



Implementation of Problem-Based Learning Model to Improve Learning Outcomes in Mathematics Subject

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ABSTRACT

This study aims to determine the learning outcomes of grade IV students on the implementation of problem-based learning models in mathematics subjects of operation materials, calculating, adding and subtracting numbers to 1,000. This type of research was a Classroom Action Research consisting of 2 cycles. The subjects of this study were grade IVB students of SDN Julang Bogor City. The data collection technique of learning outcomes used objective tests and analyzed with descriptive percentages. The results of this study showed an improvement in both the learning process, changes in student behaviour, and learning outcomes. The learning process of cycle I with a percentage of 97% then cycle II increased to a percentage of 98%, in the change in behaviour of students cycle I with a percentage of 70%, then cycle II with a percentage of 90% and the results of the completeness of students learning outcomes in cycle I 54% were completed, then cycle II increased by 92% which was complete. All aspects studied had increased from cycle I to cycle II. Thus, it can be concluded that the implementation of the problem-based learning model can improve the learning outcomes of grade IVB students of SDN Julang Bogor City.

INTRODUCTION

Education according to Law Number 20 of 2003 concerning the national education system, education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, and Country. The purpose of education is the basic point to determine where the direction of education will be achieved, who will be the subject and object of education and what results will be achieved so that it will be seen how the process and path must be passed to realize these educational goals (Arifudin & Taryana, 2018; Arifudin, 2020). In the educational process, the position of teachers and learners is very important to achieve the expected quality.

One of the factors that affect the learning outcomes achieved by students includes the suitability of the use of learning models and continuity with the lives of students. Therefore, the use of learning models

must follow the material, so that the learning process is meaningful for teachers and students, to achieve learning objectives and achieve maximum results.

One of the learning models recommended by the Ministry of Education and Culture to improve student learning outcomes is the Problem-Based Learning (PBL) model. The PBL model is a learning model that uses real-world problems so that students are motivated to learn. The PBL model is a teaching method used by teachers in the learning process which can be enjoyed by students to improve students' critical thinking skills (Davita & Pujiastuti, 2020). By using the PBL model, it is hoped that the mathematics learning outcomes of class IV students at Julang State Elementary School can improve. Furthermore, PBL is learning that uses real problems in everyday life (authentic) which are open-ended to be solved by students to develop thinking skills and problem-solving skills, social skills, skills for independent learning, and building or acquiring new knowledge.

Based on observations in class IV.B SDN Julang Bogor City, mathematics learning was still relatively low. The predefined KKM was 75, the lowest value was 20 and the highest value was 80. Of the 26 students, 23% had achieved KKM, while 77% had scored below KKM. Learning can be said to be successful if at least 75% of students complete learning. This happened because mathematics learning tends to still use the lecture model in presenting the material. This caused many students who consider the process of learning mathematics to be something boring, monotonous, less fun, and various other complaints. So that it had an impact on the low learning outcomes of mathematics.

The subject of mathematics itself also has a purpose. According to the National Council of the Teachers of Mathematics (Marfu'ah et al., 2022), the objectives of learning mathematics are (1) Learning communication (math communication), (2) Thinking about mathematics (3) Solving problems (solving math problems), (4) Learn to associate ideas (mathematical relationships), and (5) Develop a positive attitude towards mathematics. One of the goals of mathematics learning can be achieved through the use of appropriate learning models that suit the characteristics of students so that apart from improving mathematics learning outcomes, students can also indirectly improve their thinking abilities.

The low learning outcomes of mathematics are caused by several factors, including the use of inappropriate models so that students only memorize not understand the material, students joke and are busy telling stories with their friends when the teacher is explaining the material. Learners also tend to be passive in learning. Therefore, it is necessary to update the teachers in carrying out learning that can improve mathematics learning outcomes to play an active role in the learning process.

According to Sarjianto (2019), learning outcomes consist of (1) verbal information, namely the ability to express knowledge in the form of language, both spoken and written, (2) intellectual skills, namely the ability to present concepts and symbols, (3) Cognitive strategies, namely skills and directing one's cognitive activities, (4) motor skills, namely the ability to carry out physical coordination in affairs and coordination, so that automatism of physical movements is realized, and (5) attitude is the ability to accept and reject objects offered to that object. So what is meant by learning outcomes are the results achieved or the level of success of students when carrying out learning activities at school which include cognitive, affective and psychomotor aspects, and can be in the form of patterns of actions, values, understanding, attitudes, appreciation or skills obtained from the results. tests on a certain amount of subject matter and are permanent. Good learning outcomes are obtained from several factors. One of them is the factor of using an appropriate learning model that can accommodate the characteristics of students in learning.

