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IMPROVING STUDENTS' LEARNING OUTCOMES THROUGH IMPLEMENTATION OF PROJECT-BASED LEARNING INTEGRATED WITH LOCAL WISDOM

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ABSTRACT

The success of achieving learning objectives is seen from student learning outcomes, seen from the knowledge aspect for the elements of the concept of science, and science, as well as attitudes and skills based on the elements of science and science process skills. Teachers who are less creative and innovative in implementing learning models that are suitable for students will affect student learning outcomes. This causes a monotonous, boring, and uninteresting learning atmosphere for students, so that students' science learning outcomes are still relatively low from the predetermined KKTP value. In addition, in this era of increasingly rapid technology and globalization, it can cause a shift in culture and local wisdom for the younger generation. Therefore, this study aims to determine the increase in science learning outcomes by using the Project-Based Learning model containing local wisdom at SD N Ngepungrojo 01 Pati. The Project-Based Learning model, containing local wisdom, is a learning model that uses projects by integrating local wisdom. The stages of the Project-Based Learning model are divided into six stages. The research method that will be used in this study is pre-experimental with a one-group pretest-posttest design. Data analysis techniques consist of initial data analysis using validity tests and normality tests, and research data analysis using the Paired Sample T-Test and N-Gain test.

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Introduction

One of the essential things in the Independent Curriculum to improve the Basic Education system in Indonesia by combining the subjects of Natural Sciences (IPA) and Social Sciences (IPS) into Natural and Social Sciences (IPAS). IPAS is a scientific approach that is related to how to find out about nature systematically, so that it is not only the mastery of a collection of knowledge in the form of facts, concepts, theories, or principles, but also a process of discovery (Susilowati, 2023). Nature and science are related, namely, one branch of science that focuses on studying nature and the processes in it.

Adnyana & Yudaparmita (2023) stated that science learning has two important elements to achieve the desired learning objectives so that student learning outcomes are maximized, including: conceptual understanding and process skills. The first element that must be mastered by students is the ability to understand concepts. According to Savitri & Meilana (2022), conceptual understanding is a higher level than the knowledge obtained, so there needs to be an introduction or knowledge to understand. This means that students can understand a concept based on the subjects they are studying. According to Adhani & Rupa (2020), conceptual understanding is the basis for achieving learning outcomes and has an important role in the learning process. To instill conceptual understanding, teachers must be able to link real contexts to the surrounding environment, so that they can develop the level of understanding of the students' science concepts themselves. The level of understanding of science concepts among Indonesian children also needs to be improved, as indicated by Indonesia's 2018 PISA (Program for International Student Assessment) score for science at 396, which places Indonesia in 37th place out of 42 countries (Yulaikah et al., 2022).

The second element of science is process skills. According to Masus & Fadhilaturrahmi (2020), one of the objectives of science subjects in elementary schools that must be developed is process skills. Science process skills are an important tool for learning and understanding science, and are also important in gaining science knowledge (Lusidawaty et al., 2020). These skills are non-negotiable because science process skills in learning are basic skills that students must have in developing their potential in the learning process. Science learning not only conveys information and understanding of the material, but must also pay attention to the development of other abilities such as observing the ability of an object, using tools and materials, conducting experiments, communication skills and students' abilities in concluding the results of observations or experiments (Masus & Fadhilaturrahmi, 2020). The learning process emphasizes providing direct experience to develop competencies to explore and understand the natural environment scientifically. The fact presented by the Ministry of Education and Culture, December 2016, based on data from the PISA (Programme for International Student Assessment) survey, there was an increase in educational achievement in 2015 when compared to the achievement in 2012 (Nurjanah et al., 2021). However, this achievement is still below the average for OECD (Organisation for Economic Cooperation and Development) countries, so it is still necessary to improve students' science process skills by improving and changing various methods, techniques, and lesson delivery.

