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Increasing Motivation And Cognitive Learning Outcomes Of Grade 4 Elementary School Students In Science Subjects, Material On Changes In Form Of Objects Through The Project Based Learning (PjBL) Learning

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Abstract. The aim of this research is to improve learning outcomes in science subjects by applying the PjBL learning model to students in class 4A of SD Muhammadiyah 1 Ketelan Surakarta and to increase motivation to learn science subjects by applying the PjBL learning model to students in class 4A of SD Muhammadiyah 1 Ketelan Surakarta. This type of research is classroom action research using a qualitative and quantitative approach. This class Action Research consists of 2 cycles, each cycle consists of 4 stages, namely: (1.) Planning; (2.) Implementation of Action; (3.) Observation and Evaluation; (4.) Reflection. The results of classroom action research showed an increase in student motivation, which was initially 57%, increasing by 5% to 62%. As well as increasing student cognitive learning outcomes, in cycle II the number of students who got a score > 80 increased to 25 students or as much as 96% and students who got a score < 80 decreased from the initial 4 students to 2 students or as much as 4%. it was concluded that the learning outcomes usedProject Based Learning can increasing motivation and learning outcomes for grade IV science at SD Muhammadiyah 1 Ketelan Surakarta for the 2023/2024 academic year.

Keywords : Project Based Learning, Learning Outcomes, Students, Science

INTRODUCTION

In science learning, real activities are important in determining the meaningfulness of learning because students' way of thinking at elementary school level still tends to be concrete. However, in reality, real activities are still very minimal in science learning at elementary school level, this causes student motivation when learning takes place tends to not be optimal so this also affects student learning outcomes.

science learning strategies should be planned in such a way by considering the progress of Science and Technology (Te et al., 2023)

With interesting learning, students will be more interested in learning. However, choosing this method not only attracts students' interest but is expected to have an impact on improving student learning outcomes and making students play an active role in learning activities. (Nuryana et al., 2021)

By implementing the PjBL learning , making learning enjoyable for students and increasing student learning activity in science learning in basic education can be achieved. Apart from that, it can also improve the implementation of the current curriculum and increase understanding and create a conducive learning atmosphere. (Te et al., 2023)

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Based on the results of observations in class 4A of SD Muhammadiyah 1 Surakarta, learning activities have indeed used media combined with ICT media such as through showing videos or power points via LCD, but practical activities have not been carried out optimally so that student motivation in the learning process is still not optimal and the results Student learning has not yet achieved the expected results. Therefore, researchers chose the PjBL learning model to improve learning outcomes and increase student activity in learning because according to (Latifah et al., 2021). The learning method using the PjBL learning model is a very effective learning method for helping students find answers to questions such as: How do I organize it? How does the process work? What is the process of doing it.

Through this PjBL learning model, students can learn to be more active in expressing their opinions and the atmosphere is conducive to developing knowledge, attitudes, activeness and social skills such as cooperation skills that are beneficial for their lives in society (Latifah et al., 2021).

Motivation comes from the word motive, namely the condition within an individual that encourages the individual to carry out certain activities, whether consciously or not, to achieve certain goals (Andriani, 2019). A person who has motivation to learn will be seen from his attitude in learning activities. The characteristics of students who have motivation to learn include: (1) diligent, students are able to work continuously for a long time and do not procrastinate their work. (2) tenacious, when facing difficulties a student will not give up and give up and even they do not need external encouragement. (3) have an interest in various problems, are able to face a problem. (4) work independently. (5) tend to like challenges so they easily get bored with routine things and lack creativity. (6) have a strong opinion, especially if his opinion is correct (Syachtiyani & Trisnawati, 2021).

Learning outcomes are essentially changes in a person's behavior as a result of the learning process. These changes can take the form of knowledge, understanding, skills and attitudes which are usually expressed in the form of numbers or letter symbols with predetermined criteria. The learning outcomes obtained by students can provide information about students' abilities to understand the learning material explained by the teacher in the teaching and learning process in class (Irawati et al., 2021).. This is in line with the opinion of (Rahmawati, 2020) which states that learning outcomes are the results that have been achieved by students after learning activities in a predetermined subject within a predetermined time. So, it can be said that learning outcomes are the results that students have achieved after learning which also provides changes to the students themselves.

Science is broad human knowledge, obtained by systematic observation and experimentation, and explained through rules, laws, principles, theories and hypotheses. According to Hungeford, Volk and Ramsey science is (1) the process of obtaining information through empirical methods, (2) information obtained through investigations that have been organized logically and systematically, and (3) a combination of critical thinking processes that produce information which can be trusted and valid. 2021).Science is the science of humans in groups known as society using political science, economics, history, sociology, anthropology, and so on (Sulistianah, 2021).