If this learning activity is left unchecked, the learning process is felt to be less meaningful. Students will not be active, and as a result, students' understanding is not in line with expectations. To overcome this, it is felt that there is a need for efforts to change the learning process by finding a learning model that suits the conditions and needs of students. One of them is by using the PBL model.

According to (Djonomiarjo, 2020), the PBL model is a cooperative learning model that requires students to be active and motivated students so that they can support and help each other in mastering the subject matter learned. In the PBL model, students do not just listen, handicap, and memorize the material delivered by the teacher, but are expected to be able to think critically, search, process data, and communicate in the learning process. So that learning can be on the side of students (Student Center).

Bachtiar et al. (2018) stated that the PBL model is a learning model designed based on real-life problems that are unstructured, open and promotes students' interests and cognitive abilities and allows them to learn in real-life contexts. PBL is also most often positioned as a student-centred learning activity guiding students, with a focus on students' active and collaborative creation of knowledge that encourages students to be involved in policies or cases and problems in the world (Setyorini & Wulandari, 2021). Rahmadani (2019) also stated that the PBL model is a learning model that is presented with various problems that exist around students, so students are required to solve these problems by using students' critical thinking. That way students can solve problems around them.

Based on the opinions above, the PBL model is a plan or set of components, or a pattern that educators use to design an interesting learning process in the classroom, where the problem presentation involves everyday life, and emphasizes students being able to think of critical and creative in solving problems. One of the subjects that require critical and creative thinking skills in solving problems and can be integrated with everyday life is mathematics.

Mathematics is the basic science of all science. Mathematics is usually considered the most difficult subject by some people, so quite a lot of people are found to not have basic numeracy skills. In line with this, according to Idris et al. (2023), the definition of mathematics is a set of knowledge related to various imaginary compositions and relationships between neatly arranged structures, so mathematics learning has specific characteristics that differentiate it from other scientific disciplines. Heryanto, Panjaitan, and Sembiring (2022) also stated that mathematics is a very important field of study for students to master because mathematics lessons are closely related to everyday life. So, learning mathematics cannot be learned once but requires time to be studied repeatedly because mathematics deals with numbers and formulas.

Therefore, based on the description above, researchers intend to conduct research in terms of improving student learning outcomes in mathematics subjects for grade IVB students. The purpose of this study is to determine the learning outcomes of grade IV students of SDN Julang on the implementation of problem-based learning models especially in mathematics subjects, operation materials, calculating, adding and subtracting numbers to 1,000.

METHOD

This study used a Classroom Action Research (CAR) approach. This research was carried out at SDN Julang, Tanah Sareal District, Bogor City. This research was conducted in the odd semester of the 2023/2024 academic year. The subjects of this study were students of class IVB SDN Julang with a total of 26 students consisting of 11 girls and 15 boys. This classroom action research procedure used the modified model design of the Ministry of National Education (2010) from the Kemmis and Taggart (1998) model. The Kemmis and Taggart Model Classroom Action Research design chart can be seen in Fig. 1.

