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Project-Based Learning: An Innovative Learning Model to Improve the Understanding of Science in Fifth-Grade Students

Fiskawati Derate Asprila[1], Singgih Subiyantoro[2*]
[1,2] Universitas Veteran Bangun Nusantara, Indonesia
fiskaasprila16@gmail.com[1], singgihsubiyantoro@univetbantara.ac.id[2*]
*Corresponding Author

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ABSTRACT

The lack of understanding of elementary school students in the subject of science, especially the material on the human digestive system, is the background of this study. The purpose of this study is to improve the understanding of fifth-grade students on the material on the human digestive system by using the Project-Based Learning (PjBL) learning model. The method used in this study is classroom action research consisting of 2 cycles with four stages, namely planning, action, observation and reflection. The data analysis techniques used in this study are participatory observation techniques, data utilization techniques and document data analysis. The subjects of the study were 15 fifth-grade students. The results of the study showed that students' understanding increased after the PjBL model was applied, as evidenced by the percentage of students' average scores in the pre-cycle not reaching the criteria for achieving learning objectives; then in cycle I, the score increased by 13% and in cycle II it increased by 20%. This research is expected to contribute to educational institutions to provide information in improving the quality of education.

Keywords: *Project-Based Learning, student understanding, science, human digestive system*

Introduction

Education is a conscious and planned effort to create an environment and learning process where students actively develop their potential to become people who have spiritual strength, self-control, personality, intelligence, noble character, and skills needed for themselves, society, nation and state (Imiah Pendidikan dan Pembelajaran et al., 2020). Education serves as a means to improve the quality of human resources in terms of intellectual, personality, and character development. This will strengthen the foundation of a country and encourage sustainable development.

The education sector has a great responsibility to produce a high-quality young generation for this nation. An effective learning system is expected to produce students who are proficient and ready

to face future challenges. They will be able to make positive contributions and make innovations that encourage the growth and progress of the country by having qualified abilities. (Zahra & Arifin, 2024)

The objectives of education must be understood and realized by all education sectors to ensure that education is directed at the goals that have been set in carrying out elementary school education activities specifically. Elementary school education is an important step in improving the quality of human resources (HR). This will be beneficial for the next generation, who will be responsible for the development of the Indonesian nation and state, because they know the fields of technology and science.

Natural and Social Sciences (IPAS) is a field of study that includes knowledge about nature and society. IPAS aims to develop students' understanding of the relationship between nature and culture and to develop positive social and environmental attitudes through diverse and interactive learning. IPAS learning is a combination of science and social studies which is a characteristic of the Merdeka Curriculum currently being implemented (Rahmayati & Prastowo, 2023).

In the current conditions, the learning process in Elementary Schools, especially in IPAS learning, has not yet reached the standard. Due to the fact that there are still Elementary School teachers who use less interesting learning models, where students are required to listen, pay attention, and take notes on the teacher's explanation (Qori Wahyuni et al., 2024). In fact, the learning process itself is an event that gives students many opportunities to actively participate in learning activities because the process itself is a change in behaviour related to knowledge, attitudes and skills through interactions between teachers and students (Muhardini et al., 2023)

The role of a teacher is very important in improving the quality of education by presenting learning that is in line with students' interests and talents (Fadil & Isna Alfaien, 2023). In an interaction, teachers should also have ideas or ideas to meet students' needs in the learning process, namely with learning models. Models in learning are very important because they can support the achievement of a goal in learning both directly, namely face-to-face or indirectly (Solehah et al., 2022). The use of innovative learning models is a solution to maximize students' abilities in learning. With innovation in learning models, the quality of learning will increase, learning can run effectively and efficiently (Norhikmah et al., 2022). In addition, choosing the right learning model will help solve problems that may be found in the learning process so that learning objectives can be achieved (Marlani & Prawiyogi, 2019)