The success of achieving educational goals can be seen from the learning outcomes achieved by students through the learning process at school. Whether or not the goals are achieved is seen from the aspects of knowledge, skills, and attitudes (Adnyana & Yudaparmita, 2023). Thus, the elements of conceptual understanding and process skills are the most important elements in improving students' knowledge and skills.

Science subjects in Elementary Schools are less popular with students because they are considered difficult (Gumilar, 2023). Educators must be able to change students' way of thinking about science subjects that are considered difficult by students into fun and easy-to-understand learning. In the initial stage of the science learning process, what teachers must do is invite students to learn and build on the knowledge that students have found in their daily lives. Developing with an understanding of concepts and process skills to improve the learning process in Elementary Schools.

The current reality is that science learning for understanding concepts and process skills has not received optimal attention (Rizkianida et al., 2023). This is because teachers are less creative in designing learning that can direct students to be able to integrate the construction of everyday life experiences outside the classroom with their knowledge in the classroom, which has an impact on educational goals not being achieved and low learning outcomes. One of the causes is the use of

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inappropriate learning methods or approaches by teachers in teaching (Wahyuni et al., 2020). Teachers teach more material concepts through the transfer of knowledge and providing examples that tend to be memorization material for students, creating a monotonous and boring learning atmosphere.

The researcher conducted observations and interviews at SD N Ngepungrojo 01 with teachers and students of grade IV. The researcher found that, according to the grade IV teacher, teaching science subjects to students must be done repeatedly so that the material can be delivered to students optimally. The learning method used is still using conventional methods, so that when the teacher explains the material to students, it seems monotonous, boring, and does not attract students' attention. The grade IV teacher stated that the students' science learning outcomes are still low. The lowest score is 25 and the highest score is 80. Most students get scores below the KKTP (Criteria for Achieving Learning Objectives), which has been set namely 70. Of the 31 students, only 4 have scores that meet the KKTP, and 27 other students are still below the KKTP. According to the grade IV students of SD N Ngepungrojo 01, when the teacher teaches, he does not use a learning model that is appropriate to the needs and conditions around the students so that students feel they do not understand the learning material delivered by the teacher and students will be happy if the learning is done through direct practice. Researchers also found that there had never been any learning that focused on material around the students' environment and introduced the local wisdom of Pati that was linked to the science subjects.

The educational process by linking local wisdom is important to be realized because local wisdom has begun to be neglected, as seen from daily life behavior that does not embody local wisdom values and is beginning to be replaced by a lifestyle order that contains pragmatic-capitalistic values (Ndek et al., 2024). In line with Ayu Rachmawati (2022), who explained that Science Learning can be integrated with local wisdom values because Science is closely related to the surrounding environment. So teachers can develop the content of the material with everything related to the student's place of residence.

Based on these conditions, researchers have a solution to improve students' science learning outcomes by implementing a Project-Based Learning (PjBL) learning model containing local wisdom. Thus, students can explore initial knowledge and new knowledge directly through the life around them and carry out a real project containing local wisdom. Therefore, researchers are interested in conducting research using a quantitative research model entitled "The Effectiveness of Project-Based Learning Containing Local Wisdom to Improve Science Learning Outcomes at SD N Ngepungrojo 01".

This study aims to prove the increase in science learning outcomes by using the project-based learning model containing local wisdom for class IV of SD N Ngepungrojo 01. This effort is made so that learning objectives can be achieved optimally. The success of the study will be analyzed through quantitative data measured using simple statistical methods, so that the results obtained can show the effectiveness of the project-based learning model containing local wisdom that is applied objectively.

Research Methods

The research method that will be used in this study is pre-experimental with a one-group pretest-posttest design. This design is used because this study only involves one class, namely the experimental class, which is used to compare the pretest results with the posttest results. The population in this study was all students of SD N Ngepungrojo 01, Pati District, Pati Regency, Central Java, from grade I to grade VI, with a total of 178 students. The sampling technique used in this study is the total sampling technique, or saturated sample, where all populations are used as samples. The sample in this study was all fourth-grade students of SD N Ngepungrojo 01, totaling 30 students, including 17 male students and 13 female students.

