

IMPROVING DISCIPLINE AND LEARNING OUTCOMES IN MATHEMATICS THROUGH THE PROJECT BASED LEARNING METHOD IN ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

Based on the initial observations that have been carried out, problems were found in the form of low levels of discipline and student learning outcomes before integrating project-based learning. The purpose of the research action was carried out as an effort to improve the attitude of discipline and learning outcomes of mathematics on the material of blocks and cubes in grade IV students of SD Negeri Karangasem 4, Surakarta, totaling 26. The research was conducted over two cycles through a series of planning, action, observation, and reflection. Data collection techniques include observation and written tests. Data analysis is qualitative and quantitative. The results of the study showed that the overall level of discipline of students showed a percentage of 58%, after the first cycle was carried out there was an increase in the rate of 77%, then the second cycle again showed an increase in the percentage of 92%. The learning outcomes of students before the cycle were carried out by 23%, increased in the first cycle by 62%, and in the second cycle again increased to 92%. The average overall score of students was 85 with a completion percentage of 92% as many as 24 students completed the KKTP. The data shows that the implementation of project-based learning can improve discipline and learning outcomes of students.

Keywords: Discipline, Learning Outcomes, Project Based Learning

ABSTRAK

Berdasarkan observasi awal yang telah dilaksanakan ditemukan permasalahan berupa tingkat kedisiplinan dan hasil belajar peserta didik rendah sebelum mengintegrasikan *project based learning*. Tujuan dilakukan tindakan penelitian sebagai upaya peningkatan sikap disiplin dan hasil belajar matematika materi balok dan kubus pada peserta didik kelas IV SD Negeri Karangasem 4, Surakarta yang berjumlah 26. Penelitian dilaksanakan selama dua siklus melalui serangkaian perencanaan, tindakan, pengamatan, dan refleksi. Teknik pengumpulan data meliputi observasi serta tes tertulis. Analisis data bersifat kualitatif serta kuantitatif. Hasil penelitian menunjukkan bahwa tingkat kedisiplinan keseluruhan peserta didik menunjukkan angka presentase 58%, setelah dilaksanakan siklus satu mengalami kenaikan presentase 77%, kemudia siklus dua kembali menunjukkan kenaikan presentase 92%. Hasil belajar peserta didik sebelum dilaksanakan siklus sebesar 23% meningkat pada siklus satu sebesar 62% dan siklus dua kembali mengalami kenaikan menjadi 92%. Rata - rata nilai keseluruhan peserta didik adalah 85 dengan presentase ketuntasan 92% sebanyak 24 peserta didik tuntas KKTP. Dari data menunjukkan dengan penerapan *project based learning* mampu meningkatkan disiplin dan hasil belajar peserta didik.

Kata kunci: Disiplin, Hasil Belajar, *Project Based Learning*



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INTRODUCTION

Permendikbudristek No. 12 of 2024: the curriculum used is the Merdeka curriculum. As an effort to improve the quality of education in Indonesia, especially in elementary schools, teachers must design learning according to the context of student needs that are relevant to the development of the times. So that students can develop their interests and talents (Kementerian Pendidikan, 2023)

Elementary school teachers must have the ability to design learning processes because elementary education influences students' education at the next stage (Wibowo et al., 2022). A person who is a role model for students is a teacher in terms of knowledge and personality. In Javanese culture, teachers are described as figures who are worthy of being emulated (Salsabilah, 2021). The learning process involves interaction, discussion, and questions and answers between teachers and students, allowing students to interact with peers. Teachers are also facilitators where students get learning according to the learning style of each participant so that students can hone their abilities, skills, and talents (Yestiani & Zahwa, 2020)

Mathematics is a learning material whose subject matter is abstract and constructed through a deductive reasoning process, with clear language and rules, systematic thinking, and strong relationships between concepts (Nurriskah et al., 2020). Mathematics is closely related to a subject that aims to stimulate students to think logically, rationally, and critically (Nila, 2008)