The project-based learning model is a teaching model that encourages students to gain new knowledge based on experience through real activities (Sulistianah, 2021). The aim of PjBL is to improve students' abilities in solving project problems, acquire new knowledge and skills in learning and make students more active in solving complex project problems with real product results (Kahar & Ili, 2022).

The use of experimental methods in science learning has been proven to be able to increase students' motivation and learning outcomes, this is proven by several studies which became references in preparing this research, including: 1.) research from (Apriany et al., 2020) entitled "Influence Application of the Project Based Learning (PJBL) Learning Model on Students' Cognitive Learning Outcomes in Science Subjects in Class V of SD Negeri 5 Bengkulu City" where the research states that overall there is an influence of the PjBL learning model on students' cognitive learning outcomes in science subjects. 2.) Research from (Sumarni, 2020) with the research title "Application of the Project Based Learning (Pjbl) Model to Improve Student Activities and Learning Outcomes in Science Subjects Concerning the Properties of Light in Class V A Semester II for Elementary School Students in Bantardekang 1 Academic Year 2017/2018" which states that the project based learning model really helps students increase their activities and achieve better learning outcomes.

There are quite significant changes in student learning outcomes compared to the learning outcomes achieved by students before using the project based learning model. As proof, the average completion rate in the initial condition was only 31.43%, then learning outcomes increased after cycle 1 to 77.14%, and further increased in cycle II to 94.29%. 3.) research from (Elisabet et al., 2019) with the research title "Improving Motivation and Science Learning Outcomes by Using the Project Based Learning (PjBL) Learning Model", states that using the Project Based Learning model is able to help students increase motivation and learning outcomes in science subjects.

The formulation of the problem in this research is: Can the application of the PjBL learning model improve the learning outcomes of class 4A students at SD Muhammadiyah 1 Ketelan Surakarta in science subjects? ; Can the application of the PjBL learning model increase the learning motivation of class 4A students at SD Muhammadiyah 1 Ketelan Surakarta in science subjects?

The objectives of this research are: To improve learning outcomes in science subjects by implementing the PjBL learning model for class 4A students at SD Muhammadiyah 1 Ketelan Surakarta; To increase motivation to learn science subjects by applying the PjBL learning model to class 4A students at SD Muhammadiyah 1 Ketelan Surakarta

METHOD

This research was carried out at SD Muhammadiyah 1 Surakarta on November 2 2023 and November 16 2023. This research was carried out during the science and science learning process with material on changes in the shape of objects consisting of 2 cycles. This type of research is classroom action research using a qualitative and quantitative approach. This class Action Research consists of 2 cycles, each cycle consists of 4 stages, namely: (1.) Planning; (2.) Implementation of Action; (3.) Observation and Evaluation; (4.) Reflection

The research subjects were class 4A students at SD Muhammadiyah 1 Surakarta, consisting of 26 students. Research procedure, Cycle I, first planning, includes designing teaching modules, preparing student activity assessment rubrics consisting of student activity in science practicum, group discussions and group presentations. Second, implementing teaching modules, implementing actions including forming groups, and directing project activities. Third, observation during group discussions and presentations. Finally, do reflection, where at this stage the results of observations from the ongoing learning process are collected and analyzed as a reflection on whether the learning has been carried out according to plan so that improvements can be made in the next cycle.

Cycle II, first planning, includes designing teaching modules, preparing student activity assessment rubrics consisting of student activity in science practicum, group discussions and group presentations. Second, implementing teaching modules, implementing actions including forming groups, and directing project activities. Third, observation during group discussions and presentations. Finally, do reflection, where at this stage the results of observations from the ongoing learning process are collected and analyzed as a reflection on whether the learning has been carried out according to plan.

Data collection techniques include observation, documentation, test questions and rubrics. Observations are carried out to observe students' responses in receiving learning and are used to observe the activities carried out by teachers in delivering learning so that they can find out the extent of conformity between the learning plans that have been designed. The data collection technique in this research was carried out using an observation sheet for student activity data in active group discussions and presentations. Documentation is used to show activities that have been carried out during research. The test questions used are written tests, this test is carried out to determine the extent of students' understanding of the material being taught.

Rubrics are used to measure the level of learning motivation that students have. To check the validity of the data and the validity of the data, several steps can be taken, namely:*:Member Check,* namely checking the truth and validity of the data source;*Audit Trail*, namely checking the correctness of the research results along with procedures and data collection methods by discussing the results obtained with the group; The author will hold discussions to check the correctness of the data with observers, examine the ins and outs of students, as well as assess students' understanding of the material on changes in the form of objects.