Data collection techniques used in this study include interviews, observations, tests, and documentation. Data analysis techniques used are the normality test, the paired sample T-test, and the N-Gain test. Data analysis of the normality test uses pretest and posttest data to prove whether the data is normally distributed or not. In addition, there is a paired sample T-test, and if the t-count is more than the t-table, then Ho is rejected and Ha is accepted. To conduct the N-Gain test analysis, you can refer to Table 1.

Table 1. N-Gain level categories

Nilai N-Gain	Categories
N-Gain ≥ 0,70	High

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0,30 ≤ N-Gain < 0,70	Medium
N-Gain < 0,30	Low

(Source: Wahab et al., 2021)

The research process consists of several stages. The first stage is pre-research, which includes interviews, observations, documentation, preparation of learning instruments, and the creation of teaching modules and test questions, which several experts in their fields then validate. The second stage is implementation, which begins with the provision of a pretest, followed by learning using a project-based learning model containing local wisdom for three meetings, and ends with the provision of a posttest. The third stage is data processing and analysis to obtain research results.

Result and Discussion

The data description contains an overview of the research data obtained from the research that has been carried out at SD N Ngepungrojo 01. This study uses two variables, namely the independent variable (X) and the dependent variable (Y). The independent variable in this study is the Project-Based Learning (PBL) learning model containing local wisdom, while the dependent variable in this study is the results of learning science. This research was conducted in class IV of SD N Ngepungrojo 01 in May 2025 to measure the results of learning science of class IV students on the material of plants as sources of life on earth. This research was conducted over five meetings. The recapitulation of the pretest and posttest results is as follows.

Table 2. Recapitulation of pretest and posttest results for the science subject

Data Size	Pretest	Posttest
Total Respondents	30	30
Average	56,47	85,23
Lowest Value	27	67
Highest Value	80	100

(Source: researcher data, 2025)

Based on the table showing the results of the pretest and posttest, this shows that after being given treatment using the Project-Based Learning learning learning model containing local wisdom, there was an increase in the results of learning science in class IV compared to before treatment. The average pretest score was 56.47, with the lowest score of 27 and the highest 80. Meanwhile, the average posttest score reached 85.23, with the lowest score of 67 and the highest 100. This shows that the posttest score is on average higher than the pretest score.

1. Normality test results

The normality test in this study was used to determine whether the data obtained was normally distributed or not. The normality test used was the Shapiro-Wilk normality test, assisted by SPSS Statistics 26. The data tested for normality in this study were the pretest and posttest, with a previously established hypothesis that if the probability value> 0.05, then the data is declared normal, while if the probability value <0.05, then the data is declared abnormal (Sugiyono, 2019).

Table 3. Results of the normality test of the results of learning science results

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.173	30	.023	.942	30	.101
Posttest	.182	30	.013	.909	30	.014

a. Lilliefors Significance Correction

(Source: data from SPSS Statistics 26)

Based on the pretest and posttest data analysis table seen in the Shapiro-Wilk column, the results obtained sig> 0.05, namely 0.101 for pretest data and 0.014 for posttest data, both of which are greater than 0.05. From the results of the analysis, it can be concluded that the data on the results of learning science is normally distributed and can be categorized as significant, so Ho is accepted. Thus, the pretest and posttest data have met the normality assumptions required for statistical analysis that assumes a normal distribution, and can be used for further data analysis.

2. Paired sample T-test results

The paired sample t-test is used to test the hypothesis that aims to determine whether there is a difference in the average score of students' science learning outcomes before and after being treated using the Project-Based Learning (PjBL) learning model containing local wisdom. This data will be analyzed using a parametric statistical test, namely the paired sample t-test, to identify whether there is a difference between the pretest and posttest scores. Data analysis in this study was carried out using SPSS Statistics 26, with a previously established hypothesis that if sig <0.05, then Ha is accepted, and if sig> 0.05, then Ho is rejected. The recapitulation of the completeness of the pretest and posttest learning outcomes is as follows.

