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IMPLEMENTATION OF A PROBLEM BASED LEARNING MODEL ON A SCIENTIFIC APPROACH TO IMPROVING STUDENTS' CRITICAL THINKING SKILL MATHEMATICS SUBJECT IN ELEMENTARY SCHOOL

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ABSTRACT
This study aims to improve the critical thinking skills of grade 1 students through the implementation of a Problem-Based Learning (PBL) learning model based on a scientific approach. This research is a Collaborative Classroom Action Research (PTKK) which was carried out together with grade 1 teachers and was carried out for 2 cycles. The subject of the research involved 26 grade 1 elementary school students. Data collection techniques used are observation, interviews, tests, and documentation. Data analysis techniques in this study are descriptive comparative and descriptive qualitative. The results showed that the application of the PBL model increased critical thinking skills, namely in the pre-cycle with an average value of 45.18%. After being given action in cycle I, namely by applying the Problem-Based Learning (PBL) learning model, students' critical thinking skills increased with a score of 69.70% (good category). Then after making improvements in cycle II. In the implementation of learning cycle II, the achievement of students' critical thinking skills reached an average of 81.76% (good category). The collected data were then analyzed using descriptive comparative statistical analysis techniques. The results of the study show that the implementation of Problem-Based Learning (PBL) with a scientific approach can improve the critical thinking skills of first-grade students in elementary school.
Keywords: *Problem-Based Learning (PBL), Scientific Approach, Critical Thinking*

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1. Introduction

Education is one aspect of the embodiment of human culture that is dynamic and has developmental requirements (Amri, Sofan. 2013). Therefore, changes and developments in education are things that must be done in order to be able to adjust to changes and developments in human life. The various changes that have occurred certainly lead to improvements in the current education system, it is hoped that educational institutions will continue to survive, then be able to anticipate future life and the demands of modern society. Because education is a cultural process that aspires to increase human dignity and worth, education is the most important activity for achieving the progress of the nation and state (Yusita, et al, 2021). To create meaningful education starting from learner-centered learning activities. According to the Ministry of National Education (in Warsita, 2008: 85) "In Law No. 20 of 2003 concerning National Education System Article 1 Paragraph 20, Learning is the process of interaction of students with educators and learning resources in a learning environment." So learning in the classroom should occur a two-way communication process both between teachers and students and between students. Two-way communication activities can occur through question and answer during learning, this can occur when students respond to teacher questions or vice versa.

In fact, learning mathematics in class 1 has not been effective in maximizing the potential that exists within students. This can be seen from the learning outcomes, especially in addition and subtraction material obtained by students where it is still not as expected, namely 78% of students still get scores below the KKM. In addition, at the time of observation it was also seen that students had not been able to express questions that were appropriate to the context of the material and had not been able to answer questions about the conclusions of the learning that had been carried out. One of the reasons is that the learning carried out by the teacher is still not efficient in conveying subject matter and in providing essential questions when learning. When learning tends to only listen to the teacher and without giving essential questions of the material being studied. So as a result the students are less enthusiastic and feel bored quickly and tend to ignore the teacher who is explaining the lesson. As a result, students have little vocabulary to identify story problems in

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mathematics. This has an impact on the low critical thinking skills of students in learning mathematics, especially the material of addition and subtraction. According to Kuswana (2011) explains that "critical thinking is the ability to analyze problem situations through evaluating potential, ways of solving problems, and summarizing various information to determine decisions". So in this case, it is necessary to design a lesson that familiarizes students with constructing their thoughts both with teachers, friends and with the mathematical material itself.

Based on these problems, researchers will examine the use of the Problem Based Learning model. Koeswanti, (2018: 67) explains that the Problem Based Learning model is an innovative learning model where in the learning process students are faced with concrete problems and create an active learning atmosphere centered on students with the teacher as a facilitator. One of the learning models that enables students to think critically is the PBL model. On the other hand, students' critical thinking skills can also be developed through a scientific approach. Where according to the Ministry of Education and Culture (2013) the scientific approach is a learning model that starts from collecting data through observation, conducting experiments (trying), asking questions, processing information or data, to communicating it based on scientific concepts. Through a scientific approach, teachers can provide learning experiences that allow students to explore and construct knowledge concepts with five stages, namely observing, asking, trying, reasoning and communicating. Through these five stages it is expected to maximize the achievement of the goals of critical thinking itself, namely to achieve a deep understanding of a matter being studied through a series of directed and clear processes, so that the truth of the concept understood can be accounted for, then a scientific approach (scientific approach) can be a solution to the problem. So in an effort to improve students' critical thinking skills teachers should use models, methods and approaches that are more varied and adapt to the needs and characteristics as well as materials and learning objectives. The learning model and approach used should be one that builds a classroom atmosphere to be able to interact optimally between all components involved in learning, namely teachers and students. The PBL model and the scientific approach both use a problem in their learning. In the PBL model learning is a real problem (Tan, 2003), and

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if the scientific approach is learning using problems that students can reason with (Carey, 2011). So that through these two learning models it is believed to be able to create a learning process that actively involves students to solve mathematical problems based on the context in everyday life. From this learning can help students to learn problem solving by answering the questions given and then answering them using the steps or methods and concluding the answers. From these activities it is hoped that students will be better prepared to face life in the 21st Century and in the future.

