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Implementation of problem based learning model assisted by powerpoint and space building props on the surface area of cubes and beams in fourth grade students SDN Teluk Pucung I

Oriza Sativa[1], Dena Aryani Putri[2], Aliyatun[3], Fakor[4], Sahabudin[5]

[1]Teluk Pucung Elementary School, [2]SDIT Manjul, [3]SDN Tanjung Lesug, [4]SDIT Al-hikmah, [5]SDN Jero Wangi II

*oriza.sativa131292@gmail.com

ABSTRACT

One of the efforts to overcome students' low understanding of the material surface area of cubes and blocks is through the application of innovative learning models. The research aims to improve students' understanding of the material of the surface area of cubes and blocks through Problem Based Learning models assisted by powerpoint media and props for building cubes and blocks. The study used the collaborative classroom action research model of Kemmis & Mc Taggart. The participants of the study were 16 students consisting of 10 female students and 6 male students in grade VI SDN Teluk Pucung I. Researchers collected data through observation, interview, and test techniques. Observation and interview techniques are useful for obtaining data on the implementation of research. Meanwhile, test techniques are used to measure students' understanding in the form of description questions. Researchers analyze data through three stages, namely reducing data, presenting data, and drawing conclusions. The data that has been analyzed is then validated through triangulation techniques. Research findings show an improvement in reading skills in each cycle. Referring to the research findings, the researcher concluded that the application of the Problem Based Learning model assisted by powerpoint media and teaching aids for building cubes and blocks can increase students' understanding of the material surface area of cubes and blocks.

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1. INTRODUCTION

Education is one of the most important roles for humans. Without education, humans will experience difficulties in living their lives. The success of learning mathematics in elementary school is the main key to the role of the teacher (Lugina & Artiani, (2022). Teachers are required to be creative in using appropriate media, methods and props on the material, so that the learning process takes place to be conducive and fun so that students easily understand the concept of the material being taught. In addition, teachers need to understand student characters.

Types of mathematics learning difficulties in elementary school children according to Wiwin, et al (2023) The factors that cause learning difficulties consist of student personal factors related to student learning habits, factors of mastery of material concepts, and factors of providing teacher assistance.

Based on the results of observations of mathematics learning that has been carried out in class VI, the percentage of students' understanding of mathematical concepts is still very low. This can be seen from the average score of class VI on students' math tests obtained only reached 62, especially on the material of the surface area of building spaces, as shown in the following table 1.

Table 1. Data of Students in Obtaining Evaluation Results of Subjects Mathematics lesson on surface area of cubes and blocks

No.	Value	Number of students	Description
1.	75	4 students	• Highest score = 75
2.	65	3 students	• Lowest score = 50
3.	60	5 students	• Average = 62
4.	50	4 students	• KKM = 75
Total	995	16 students	

Source: Results of student grades at SDN Teluk Pucung I

From the table above, it can be seen that the good category score was only obtained by 4 students out of 16 students in class VI, while the others obtained sufficient and insufficient scores. From this data, the class average score is 62. This is still far from the expectations in achieving the targeted Maximum Completeness Criteria (KKM) of 75. Based on this data, it can be concluded that students have not achieved success in understanding, especially in the material of the surface area of cubes and beams.

Some possible causes of students' low understanding of the surface area of cubes and beams material so that it results in low class average scores and classical completeness that is not achieved are: (1) when learning about the surface area of cubes and beams, students often make mistakes in the use of formulas, (2) when students are given the task of calculating the surface area of combined cubes and beams, most students are unable to solve the problem, this is because students tend to like to look for the easy ones without being accustomed to thinking critically, so that mathematics becomes a difficult lesson to understand for grade VI students, (3) the use of teaching aids used by teachers pays less attention to the utilization of learning media in helping students' understanding of mathematical concepts, (4) teachers have not used a variety of methods or models so that when the learning process takes place the teacher is always active, (5) the lack of student roles in activeness when learning activities take place makes students always passive, most

likely the material absorbed is only memorization not accompanied by meaningful concepts and learning and is not memorable to students.