Table 4. Recapitulation of Science Learning Outcomes

No	KKTP	Many Students	Completion Percentage

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	70	Completed	Not Completed	Completed	Not Completed
1. *Pretest*	70	4	26	13,3%	86,7%
2. *Posttest*	70	29	1	96,7%	3,3%

(Source: researcher data, 2025)

Based on the table above, the results of the data analysis show that there is a significant increase in student learning completion after learning. During the pretest, out of 30 students who took the test, only 4 students, or 13.3%, achieved completion, while 86.7% had not completed it. This shows that before learning, most students did not understand the material well. After learning and measuring through the posttest, the number of students who completed it increased drastically to 29 students or 96.7%, while those who did not complete it decreased to only 1 student or 3.3%. This change shows that the learning method applied is very effective in improving students' understanding and learning outcomes in science.

Table 5. Paired Sample T-Test Results on Science Learning Outcomes

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest Posttest	-28.76667	9.16020	1.67242	-32.18714	-25.34619	-17.201	29	.000

(Source: data from SPSS Statistics 26)

Based on the table of hypothesis test results explained previously, using the paired sample t-test formula, the average difference value (mean difference) was obtained at -28.76667 with a standard deviation (std. deviation) of 9.16020 and a standard error of the mean (std. error mean) of 1.67242. The t value = -17.201 indicates the magnitude of the difference between the two conditions (before and after treatment) relative to the standard error of the difference. The degree of freedom (df = 29) indicates the number of samples reduced by one, namely 30-1. A significance value (p-value) of 0.000 <0.05 indicates that the difference is very statistically significant, so Ho is rejected and Ha is accepted. This shows that there is a significant difference in the average learning outcomes of students in science before and after being given treatment using the Project-Based Learning (PjBL) learning model containing local wisdom.

3. N-Gain test results

The N-Gain test in this study was used to test the hypothesis related to whether there was an increase in the learning outcomes of science in grade IV students between before and after being given treatment using the Project-Based Learning (PjBL) learning model containing local wisdom. To analyze the increase, the N-Gain test was conducted by comparing the pretest and posttest scores that had been obtained with the ideal score that had been determined. The following are the results obtained from the N-Gain test.

Table 6. N-Gain Test Results of Science Learning Outcomes

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score	30	.18	1.00	.6861	.19517
NGain_Persen	30	18.18	100.00	68.6059	19.51679
Valid N (listwise)	30				

(Source: data from SPSS Statistics 26)

The results of the N-Gain test calculation in the table show that the N-Gain score obtained is 0.6861, which is included in the moderate category. Meanwhile, the N-Gain percentage results obtained an average of 68.6059, which can be interpreted as quite effective. This shows that the treatment given, namely the Project-Based Learning (PjBL) learning model containing local wisdom, is quite effective in improving the learning outcomes of science in grade IV students of SDN Ngepungrojo 01. The results of the N-Gain test analysis on the IPAS learning outcome indicators are as follows.

Table 7. N-Gain Test Analysis on IPAS Learning Outcome Indicators

Learning Outcome Indicators	Average		N-Gain	Categories
	Pretest	Posttest		
Remembering (C1)	40,91	86,25	0,77	High
Understanding (C2)	41,46	80,87	0,67	Medium
Apply (C3)	39,57	91,37	0,86	High
Analyze (C4)	78,12	85,50	0,34	Medium
Evaluate (C5)	57,56	85,12	0,65	Medium
Create (C6)	66,47	82,50	0,48	Medium
Average	**54,02**	**85,27**	**0,62**	**Medium**

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Based on the data obtained, there were significant changes in each indicator, with n-gain values varying between 0.34 and 0.86. Overall, the increase in the average pretest score of 54.02 to a posttest of 85.27 resulted in an n-gain of 0.62, which is included in the moderate category. The learning outcome indicators used in the element of understanding the concept of science consist of six indicators, namely the first indicator, remembering (C1), at a pretest average of 40.91, while the posttest average was 86.25. The second indicator understanding (C2) at a pretest average of 41.46, while the posttest average was 80.87. The third indicator is applying (C3) at a pretest average of 39.57, while the posttest average was 91.37. The fourth indicator is analyzing (C4) at a pretest average of 78.12, while the posttest average was 85.50. The fifth indicator is evaluating (C5) on the pretest average of 57.56, while the posttest average is 85.12. The sixth indicator is creating (C6) on the pretest average of 66.47, while the posttest average is 82.50. This proves that the average of each indicator on the posttest results is higher than the pretest results.

