where in the first cycle as many as 40% of students had low learning motivation, while in the second cycle the figure decreased to 22.16%. Problem-based learning provides students with the opportunity to be more active, independent, and involved in the learning process, so that they are able to analyze, evaluate, and infer information more critically. The learning atmosphere also becomes more conducive and fun because of the interesting learning media, ice breaking activities, and adequate supporting facilities. Students not only actively engage in group discussions, but also show increased participation in presentations and questions and answers between groups. Thus, the PBL model can be used as an alternative to innovative and effective learning strategies to improve the quality of mathematics learning in elementary schools.

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