Discipline shows an attitude developed in the educational process. Discipline is an expression of the mental attitude of individuals and society, expressing feelings of obedience and obedience supported by a sense of duty and fulfillment of obligations to achieve goals. (Asrah et al., 2016). Students who show discipline in their learning look different from students who are not disciplined (Dwijayanti et al., 2022). Disciplined students will be more confident in answering their teacher's questions and asking about material that is not yet clear. These students work hard in class and are ready to take exams. Student behavior shows student motivation to learn (Sutrisna Dewi et al., 2019). Indicators of student discipline levels, according to Pratiwi et al. (2024), include (1) students paying attention to the teacher when providing learning materials, (2) students not joking during lessons, (3) students doing the assigned tasks, (4) students not walking to their friends' seats or going out of class, and (5) students submitting assignments on time. Teachers also need to direct students to behave (Bila & Desstya, 2023). After conducting observations of grade IV students of SDN Karangasem 4, Surakarta, it was found that student discipline was still low during learning activities. The low disciplinary attitude of grade IV students of SDN Karangasem 4 Surakarta will affect learning outcomes.

Learning outcomes are the achievement of new behavior and tend to persist in the cognitive, affective, and psychomotor domains of the learning process regarding the

content of the lesson carried out over a certain period of time. The cognitive domain is the basis for acquiring knowledge and consists of three skills that need to be mastered, including perception, memory, and thought. (Djamarah, 2015) in (Nurriskah et al., 2020). The learning outcomes of grade IV students of SDN Karangasem 4 Surakarta in mathematics before each cycle were implemented using project-based learning; only 26% of students completed the KKTP. Project-based learning is a method of directing students who are presented with a problem and then directed to create a project (Thomas et al., 2015). Project-based learning is a learning method that focuses on students creating and applying concepts from projects created through independent exploration and problem solving during the learning process (Afriana, 2015).

Six project-based learning syntaxes were developed by two experts, namely the George Lucas Educational Foundation and Doplett (Afriana, 2015). The syntax for project-based learning includes (1) determining basic questions, (2) creating a project overview, (3) coordinating schedules, (4) monitoring project progress, (5) evaluating learning outcomes, and (6) evaluating experience (Nurhadiyati et al., 2020). In its implementation, project-based learning can be implemented by giving students assignments in the form of projects that require students to solve problems actively and collaboratively, such as conducting research, thinking creatively, and collaborating with their classmates. So, the project-based learning model can not only improve students' academic skills but also train students' social skills, increase students' learning motivation, and improve students' problem-solving skills.

In line with previous research conducted by Ramadianti (2021) entitled "The Effectiveness of the Project-Based Learning Model on Elementary School Mathematics Learning Outcomes." The results of the analysis show that the project-based learning model can improve student learning outcomes by an average of 24.72%, from a minimum of 11.30% to a maximum of 37.48%. Along with research conducted by Ainurrohman et al. (2024) entitled "Efforts to Improve Student Discipline Through the Elementary School Project-Based Learning Model." The results of this study indicate that along with the increase in student learning outcomes, the level of discipline also increases with the project-based learning method. Based on several studies, researchers use project-based learning methods to find solutions to the low discipline and learning outcomes of grade IV students at SDN Karangasem 4 Surakarta. However, the current research has a difference, namely efforts to improve discipline and mathematics learning outcomes through the project-based learning method at SDN Karangasem 4 Surakarta.

METHOD

The research conducted is Classroom Action Research, abbreviated as PTK. Classroom action assessment investigation has a function in solving problems that arise in the classroom. The PTK stages based on the model proposed by Kemmis and McTaggart include planning activities, implementing actions, observation, and reflection. (Wijayanti, 1967). According to Indriyani et al. (2019), learning activities that guarantee the persistence of students' memory are those that encourage students to actively construct and connect material concepts. Learning models supported by learning media that allow student involvement in making a block and cube project.

The researcher carried out this activity with the aim of improving discipline and learning outcomes. fourth-grade students of SDN Karangasem 4, Surakarta, in mathematics subjects on block and cube material with the project-based learning method. According to Kemmis and McTaggart in Susanti et al. (2019), classroom action research has four components, including (1) planning, (2) acting, (3) observation, and (4) reflection. The researcher acts as both a teacher and an observer. This research was conducted at SDN Karangasem 4 Surakarta. The series of activities was carried out from April to May 2024 in the 2023/2024 academic year. The subjects of this study were all 26 students of Class IV SDN Karangasem 4 Surakarta, 12 female and 14 male.