The first indicator in learning outcomes is remembering, with an N-Gain value of 0.77 which is included in the high category. Before being given treatment, students had difficulty remembering information that had been learned and often found it difficult to associate concepts taught. This is in line with the opinion of Putra et al. (2019) who stated that students often have difficulty remembering newly learned information. However, after being given treatment with the Project Based Learning model containing local wisdom, students found it easier to remember the information that had been learned. By carrying out activities in the form of projects, it allows students to visualize the material taught contextually and realistically, which strengthens their memory. As a result, students' ability to remember information increased, as seen in the posttest results which showed an average score of 86.25, compared to the pretest of 40.91.

The second indicator in learning outcomes is understanding, with an N-Gain value of 0.67 which is included in the moderate category. Before being given treatment, students had difficulty understanding the material taught because of the lack of relevance to their daily lives. This is in line with the research of Risanjani et al. (2023) which states that non-contextual learning often makes it difficult for students to relate material to their real experiences. After implementing the Project Based Learning learning model containing local wisdom, students can understand the material more easily. Through activities in the form of projects containing local wisdom, the learning material becomes more relevant to their lives. This is reflected in the increase in the pretest score which was 41.46 to 80.87 in the posttest, indicating a significant increase. This increase confirms that the learning model in the form of projects containing local wisdom is effective in improving student understanding.

The third indicator in learning outcomes is applying, with an N-Gain value of 0.86 which is included in the high category. Before being given treatment, students had difficulty applying the concepts they had learned in real situations. After the Project Based Learning learning model containing local wisdom was implemented, students could more easily apply the concepts they had learned. This approach makes the material more applicable and easier to understand. This is reflected in the increase in the pretest score of 39.57 and the posttest which increased to 91.37, which shows a very significant increase in students' ability to apply the knowledge they have learned. This increase also confirms that project-based learning is effective in improving students' ability to apply concepts in real life, as stated by Risanjani et al., (2023).

The fourth indicator in learning outcomes is analyzing, with an N-Gain value of 0.34 which is included in the moderate category. Before being given treatment, students had difficulty analyzing information in depth and comparing various existing aspects. This is in line with the opinion of Adolph (2019) who stated that analytical skills require the ability to break down material into smaller parts and understand the relationships between these parts. After the Project Based Learning learning model containing local wisdom was implemented, students began to hone their critical thinking skills. The increase in scores recorded from the pretest of 78.12 to the posttest which increased to 85.50 showed a significant increase in students' ability to analyze.

The fifth indicator in learning outcomes is evaluating, with an N-Gain value of 0.65 which is included in the moderate category. Before being given treatment, students had difficulty evaluating and assessing situations or phenomena around them. This is in line with the opinion of Adolph (2019) who stated that evaluation requires the ability to consider various options and determine the most appropriate choice. After the implementation of the Project Based Learning learning model containing local wisdom, which

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provides opportunities for students to assess and evaluate and can think more critically. This evaluation process allows them to connect theory with practice. The increase in scores recorded from the pretest of 57.56 and the posttest of 85.12 shows a significant increase in students' evaluation abilities.

The sixth indicator in learning outcomes is creating, with an N-Gain value of 0.48 which is included in the moderate category. Before being given treatment, students had difficulty creating new ideas or solutions related to the material being studied. This is in accordance with the opinion of Sari (2023) who stated that the opportunity to develop ideas can encourage students to think more innovatively. After the Project Based Learning learning model containing local wisdom was implemented, it encouraged them to think creatively and apply knowledge in real life. This process provides an opportunity for students to develop their own ideas, which strengthens their skills in creating new solutions. The increase in scores recorded from the pretest of 66.47 to the posttest of 82.50 shows a significant increase in students' creative skills.