The Project Based Learning (PjBL) learning model is learning that focuses on real-world problems. This learning model provides opportunities for students to practice directly with a problem that allows students to be more actively involved in the learning process and improve their critical thinking skills. This learning model also helps students in creating creative solutions to problems, especially in science learning where the Project Based Learning model aims to help students understand the concept of science in everyday life. (Fatimah et al., 2024)

Project-based learning requires students to learn and produce something, so that it can increase students' learning motivation, problem-solving skills and students' ability to work in teams. According to (Billy et al., 2019), the Project Based Learning (PjBL) model consists of several steps, namely: (1) giving students basic questions that can arouse curiosity to conduct investigations, (2) making project plans by providing students the opportunity to identify problems and organize them into project plans, (3) making a schedule to determine the project period, (4) monitoring students to reduce the possibility of project errors, (5) testing results to prove hypotheses, (6) concluding what has been done.

The Project Based Learning (PjBL) learning model has the advantage of helping students to broaden their thinking in dealing with problems that somebody may face in everyday life. In addition, project-based learning also provides direct training to students through the development of critical thinking and skills to be used in everyday life (Antari et al., 2023). Therefore, this project-based learning

model can be one of the learning models that teachers can apply to develop and train student cooperation and activeness (Ayu Lola Monika et al., 2023).

Science education in elementary schools is generally a subject that is an important part of improving the quality of education. The goal is to produce quality students who have a scientific attitude and science process skills. In addition, science learning in elementary schools also aims to provide an understanding of the scientific discipline of science and work skills (projects) to produce a product that shows a person's mastery of competence as a result of their learning (Wayan Rati et al., 2017).

Science learning is expected to provide students with the opportunity to learn about themselves and the environment and get the chance to apply it in everyday life. The learning process is centered on direct experience that helps students gain the ability to explore and understand the environment scientifically. Based on this, the Project Based Learning (PjBL) learning model can be an alternative learning model that can be applied to science subjects in particular. So that students can meet the needs of science learning and students can achieve a good understanding of the material.

Research Methods

This research was conducted at SD Negeri Puhgogor 1 in Bendosari District, Sukoharjo Regency involving 15 students in grade V, consisting of ten male students and five female students. The purpose of this study was to improve the understanding of science in grade V students using the Project Based Learning (PjBL) learning model.

Classroom Action Research, or PTK, is the type of research used in this study. PTK is an effort to monitor activities in the classroom to improve or improve learning to be more effective (Eko et al., n.d.). Actions that intentionally appear and occur simultaneously in the scholl are called classroom research actions. PTK uses a cycle plan from beginning to end, namely planning, acting, observing and reflecting (Prihantoro & Hidayat, 2019).