2. Methods

This research is a Classroom Action Research conducted for 2 cycles, each cycle consisting of two meetings. This research was conducted collaboratively with grade 1 teachers. The subjects of this study were grade 1 students consisting of 26 students consisting of 13 female students and 13 male students. In this study, researchers used Kemmis and Mc.Taggart models. According to Arikunto (2013: 132), there were four stages used which included planning, action, observation, and reflection. where one model of classroom action research is easy to understand and implement. In addition, the Kemmis and Mc.Taggart models have systematic steps in their implementation.
The data collection technique used in this study was in the form of test instruments in the form of evaluation questions for assessing students' critical thinking skills, as well as non-test instruments, namely observation sheets, interviews, and documentation. Data were obtained by observing the activities of teachers and students in class, interviews with teachers, and also students' math scores in pre-cycle activities.

The data analysis technique used in this study is descriptive qualitative and descriptive comparative. Comparative descriptive, namely comparing the results of the initial conditions or pre-cycle, after cycle 1, and after cycle 2 to determine the increase in students' critical thinking skills. The data from the critical thinking ability test results were then analyzed by the researcher by calculating the percentage of students' thinking ability and the percentage classically. While descriptive qualitative is the result of research conducted descriptively without doing calculations

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as a measure of its success. Qualitative data were obtained from observation sheets when learning activities took place.

Students are said to be able to solve problems if students are in the good or very good category. Then to determine the category compared to the following criteria:

$$\text{Percentage} = \frac{score\ obtained}{maximum\ score} \text{ x } 100$$

Tabel 3.2

Category level of students' critical thinking skills:

No	Mastery Level	Category
1	90%-100%	Very Good
2	80%-89%	Good
3	70%-79%	Enough
4	50%-69%	Not Enough
5	0-49%	Very Less

Based on the criteria for the level of students' critical thinking skills, the success criterion is if 80% of the total students have a good or very good category in the critical thinking aspect. Meanwhile, if in the classical group, there are 85% of students who achieve > 70%, then classical completeness is fulfilled.

3. Result and Discussion

Based on the results of the study, there was an improvement in students' critical thinking skills in Cycle I and Cycle II. In cycle I, student learning outcomes were obtained that 1 student got a

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very high or perfect score, namely 100, 13 students got high scores, 8 students got fair scores, and 4 students got low scores. Thus the action in the first cycle 22 students completed and 4 students who did not complete. In cycle II, student learning outcomes were obtained that only 8 students got perfect scores, 15 students got high scores, and 3 students got low scores. Thus the action in the first cycle 24 students completed and 2 students who did not complete. Students' critical thinking skills during pre-action with addition and subtraction materials obtained an average of 45.18%. This condition indicates that overall students' critical thinking skills in mathematics subject matter of addition and subtraction are still relatively low, which means that it is necessary to provide an action that can improve students' critical thinking skills so that they experience improvement. In the first indicator, students' critical thinking skills were seen to have increased, namely understanding problems and responding to questions asked by the teacher or questions by showing the keywords used in solving them correctly with a percentage of 53.84%, which then increased in cycle I to 72.11%, and continued to increase in cycle II to 86.65%. Then in the second indicator students' critical thinking skills also saw an increase, namely identifying problems by knowing the relationships between statements, questions, and concepts given in the problem by translating story questions into mathematical sentences correctly whereas in the pre-action the percentage of students was still 48.07%, and experienced an increase in cycle I and cycle II, namely 73.07% to 87.50%. Furthermore, in the third indicator, namely being able to write down and perform calculations using the right steps and strategies correctly, it was also seen to have increased starting from the pre-action, which was 46.15%, and in cycle I it increased to 77.88% and in cycle II it also increased to 83.69%. And the last indicator, namely being able to draw conclusions based on the questions given correctly, also experienced an increase starting from the pre-action of 32.69%, then in cycle I it became 55.76%, and in cycle II it also increased to 70.19%. More details on improving students' critical thinking skills per indicator can be seen in the following table:

Tabel 3.1

Pencapaian Kemampuan Berpikir Kritis Per Indikator Pra Tindakan, Siklus I dan Siklus II

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No	Aspek yang dinilai	Pra Siklus I	Siklus I	Siklus II	Siklus II
1	Understand the problem by responding to questions asked by the teacher by showing the keywords used in solving them correctly.	53,84%	72,11%	72,11%	86,65%
2	Identify problems by knowing the relationships between statements, questions, and concepts given in the problem by translating story problems into mathematical sentences correctly.	48,07%	73,07%	73,07%	87,50%
3	Able to write down and perform calculations using the right steps and strategies correctly.	46,15%	77,88%	77,88%	83,69%
4	Can draw conclusions based on the questions given correctly.	32,69%	55,76%	55,76%	70,19%
Average		45,18%	69,70%	69,70%	81,76%
Improvement		24,52%		12,06%	

Based on the data in the table above, it can be explained that the increase in the overall average of students' critical thinking skills starting from pre-action, cycle I, and cycle II proves that the Problem-Based Learning (PBL) learning model can affect the improvement of students' critical thinking skills in class 1B SDN Gedongkuning in mathematics, especially the material of addition and subtraction. More details on improving students' critical thinking skills per indicator can be seen in the following diagram:

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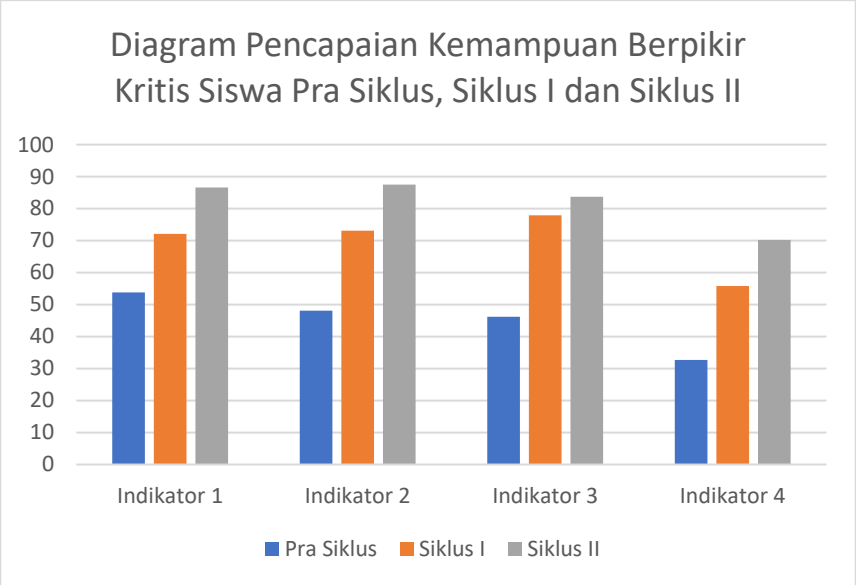
Diagram 3.1
Diagram of Achievement of Critical Thinking Ability, Pre-Cycle, Cycle I, and Cycle II



From this description, it can be seen that overall all indicators of students' critical thinking have increased. It can be seen that in the initial conditions or before the action, students are not able to think critically well or are still relatively low. This condition is because the learning that is carried out is still teacher-centered or teacher-centered, where students tend to only listen and there is no communicative interaction when learning. Even if communicative interactions sometimes occur, the teacher tends to give less appreciation to students who dare to answer, so students choose to be silent and become passive in learning. The learning model used makes students only fixate on what is conveyed by the teacher, so that the knowledge that students receive is only rote and students are less able to understand in depth the material obtained.

4. Conclusion

Learning activities carried out using the Problem-Based Learning (PBL) learning model can improve students' critical thinking skills. Through the Problem-Based Learning (PBL) Learning Model the students' Mathematical Critical Thinking ability increased, this can be seen from the

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increase that occurred in the initial test, cycle I, and cycle II. This is evidenced by the achievement of students' critical thinking skills in Mathematics when the initial conditions were included in the less category, namely only achieving an average of 45.18%. After being given action in cycle I, namely by applying the Problem-Based Learning (PBL) learning model, students' critical thinking skills increased with a score of 69.70% (good category). Then after making improvements in cycle II. In the implementation of learning cycle II, the achievement of students' critical thinking skills reached an average of 81.76% (good category). This achievement already meets the success criteria of this study, thus it can be concluded that the Implementation of a Problem-Based Learning (PBL) Model Based on a Scientific Approach can Improve Students' Critical Thinking Ability in Mathematics 1st grade students.

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