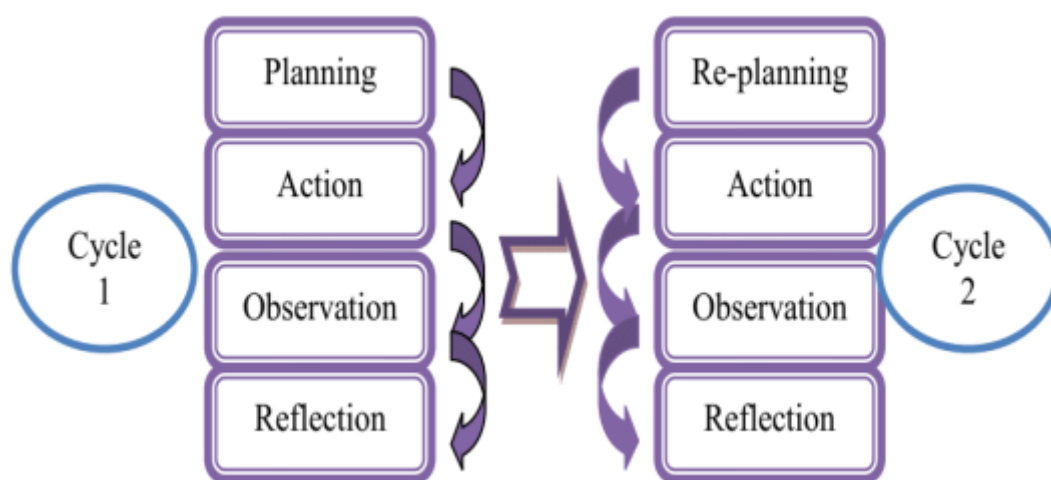


Figure 1. PTK Implementation Cycle

The data acquisition technique in the current study uses the observation and written exam methods. The use of research tools in the form of observation sheets to observe disciplinary behavior and written exam questions to assess student performance. Currently, the data analysis method uses qualitative and quantitative methods. Qualitative methods are used in observing students' disciplinary attitudes. While quantitative is used in analyzing student learning outcomes as seen from the

average value that has been completed if it reaches a KKTP value ≥ 70 , which has been determined by the school through written test evaluation questions.

RESULTS AND DISCUSSION

Result

This research was conducted in class IV of SD Negeri Karangasem 4 Surakarta with a period of April to May 2024. With the aim of improving student discipline and learning outcomes, 2 cycles were carried out. Each cycle has a time of 70 minutes (2 JP) through four steps of planning, action, observation, and reflection. Both cycles apply the project-based learning method in class IV mathematics on the material of cubes and blocks. The following is the discipline data obtained after implementing the project-based learning method.

Table I. Improvement of Overall Student Discipline

No	Indicator	Before Cycle		Cycle 1		Cycle 2	
		Percentage	%	Percentage	%	Percentage	%
1.	Students pay attention to the teacher providing learning materials	15	58	20	77	24	92
2.	Students do not joke during lessons	9	35,	17	65	19	73
3.	Students do the assigned tasks	17	65	22	85	26	100
4.	Student do not walk to their friends seats or go out of class	7	27	12	46	18	69
5.	Students collect assigments on time	13	50	21	81	25	96
The level of increase in students' disciplinary attitudes in general			47%		71%		86%

The table of disciplinary attitudes of grade IV students of SDN Karangasem 4, Surakarta, shows that before the implementation of the project-based learning method, the level of student discipline was very low. During the cycle, the teacher implemented the project-based learning method in the learning process so that an agreement was made between the teacher and students in implementing the research during period 2. Based on the data, there was an increase in student discipline in each cycle. Before the

cycle, the percentage of 47% increased in cycle one to 71%. In line with cycle one, cycle two also experienced an increase in percentage of 86%.