Such conditions, if left unchecked, will adversely affect the quality of mathematics learning in class VI. One alternative problem solving that teachers can choose is to apply mathematics learning to the material of the surface area of cubes and beams with the Problem Based Learning model assisted by powerpoint and building props. So that students can understand the material of the surface area of cubes and blocks and learning becomes memorable and easy to understand. As according to Aprilianti, Rahayu,. Suwangsih, (2023) stated that the solution to improve students' understanding of the material of the surface area of the building space can apply the Problem Based Learning model, making students get the widest possible opportunity to be able to analyze and solve a problem both individually and in groups accompanied by teacher guidance, so that students can exchange information, ideas or ideas they have. In accordance with these characteristics and the advantages of the Problem Based Learning model according to Seo Management, (2022) students are trained to be able to always use critical thinking, can be skilled in solving a problem, in order to trigger an increase in the activity of students in the classroom, with learning while practicing, this learning system makes students accustomed to learning but using relevant sources, a more conducive and effective learning activity, this arises because students are required to be active.

As well as displaying learning powerpoint media to be more effective, professional, and also easy. So that it is more interesting and clear. And the use of teaching aids can facilitate student understanding because mathematics teaching aids can be interpreted as a set of concrete objects that are designed, made, and arranged intentionally which are used to help instill and understand concepts or principles in mathematics.

2. METHODS

The type of research used in this study is Classroom Action Research. The classroom action that will be carried out by the research team and the teacher is designed to consist of three cycles. The spiral PTK research approach model refers to the opinion expressed by Kemmis and Mc.Taggart (2014) which is essentially a device consisting of four components, namely planning, action, observation, and reflection, the four of which constitute one cycle.

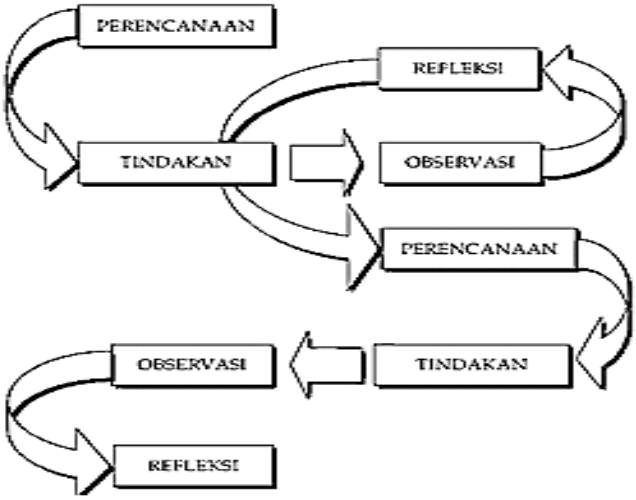

Figure 1. Kemmis and Mc.Taggart's PTK Model

In obtaining qualitative data in the form of observations of the learning process and interview results related to data and facts about learning Mathematics in class VI, researchers used non-test techniques, namely observation and interviews. Meanwhile, to obtain quantitative data, researchers used test techniques to determine Mathematics learning outcomes. This test is given to students in the form of 5 description questions on the material of the surface area of cubes and blocks.

The research instruments used included observation sheets, interview sheets, and test/question sheets. Observation sheets for teachers and students were used by researchers to assess the learning process that took place in the classroom. Interview sheets were used by researchers to obtain data and information from teachers directly related to how mathematics learning in class VI. As for the test sheet / questionnaire used by researchers to obtain student learning outcomes. The questions given were in the form of 5 question descriptions.

The purpose of this test is to determine the learning outcomes of grade VI students at SDN Teluk Pucung I in the mathematics subject matter of the surface area of cubes and blocks.