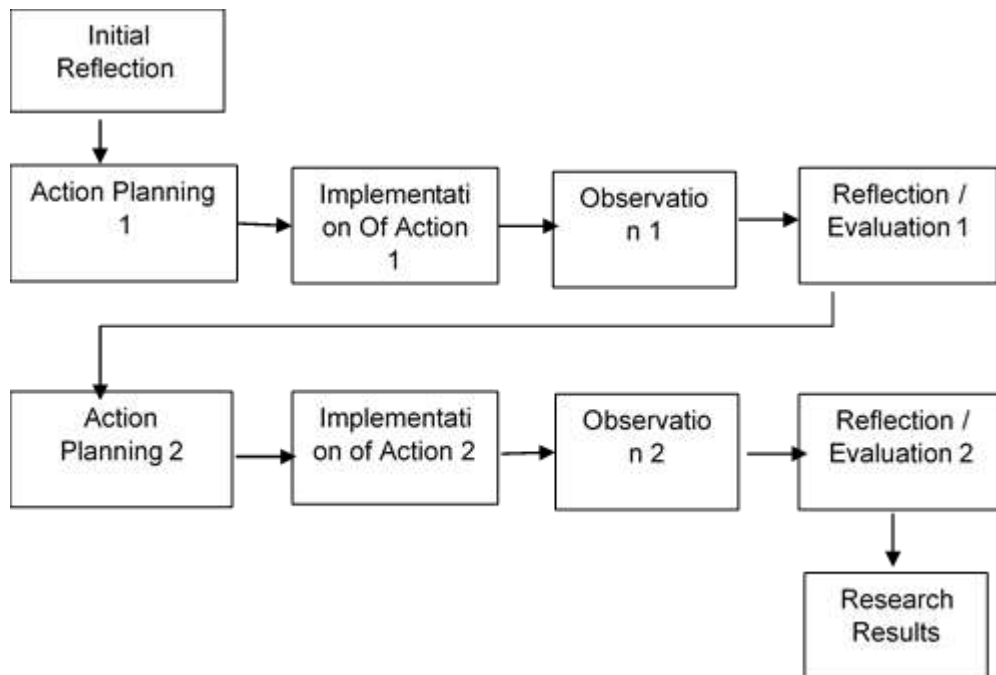


Fig. 1 Classroom Action Research Chart of the Department of National Education's Modified Model of the Kemmis and Taggart Model

The dependent variable in this study was learning outcomes, while the independent variable was the problem-based learning models. The data collection technique of learning outcomes used objective tests that were previously tested to test the validity, discriminating power, reliability, and difficulty of question items. Learning outcomes are measured by scores through posttests and analyzed with descriptive percentages on the material of operations to calculate the addition and subtraction of numbers to 1,000.

RESULTS AND DISCUSSION

In collaborative classroom action research activities starting from pre-cycle research activities, researchers make observations or observations of schools and students of grade IVB SDN Julang Tanah Sareal District Bogor City which aims to collect school objective data (school profile) and classes that will be used as research subjects. As for knowing the improvement in the learning outcomes of cycle I and cycle II can be seen in Table 1.

Table 1
Recapitulation of Research Results on Cycle I and Cycle II

Aspects Observed	Cycle Results (%)				Description
	Cycle I	Meaning	Cycle II	Meaning	
Learning process	97%	Very good	98%	Very good	Increase 1%
Changes in behaviour that appear in students	70%	Good	90%	Very good	Increase 20%
Completeness of learning outcomes	54%	Quite	92%	Very good	Increase 38%
The average value of learning outcomes	74%	Good	93%	Very good	Increase 19%

Based on Table 1, it can be seen that all aspects of research have improved. In cycle I the assessment of the learning process reached a value of 97% with very good interpretation, in cycle II learning improvements were made so that the value of the learning process increased to 98% with a very good category. Changes in behaviour in learners also increased, in cycle I reaching an average of 70% with good interpretation. After improvements were made in cycle II, the value of changes in student behaviour increased to 90% with a very good interpretation. Aspects of learning outcomes have also improved. In cycle I, the completeness of learning outcomes of class IVB students only reached 54% which exceeded KKM. then increased by 38% in the second cycle to 92% and exceeded KKM. The recapitulation of the results of cycle I and cycle II research can be illustrated in Fig. 2.