The research conducted has the aim of increasing the learning outcomes of grade IV students of SDN Karangasem 4, Surakarta, in the mathematics subject of blocks and cubes. Each cycle is carried out for 70 minutes (2 JP). With four steps that must be carried out in each cycle starting from planning, second action, third observation, and fourth reflection. The following is data on the increase in learning outcomes of class IV students at SDN Karangasem 4 Surakarta:

Table 2 Learning Outcomes of Students Before the Implementation of the Learning Cycle

NO	NAMA SISWA	Before Cycle		
		Value	Complete	Not yet
1	AMP	40		v
2	AVP	60		v
3	AEF	65		v
4	ANP	50		v
5	CF	40		v
6	DAM	75	V	
7	FAF	80	V	
8	FNK	70	V	
9	FAS	40		v
10	KH	40		v
11	KKA	60		v
12	LN	60		v
13	LA	80	V	
14	MJS	60		v
15	MAP	60		v
16	MA	60		v
17	MY	60		v
18	NNA	70	V	
19	NIP	40		v
20	NAG	40		v
21	RC	70	V	
22	RA	60		v
23	RS	40		v
24	TN	60		v
25	ND	60		v
26	N	60		v
Number of Values		1500	6	20

Average Value	58		
Percentage		23%	77%
KKM	70		

Before the cycle was implemented, where the teacher had not implemented the project-based learning method, the teacher only used the lecture method in teaching activities, making it less interesting for students. So that students do not have a disciplined attitude, which affects learning outcomes related to blocks and cubes. Data obtained before the cycle was carried out showed that there were only 6 students whose grades were complete KKTTP, with a percentage of 23%. In order for student learning outcomes to increase, the teacher integrated the project-based learning method in learning activities in cycle one as follows:

Table 3: Improvement in Student Learning Outcomes in Cycle One

NO	STUDENT NAME	Cycle 1		
		Meeting I	Meeting 2	Average
1	AMP	60	70	65
2	AVP	65	75	70
3	AEF	65	70	67,5
4	ANP	60	70	65
5	CF	70	80	75
6	DAM	85	85	85
7	FAF	85	85	85
8	FNK	85	80	82,5
9	FAS	70	75	72,5
10	KH	60	65	62,5
11	KKA	70	85	77,5
12	LN	75	80	77,5
13	LA	85	90	87,5
14	MJS	60	75	67,5
15	MAP	75	80	77,5
16	MA	70	70	70
17	MY	65	70	67,5
18	NNA	85	90	87,5
19	NIP	60	65	62,5
20	NAG	60	70	67,5
21	RC	80	75	77,5

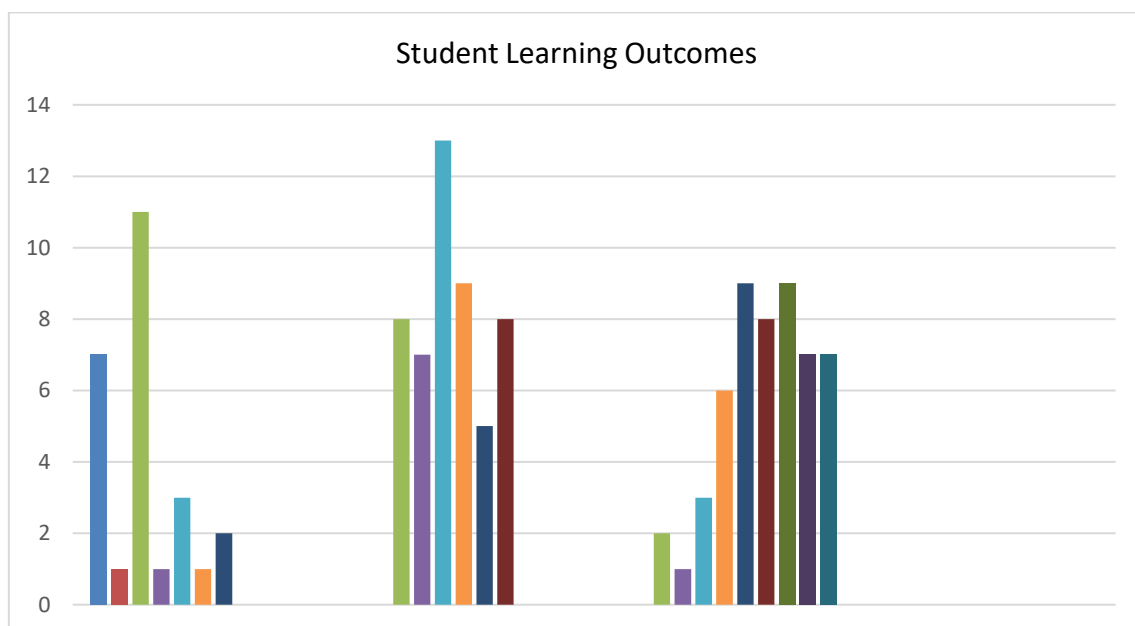
22	RA	70	75	72,5
23	RS	60	65	62,5
24	TN	65	75	70
25	ND	60	70	65
26	N	70	75	72,5
Number of Values		1815	1965	
Average Value		69	75	
Percentage				62%
KKM		70		