Table 2. Data collection instruments

Engineering	Subject	Instrument	Observed data
Observation	Teachers and students	Observation sheet	Learning activities that take place in class
Interview	Teacher	Interview sheet	Teacher data, student data, process data and learning constraints
Test	Students	Test sheet/question	Student learning outcomes on the surface area of cubes and beams

In this study, descriptive qualitative data analysis and quantitative descriptive data analysis were carried out. Qualitative descriptive analysis is used by researchers to examine data in the form of sentences, such as observation results and interview results. While quantitative descriptive analysis is used by researchers to examine data in the form of numbers such as student learning outcomes tests.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Pre-cycle Result

The implementation of this pre-cycle activity is to determine the understanding of students' concepts in mathematics lessons on the surface area of cubes and blocks. The results of the pre-class data acquisition can be seen as shown in the following table 3.

Table 3. Data on Students in Obtaining Evaluation Results for Mathematics lesson on surface area of cubes and blocks

No.	Value	Number of students	Description
1.	75	4 students	• Highest score = 75
2.	65	3 students	• Lowest score = 50

No.	Value	Number of students	Description
3.	60	9 students	• Average = 64
Total	**1.031**	**16 students**	• KKM = 75

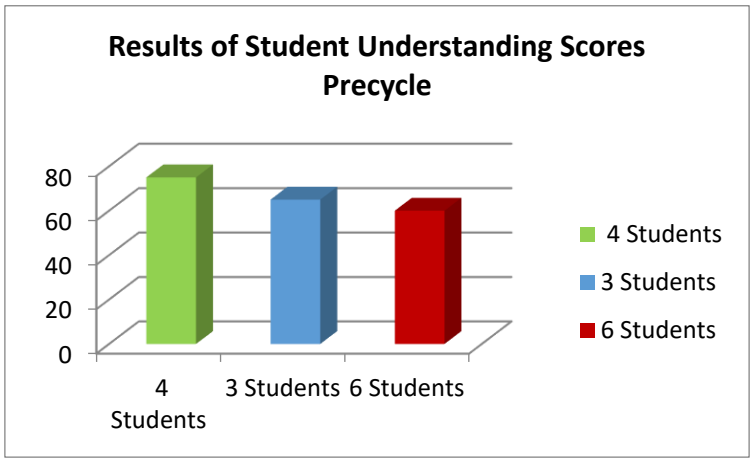

Figure 2. Student Comprehension Results Surface area of cubes and blocks
Source: Results of student grades at SDN Teluk Pucung I

This is an improvement in the implementation of learning process activities in terms of props and methods applied so that students participate actively not only listening but learning can be memorable and meaningful to students and not boring, so by applying the PBL model using props in the first cycle.

3.1.2 Cycle I Results

To obtain student data results, namely by conducting a pretest in the form of a description in the form of LKPD and posttest in the form of PG (Multiple Choice) questions. The results can be seen in the following table 4.

Table 4. Data on Students in Obtaining Evaluation Results for Mathematics lesson on surface area of cubes and blocks

Average *Pretest* Score	*Posttest* Mean Value
69	70

The average value of the pretest in the form of LKPD questions obtained an average value of 69 while in the posttest in the form of PG (Multiple Choice) questions obtained an average value of 70, thus the posttest value increased by 1% from the pretest value. However, the average score in cycle I was still below the KKM score.

From the description, it can be seen that:

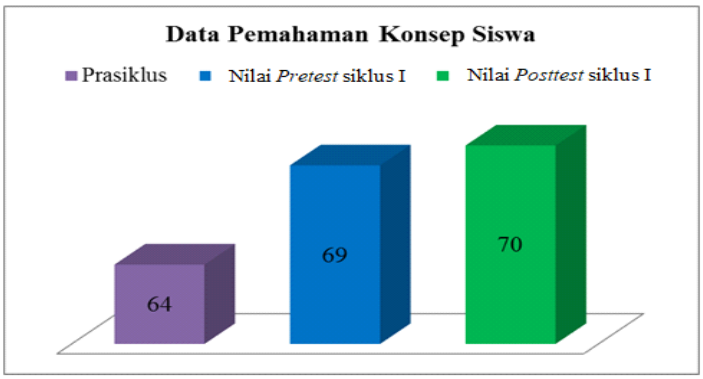

Figure 3. Student Comprehension Results Surface area of cubes and blocks
Source: Results of student grades at SDN Teluk Pucung I

This is an improvement in the implementation of learning process activities for cycle 2 using the Problem Based Learning model assisted by powerpoint and space props on the surface area of cubes and blocks.