The data analysis technique is data reduction, data presentation and conclusions. At the data reduction stage, the data is reviewed again and separates data that is considered important and not important. This stage was repeated to check for possible errors in classification. At the data presentation stage, The data that has been classified is then described taking into account the focus and objectives of the research. Describing data can be done in narrative form, making graphs or arranging it in table form. At the conclusion level, Researchers make conclusions based on data descriptions in the form of research results reports.

The indicators that are aspects of success in this research are: There is an increase in student learning activities in science learning; Increased student learning outcomes are short-term learning outcomes as shown by an increase in average scores

DISCUSSION

Based on the results of research using the Project Based Learning (PjBL) learning model from cycle I to cycle II, the researchers experienced improvements as expected.

In this research, at the final stage of each cycle, students are asked to work on evaluation questions, where these evaluation questions can measure student learning outcomes in science

subjects. The following are the results of a comparison of learning outcomes in learning science subjects from cycle I to cycle II

Table 1. Results of Observation of Student Motivation in Cycle I

NO.	Aspects	Score	Percentage
1.	Diligent in facing the task	48	57% (From a maximum score of 390)
2.	Tenacious in facing difficulties	45	
3.	Show interest in various problems.	42	
4.	Enjoys finding and solving problems.	46	
5.	Believe in what they do.	44	
Total		225	

Based on Table I, it can be seen that students got a score of 48 for the aspect of diligently facing tasks, while in the aspect of being tenacious in facing difficulties students got a score of 45, then in the aspect of showing interest in various problems, students got a score of 42, students got a score of 46 for the aspect of enjoying finding and solving problems, and getting a score of 44 in the aspect of believing in what he is doing. So that the total score for all aspects, students get 225 motivation scores out of 390 maximum scores or 57%.

Table 2 Results of Observation of Student Motivation in Cycle II

NO.	Aspects	Score	Percentage
1.	Diligent in facing the task	51	62% (From a maximum score of 390)
2.	Tenacious in facing difficulties	49	
3.	Show interest in various problems.	46	
4.	Enjoys finding and solving problems.	48	
5.	Believe in what they do.	47	
Total		241	

Based on Table II, it can be seen that students got a score of 51 for the aspect of diligently facing tasks, while in the aspect of being tenacious in facing difficulties students got a score of 49, then in the aspect of showing interest in various problems, students got a score of 46, students got a score of 48 for the aspect of enjoying finding and solving problems, and getting a score of 47 in the aspect of believing in what he is doing. So that the total score for all aspects, students obtained 241 motivation scores out of 390 maximum scores or 62%. This shows an increase in student motivation, which was initially 57%, increasing by 5% to 62%.

Table 3. Results of Student Cognitive Tests for Cycle I and Cycle II

NO.	Total score	Criteria	Cycle I		Cycle II	
			Frequency	(%)	Frequency	(%)
1.	80-100	Passed	22	85%	25	96%
2.	< 80	Failed	4	15%	1	4%
Total			26	100%	26	100%

Based on the table above, it shows that students' cognitive test results have increased. In cycle 1 there were 22 students who got a score > 80 or 85% of students completed the cognitive test and 4 students who got a score < 80 or 15% did not complete the cognitive test. In cycle II the number of students who got a score > 80 increased to 25 students or as much as 96% and students who got a score < 80 decreased from the initial 4 students to 2 students or as much as 4%. This shows that there is an increase in cognitive learning outcomes for students.

CONCLUSION

Based on the results of classroom action research carried out on fourth grade students at SD Muhammadiyah 1 Ketelan Surakarta for the 2023/2024 academic year, with the title: Increasing Motivation and Learning Outcomes for Grade 4 Elementary School Students in Science Subjects Through the Project Based Learning (PjBL) Learning Model. With using this model can increase motivation and science learning outcomes, this can be seen from the percentage of student learning motivation which increased by 5% from initially 57% to 62%. Apart from that, of the 26 students initially in cycle I, there were 4 students who still got a score <80. Then in cycle II the number of students who got a score <80 was reduced to just 1 student. In this research it was proven that the action hypothesis through the Project Based Learning (PjBL) learning model could increase motivation and science learning outcomes for class IV of SD Muhammadiyah 1 Surakarta for the 2023 academic year/ 2024. Thus, this research has achieved the performance indicators set by the researcher. Based on the results of this research, it is recommended that teachers, especially in science subjects, can use the Project Based Learning (PjBL) learning model as an alternative learning model in the future.

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