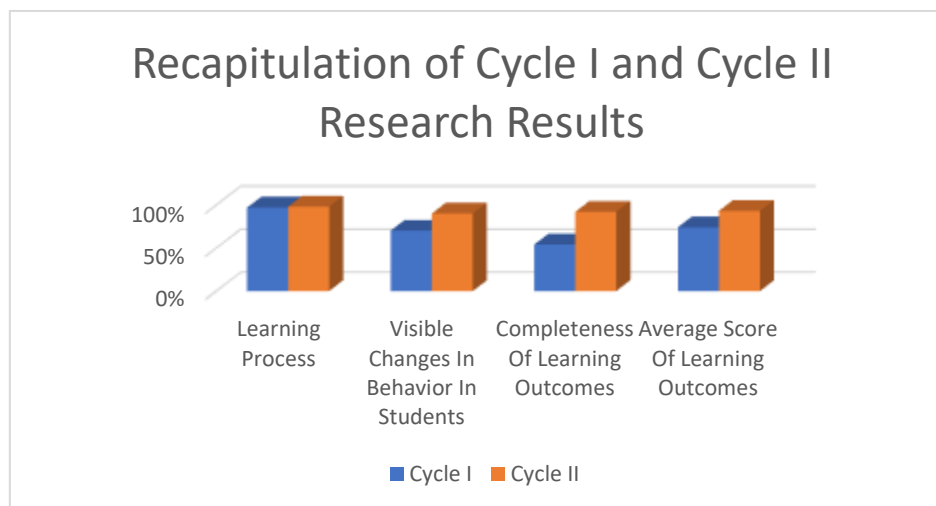


Fig. 2 Recapitulation of Research Results on Cycle I and Cycle II

This research was carried out with a collaborative classroom action research approach on grade IV.B students of SDN Julang Bogor City for the 2023/2024 academic year. In grade IV SDN Julang there are 3 classes with an average class of 26 students each. As for the subjects of research in class IVB which amounted to 26 students consisting of 15 boys and 11 girls. After this classroom action research, learning is more actively involved learners. Teachers act as motivators and facilitators. The implementation of the PBL model has increased student learning outcomes in mathematics learning. The discussion of research results that will be discussed is the process of implementing learning, changes in the behaviour of students that appear, and improving learning outcomes. The process of implementing learning using the PBL model from cycle I to cycle II has increased. In cycle I, the results of the assessment of learning implementation with an average value of 97% and exceeded the 75% success indicator which is included in the very good classification. Then in cycle II, the implementation of the learning process increased with an average value of 98% with very good interpretation and exceeded the success indicator by 75%. Then the changes in student behavior that appear from cycle I to cycle II have increased. In cycle I, the average value of changes in student behaviour that appears is 70% with good interpretation and has not exceeded success indicators. In cycle II, the average value of changes in student behaviour becomes 90% with very good interpretation and has exceeded the success indicator by 75%. Finally, the increase in student learning outcomes from cycle I to cycle II has also increased. In cycle I, for students who achieved KKM as many as 14 people, the completeness of student learning classically was 54% with a fairly good interpretation. Then in cycle II, the completeness of learning of students who reached KKM as many as 24 people classically, which is 92% with very good interpretation and has exceeded KKM.

Based on the research results, it shows that this increase is due to several things. First, the success or failure of a lesson cannot be separated from the role of a teacher. A teacher is required to be able to develop the quality of learning so that student learning outcomes can improve. Student learning

outcomes increase, one of the reasons is that teachers apply appropriate learning models. Following the opinion of Syahputra (2020) who stated that student learning outcomes are not all the same, some students get satisfactory results and some are unsatisfactory. This cannot be separated from the methods, methods and learning models that a teacher uses to explain the lessons given. Learning methods, methods and models like this must be created so that students are interested in the lessons given.

Following the results of this research, the use of learning models is very important in improving student learning outcomes. One of the learning models used is the PBL model, where this model can improve learning outcomes, learning motivation, and learning activities, and make the class atmosphere more interesting and enjoyable. In line with this, Kusnandar (2019) expressed his opinion about the PBL model which provides conditions for improving thinking and analysis skills and solving problems in everyday life so that it will create a culture of thinking in students, as well as a problem-learning process. Based Learning also requires students to play an active role in learning activities that are not only limited to the teacher so that it can improve student learning outcomes on the learning material presented. It's just that in certain problems, of course, this learning model has shortcomings, namely: (1) this model requires getting used to in its implementation because students are required to concentrate fully and have high creative power; (2) the learning process requires quite a long time; (3) students who do not have security related to the problems discussed will find it more difficult to learn; and (4) sometimes teachers have difficulty in asking students trigger questions, so teachers prefer to directly tell what is meant (Kurniasih and Berlin, 2016).

In addition to observing the results of classroom implementation assessments of learning implementation, researchers also carried out observations of students' attitudes and skills during learning activities. Similarly, as stated by Sudjana (2016) is that in essence, student learning outcomes are changes in behaviour in a broad sense including the cognitive, affective, and psychomotor fields.

CONCLUSIONS

The implementation of the PBL model is one way that can be applied in the teaching and learning process because the PBL model can create effective learning and improve student learning outcomes. In the PBL model, students are taught to be able to solve the problems they are facing and students are required to solve a problem to hone students' thinking skills that can improve learning outcomes. In this study, three things are considered, namely the learning process, changes in behaviour that appear in students and student learning outcomes. The learning process of cycle I with a percentage of 97% then cycle II increased to a percentage of 98%, in the change in the behaviour of students cycle I with a percentage of 70%, then cycle II with a percentage of 90% and the results of the completeness of students' learning outcomes in cycle I 54% were completed, then cycle II increased by 92% which was complete. All aspects studied had increased from cycle I to cycle II. It can be concluded that the implementation of the PBL model in mathematics subjects of operation materials, calculating, adding and subtracting numbers to 1,000 can improve the learning outcomes of grade IVB students of SDN Julang, Tanah Sareal District, Bogor City, semester 1 of the 2023/2024 academic year.

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