3.1.3 Cycle II Results

The results of observations or observations about the activities of the learning process taking place on the surface area of cubes and beams in class VI through the concept understanding model using the PBL model assisted by powerpoint and space building props in cycle II got the following results:

Table 5. Data on Students in Obtaining Evaluation Results for Mathematics lesson on surface area of cubes and blocks

***Pretest* Mean Score**	***Posttest* Mean Value**
85	94

The average value of pretests in the form of LKPD questions obtained an average value of 85 while in the posttest in the form of PG (Multiple Choice) questions obtained an average value of 94, thus the posttest value increased 9% from the pretest value. In the results of the acquisition of the average value in cycle II has reached the KKM value.

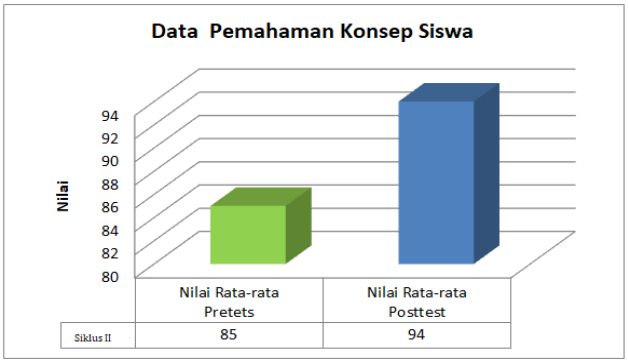

Figure 4. Student comprehension results Surface area of cubes and blocks
Source: Results of student grades at SDN Teluk Pucung I

The activities obtained from starting the pre-cycle, cycle I and cycle II have increased to meet the completeness above the KKM value. As shown in the following table 6.

Table 6. Student data in obtaining evaluation results for the following subjects Mathematics Lesson on Surface Area of Cubes and Blocks

Pre-cycle	**Cycle 1 *pretest***	***Posttest* cycle 1**	**Cycle 2 *pretest***	***Posttest* cycle 2**
64	69	70	85	94

From this description can be seen in the diagram below:

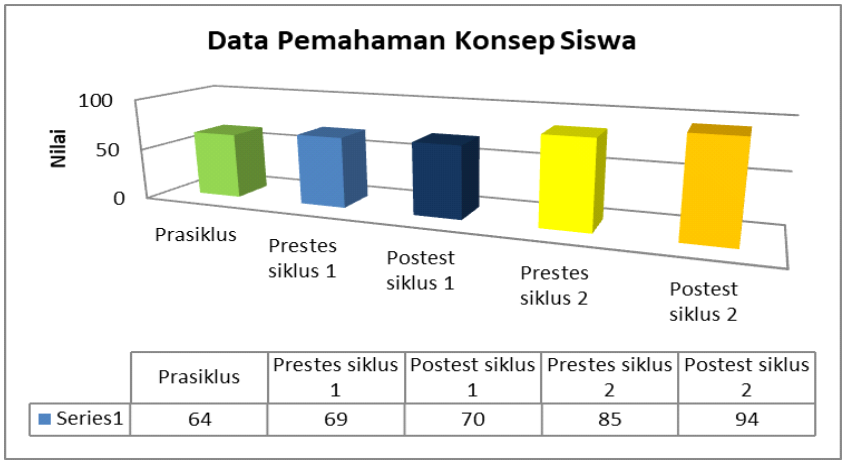

Figure 5. Student Comprehension Results Surface area of cubes and blocks
Source: Results of student grades at SDN Teluk Pucung I

Based on the results of the above research, the finding of the research results is that there is a significant increase in learning outcomes through student activities using the Problem Based Learning model assisted by powerpoint and space props can improve student understanding in mathematics subjects on the surface area of cubes and blocks.