Pada siklus 1 guru sedang menerapkan metode *project based learning* dalam kegiatan pembelajaran. Data hasil belajar peserta didik mata pelajaran matematika materi balok dan kubus diperoleh dari soal evaluasi yang telah di berikan. Rata – rata nilai peserta didik pada pertemuan pertama siklus satu sebesar 69. Selanjutnya untuk peretemuan kedua siklus satu rata – rata nilai peserata didik sebesar 75. Pada siklus satu terjadi kenaikan hasil belajar sebanyak 16 peserta didik memiliki nilai tuntas KKTP dengan presentase 62%. Kenaikan hasil belajar pada siklus satu dianggap masing kurang sehingga melanjutkan pada siklus dua. Berikut adalah data yang diperoleh pada siklus 2:

Table 4 Peningkatan Hasil Belajar Peserta Didik Siklus Dua

NO	STUDENT NAME	Cycle 2		
		Meeting I	Pertemuan 2	Rata - Rata
1	AMP	70	75	72,5
2	AVP	80	90	85
3	AEF	85	90	87,5
4	ANP	80	85	82,5
5	CF	90	95	92,5
6	DAM	100	95	97,5
7	FAF	100	100	100
8	FNK	95	100	97,5
9	FAS	75	80	77,5
10	KH	65	70	67,5
11	KKA	95	85	90
12	LN	90	95	92,5
13	LA	100	100	100

14	MJS	80	90	85
15	MAP	85	85	85
16	MA	80	90	85
17	MY	80	85	82,5
18	NNA	90	95	92,5
19	NIP	75	75	75
20	NAG	60	80	70
21	RC	95	100	97,5
22	RA	75	85	80
23	RS	70	80	75
24	TN	85	90	87,5
25	ND	60	75	67,5
26	N	80	90	85
Number of Values		2140	2280	
Average Value		82,3	87,6	
Percentage				92%
KKM		70		



Graph 1. Student Learning Outcomes

The completion of student learning outcomes can be said to have achieved the research target, recorded 24 students have completed the KKTP (Criteria for Achieving

Learning Objectives) and the average student score is 87.3. Based on the success indicator, namely the achievement of the number of students who have a KKTP completion score, the completion of student learning has increased to reach a percentage of 92%, in this case, the increase in student learning outcomes in block and cube material in class IV SDN Karangasem 4 with the project based learning method is said to have been successful and the research was stopped. The following is a recapitulation of student learning outcome data that has increased each cycle:

Table 5 Increase in Overall Student Learning Outcomes

Indicator	Value	Before Cycle		Cycle 1		Cycle 2	
		Total	%	Total	%	Total	%
Complete KKTP	≥	6	23%	16	62%	24	92%
KKTP Not Yet Completed	<	20	77%	10	38%	2	8%
TOTAL		26	100%	26	100%	26	100%
AVERAGE VALUE		58		69		85	

In line with the increase in students' discipline, learning outcomes also show an increase in each cycle based on the average value before learning was carried out, with the student cycle only 58 below the KKTP. Then cycle 1 experienced an increase with the average student value of 69. Cycle two again saw an increase in the average student value of 85. The findings of discipline data and learning outcomes in students are in line with the application of the project-based learning method during the cycle activities carried out.