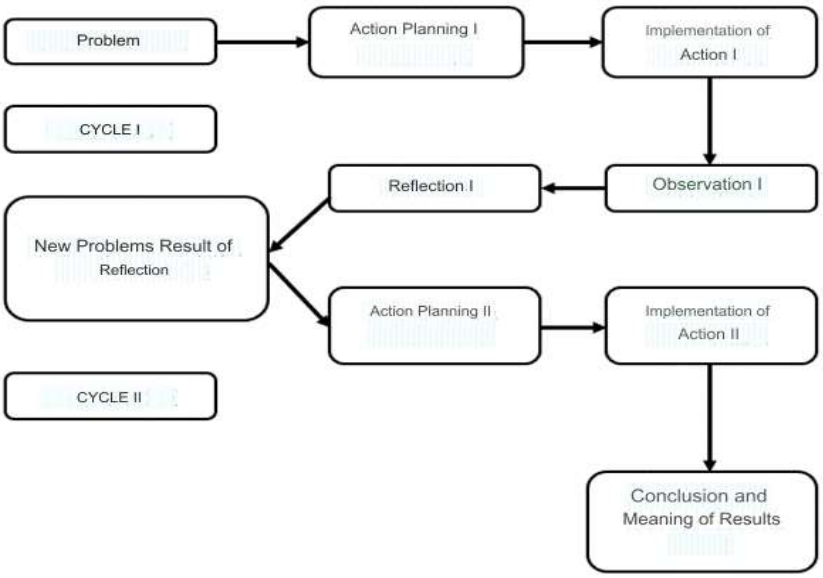

Figure 1. Stages of the Classroom Action Research Cycle

The data analysis techniques used in this study are participatory observation techniques, utilization techniques, and document data analysis. Participatory observation techniques are carried out when teachers carry out teaching activities and actions, also observe the class and students. The tools used in this observation are observation guidelines and field notes (notes on events that are considered

important) with qualitative assessment techniques. Data utilization techniques and document data analysis are by using attendance lists, teaching modules, student work, teacher work, with the assessment techniques used being qualitative.

- Formula for finding the average:

$$\frac{\text{The total score of all students}}{\text{Number of Students}}$$

- Formula for presenting the number of students who achieve KKTP (Criteria for Achieving Learning Objectives):

$$\frac{\text{Number of students who achieved KKTP}}{\text{Number of students}} \text{ X 100}$$

Results and Discussion

Based on the data obtained before the study, it shows that fifth grade students of SD Negeri Puhgogor 1 still have a lack of understanding of the subject of science. This is caused by learning strategies that make students less active during the learning process. Students become bored and tired of models that are less interesting because the models used are less varied. The use of project-based learning models is the right solution to this problem. This PjBL model can help students develop their skills by including project work that creates real results, such as reports, completed projects, and written projects assigned by teachers (Ari et al., 2018).

This study was conducted in two cycles with four stages in each cycle. To improve student understanding, cycle I planning was carried out to overcome student difficulties regarding the material on the human digestive system. Planning actions were carried out using real learning media and videos related to learning. Teaching Module Planning is used to provide actions, which include: 1) preparing material about the human digestive system with a project-based learning model to improve student understanding; 2) dividing students into three small groups, and students see the teacher working together with their friends to understand the human digestive system. By using this group, students can work together and interact well (Kasi, 2023); 3) the teacher guides students to work on student worksheets about the human digestive system; 4) conducting reflection activities on learning to improve student understanding.

Table 1. Results of Cycle I

Number	Student Name	Pre Cycle	Cycle I
1	SA	80	90
2	DI	60	70
3	AU	70	80
4	BI	60	80
5	BM	80	80
6	GD	60	60
7	IL	70	70
8	JI	60	70
9	ZI	60	70

Number	Student Name	Pre Cycle	Cycle I
10	AZ	90	90
11	BY	50	70
12	HU	60	60
13	SY	60	80
14	YU	70	80
15	DA	50	60
Average		65,34	74
Value above KKTP		20%	46%
Value below KKTP		80%	54%

Based on the data in table 1, the pre-cycle value before the study was 65.34, then after cycle I was carried out on 15 students, the value increased by 13%. This proves that learning using the Project Based Learning (PjBL) learning model in the subject of Social Sciences can improve student understanding. However, in the implementation of cycle I, there were still several weaknesses and deficiencies and the results were small, so it can conclude that this requires further action in cycle II in order to achieve the desired results and objectives.

Improvements to learning in cycle II were carried out based on the weaknesses and deficiencies identified in cycle I to find solutions. In cycle II, made improvements by making time more effective and involving students more in the learning process. The corrective actions taken were through 4 steps, which include: 1) preparing material about the human digestive system with a project-based learning model to improve student understanding; 2) the teacher explaining the material by practising real media 3) guiding students to work on student worksheets about the human digestive system; 4) conducting reflection activities on learning to improve student understanding.