3.2 Discussion

The results showed that with the PBL model can improve student learning outcomes on the surface area of cubes and beams. This can be seen from the increase in completeness of each cycle, this condition is certainly inseparable from how the learning process is carried out. Project Based Learning (Problem Based Learning) is a learning model that uses projects or activities as media. According to Kemdikbud (2013), students conduct exploration, assessment, interpretation, synthesis, and information to produce various forms of learning outcomes.

The steps of the learning process carried out by the teacher are appropriate starting from the preliminary activities which include opening (greetings), reading prayers, asking for news, checking student attendance, doing ice breaking, making apperceptions and conveying the learning objectives to be achieved that day. Continued to the core activities based on the Problem Based Learning model which consists of five learning syntaxes.

The first syntax, orienting students to the problem, where the teacher gives problems to students to find solutions. This first syntax is a syntax that determines the success in implementing the problem-based learning model Ayuningsih, D., et al. (2019). In problem orientation activities, students are very responsive where students immediately ask what they do not understand and immediately think and feel curious about how to solve the problems given.

The second syntax organizes students to learn, students will be grouped into three groups. In this second syntax the teacher forms groups of students into three groups where the group consists of 5-6 members, after dividing the group the teacher gives LKPD questions to students to solve the problems given in the initial activity.

The third syntax guides group inquiry. When solving problems, students are given the opportunity to discuss solving problems from these problems with their respective groups. When conducting discussions with their groups, almost all students play an active role and work together to work on LKPD problems. As for the attitude of students during discussion activities per group, in group 1 students divide the task when working on LKPD.

There are parts of cutting, drawing and coloring the same side on the side of the cube or the side of the beam, in group 2 there seems to be less cooperation in the group because 3 people are working and 2 people are not working and chatting instead, in group 3 all members participate in doing one job so it is not divided - divide the task so that there is a delay between other groups, in group 3 all members work well together so that the work becomes faster and get satisfactory results. In addition, students also get guidance from the teacher about the extent of the solution that has been found as well as the difficulties experienced.

The fourth syntax develops and presents the work. Each group makes a presentation to convey the results of group discussions on the problems given.

The fifth syntax analyzes and evaluates the problem-solving process. In the implementation of this fifth syntax, students are assisted by the teacher to summarize the activities of the previous presentation results, then given reinforcement of the material by the teacher. As well as an opportunity for students to ask again about the material being discussed. For the closing activity, there is the delivery of conclusions by students with the direction of the teacher about the things that have been learned today. In addition, working on evaluation questions, providing follow-up for students, praying and greetings.

The results of researcher observations during learning activities in class VI students of SDN Teluk Pucung I show that almost all students seem to pay attention to the explanations explained by the teacher. So that students get sufficient score results, namely with an average score of 94, but most students do not answer correctly on question number 4, namely mentioning the difference between the nets of cubes and the nets of blocks. Judging by the answers of students who are still less precise, the teacher must explain in more detail so that students do not confuse or confuse which side, rib, length, and shape are. In addition, it also appears that when solving the problems raised, students are very interested in the topic of the problem.

This is supported by the condition of the classroom which is crowded by problem discussions as well as student activeness in playing concrete media cube and beam models to find solutions to these problems. This condition is in line with one of the previous studies conducted by Aprilianti,. Rahayu, Suwangsih, (2023). Suggesting that the solution to improve students' understanding of the material of the surface area of the building space can apply the Problem Based Learning model, making students get the widest possible opportunity to be able to analyze and solve a problem both individually and in groups accompanied by teacher guidance, so that students can exchange information, ideas or ideas they have.

5. CONCLUSION

Based on the research that has been done, it can be concluded that the application of the Problem Based Learning model assisted by powerpoint media and props of cube and beam spaces can improve student understanding of the surface area of cubes and beams.

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