Discussion

As seen from table 1 before the cycle was carried out, it states that before project-based learning was carried out, the overall level of student discipline was only 47%. This also shows the need to improve teaching methods. Researchers collected data and created observation sheets to determine the attitude of discipline during the learning process, which contained five indicators of student discipline. These indicators included punctuality, preparedness, participation, respect for rules, and collaboration. The findings indicated that implementing project-based learning had a positive influence on improving student discipline, as evidenced by the increased scores in subsequent cycles.

The level of student discipline before the cycle action has not been implemented. Project-based learning towards cycle one, which has been implemented as a project-based learning method, has shown an increase in each indicator of discipline attitude.

The results of the indicators before the cycle towards cycle one showed an increase in percentage. The first indicator before the cycle was carried out increased 58% in cycle one to 77%; the second indicator before the cycle was carried out increased 35% in cycle one to 65%; the third indicator before the cycle was carried out increased 65% in cycle one to 85%; the fourth indicator before the cycle was carried out increased 27% in cycle one to 46%; and the fifth indicator before the cycle was carried out increased 50% in cycle one to 81%.

Based on the data, it can be seen that the average level of achievement of students' discipline attitudes before the cycle was carried out had a percentage of 47%, increasing in cycle one to a percentage of 71%. So that the overall percentage level in cycle one was only 71%. The researchers returned to implementing cycle two. These steps were then continued in cycle two. In line with the increase in cycle one, each indicator also experienced an increase in discipline from cycle one to cycle two, including the percentage. The first indicator in cycle one increased 77% in cycle two to 92%; the second indicator in cycle one increased 35% in cycle two to 65%; the third indicator in cycle one increased 65% in cycle two to 85%; the fourth indicator in cycle one increased 27% in cycle two to 46%; and the fifth indicator in cycle one increased 50% in cycle two to 81%.

Likewise, the learning outcome data that has been obtained shows an increase in each cycle. The learning outcomes before the cycle was carried out had a completion percentage of 23%; as many as 6 students completed the KKTP with an average overall score of 58. Increasing after the first cycle, the completion percentage was 62%; as many as 16 students had a KKTP completion score with an average overall score of 69. Then the second cycle was carried out again, stating an increase in student learning outcomes, showing a completion percentage of 92%. As many as 24 students had a KKTP completion score with an average overall score of 85. Based on the data that has been obtained regarding the disciplinary attitude and learning outcomes of class IV students of SDN Karangasem 4 Surakarta in mathematics lessons on blocks and cubes, it is concluded that integrating the project-based learning method can improve the disciplinary attitude and learning outcomes of students.

Research conducted by Ainurrohman et al. (2024) with the title "Efforts to Improve Student Discipline Through the Elementary School Project-Based Learning Model." The results of this study indicate that along with the increase in student learning outcomes, their level of discipline also increases with the project-based learning method.

Based on previous research, researchers found a solution to the low level of discipline of grade IV students of SDN Karangasem 4 Surakarta by integrating the project-based learning method in each cycle of learning activities. However, in this study, there is a difference from previous studies, namely improving discipline and mathematics learning outcomes through the project-based learning method in elementary school students. This is because the discipline of students is correlated with the learning outcomes obtained by students.

CONCLUSION

The conclusion can be drawn based on the research that has been carried out: after integrating the project-based learning method, it can improve the discipline and learning outcomes of grade IV students of SDN Karangasem 4 Surakarta in mathematics lessons on blocks and cubes. It can be seen that the discipline of students in each cycle generally continues to increase. Before the cycle was carried out, the percentage of students' discipline was only 47%. Then cycle one was carried out with a percentage that increased by 71%; it was felt that cycle two was not enough to reach a percentage of 86%. In line with the learning outcomes obtained by students before the cycle was carried out, the average value obtained by students was 58, and 6 students completed the KKTP. After cycle one, the average value obtained by students increased, namely 69, with a completion percentage of 62%; 16 students completed the KKTP. The researcher felt that the data obtained was insufficient and then carried out cycle two until the average value obtained by students was 85, with a completion percentage of 92%. As many as 24 completed KKTP.

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