The implementation of improvements in cycle II was carried out with a better design so that the results showed progress and improvement. This is proven by the comparison of values in cycle I and cycle II. The value obtained in cycle I compared to the value of cycle II can be seen in the following table:

Table 2. Results of Cycle II

Number	Student Name	Cycle I	Cycle II
1	SA	90	100
2	DI	70	80
3	AU	80	85
4	BI	80	90
5	BM	80	100
6	GD	60	85
7	IL	70	85
8	JI	70	80
9	ZI	70	90
10	AZ	90	95
11	BY	70	85
12	HU	60	85
13	SY	80	95
14	YU	80	90
15	DA	60	90
Average		74	89
Value above KKTP		46%	100%
Value below KKTP		54%	0%

Based on the data from cycle II in the table above, it can be seen that all students' scores have reached the criteria for achieving learning objectives and show an average score of 89 out of 15 students. This proves that students' understanding in cycle II has increased by 20% from cycle I. Based on the results of the research that has been conducted, it can be seen that the Project Based Learning (PjBL) learning model can improve students' understanding, which can be seen in the following diagram:

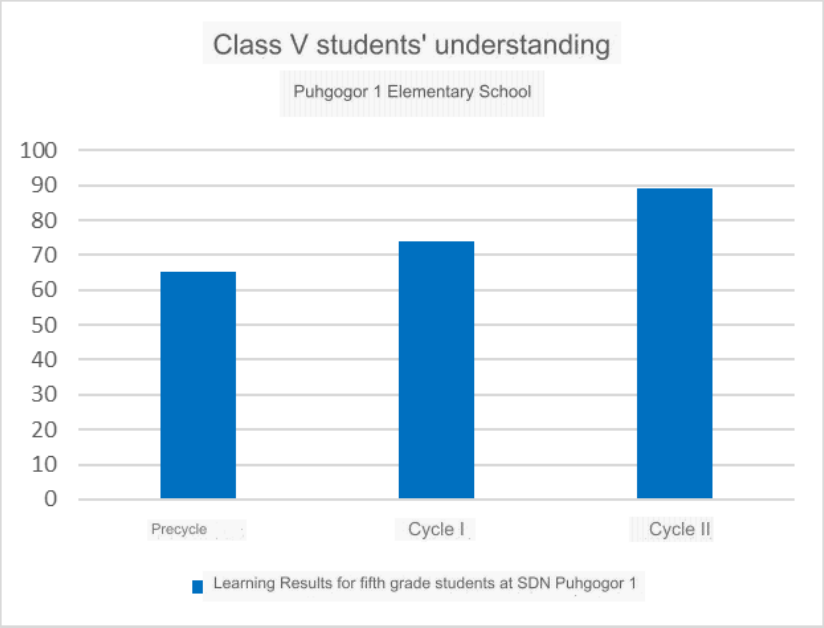

Figure 2: Student Understanding

Based on the results of the research that has been conducted show that the project-based learning model can improve students' understanding. In cycles I and II, students who initially only learned from teachers and read available books got a better learning experience than before through project-based learning. With discussions and direct practice, students' understanding will increase. The results of this study are in line with research (Fahrezi et al., 2020), which states that the Project Based Learning learning model can improve students' understanding. Research (Ambarsari et al., 2023) also said something similar, namely that project-based learning has a significant effect on improving students' abilities and knowledge of learning materials. Likewise, the values increased after carrying out project-based learning, so can conclude that the project-based learning model has a significant effect on creative thinking skills and students' understanding.

Conclusion

By considering the results of the research and discussions conducted on the problem, it proved that the use of project-based learning models or Project Based Learning (PjBL) can improve students' understanding in class V SDN Puhgogor 1. The results of the study showed a significant increase in student's knowledge before and after the application of the learning model. It also improves the understanding of science in class V students at SDN Puhgogor 1 through increased learning outcomes so that this study has achieved the performance indicators intended by the researcher. With the help of this study, teachers can use the Project Based Learning (PjBL) learning model as an alternative learning model in future science subjects.

Conflict of Interest

The results of this study are expected to provide benefits, especially for the world of education. This study is intends to contribute to educational institutions to provide information in improving the quality of education. In addition, it is also expected to be a reference material for further research.

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