Based on the analysis of the results of learning in science, after the implementation of the Project Based Learning model containing local wisdom, the percentage of students' posttest scores was higher than the pretest scores. The score analysis for each indicator also showed that the indicator of understanding concepts and science process skills with the highest scores in the pretest and posttest was in the third indicator, namely applying (C3) getting an N-gain score of 0.86 with a high category, while the lowest score was in the fourth indicator, namely analyzing getting a score of 0.34 with a medium category. Based on the table of N-Gain test results on each indicator of the elements of understanding the concept of science as described above, the results obtained were 0.62, which was in the range of $0.30 \leq$ N-Gain < 0.70 with a moderate increase category, which can be interpreted as quite effective. It can be concluded that after being given treatment using the Project-Based Learning learning model containing local wisdom, it was quite effective in improving the learning outcomes of science in grade IV students of SD N Ngepungrojo 01.

Meanwhile, the results of the N-Gain test analysis on the indicators of the results of learning in the science of science for process skills elements are as follows.

Table 8. N-Gain Test Analysis on Science Learning Outcome Indicators for Process Skills Elements

No	Process skill indicators	Average Meetings		
		1	2	3
1	Observe	75,02	84,90	95,77
2	Predict	67,36	74,21	97,80
3	Conduct investigation	75,56	87,13	92,07
4	Analize data	73,71	83,59	90,45
5	Evaluate	71,56	84,90	80,61
Average		72,64	82,94	91,34
Categories		starting to develop	developing as expected	developing very well

Meeting I with the lowest average score of 72.64 which is included in the criteria starting to develop, including the observing indicator getting a score of 75.02, the predicting indicator getting a score of 67.36, the investigating indicator getting a score of 75.56, analyzing data getting a score of 73.71 and evaluating getting a score of 71.56. At meeting I, students tended to be indifferent and less compact in carrying out group activities. In the process of predicting or carrying out activities asking the teacher about what had been observed through the video, students felt less confident and tended to be silent. Siahaan et al., (2021) argue that science process skills motivate students to prove their curiosity and direct involvement in activities. Students' confidence in carrying out projects increases so that they can complete them well.

Meeting II with an average score of 82.94 which is included in the criteria for developing according to expectations, including the observing indicator getting a score of 84.90, the predicting indicator getting a score of 74.21, the conducting investigation indicator getting a score of 87.13, analyzing data getting a score of 83.59 and evaluating getting a score of 84.90. At meeting II, students had begun to be challenged by the project activities carried out. They were encouraged to conduct investigations with good cooperation between their groups. Ritonga et al., (2020) argue that good cooperation in a team is the main key to significantly improving students' process skills and increasing students' motivation to continue learning and developing.

Meeting III with the highest average score of 91.34 which is included in the criteria for developing very well, including the observing

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indicator getting a score of 95.77, the predicting indicator getting a score of 97.80, the investigating indicator getting a score of 92.07, analyzing data getting a score of 90.45 and evaluating getting a score of 80.61. At meeting III, students looked active and enthusiastic in doing the project. They focused on every process that was gone through in doing the project. This is in line with the opinion of Yuliati et al., (2023) that the use of project-based learning models improves students' process skills in a structured manner with good collaboration between groups.

Based on the description above, it shows that students show a better and more significant understanding of concepts and process skills in the material on plants as a source of life on earth, students are active in project-based learning activities that contain local wisdom, so it can be concluded that learning using the Project Based Learning learning model containing local wisdom is effective in improving the learning outcomes of science students in grade IV of SDN Ngepungrojo 01.

Conclusion

Based on the results of the research that has been conducted regarding the effectiveness of the Project-Based Learning (PjBL) learning model containing local wisdom on the learning outcomes of grade IV students of SDN Ngepungrojo 01, the following conclusions can be drawn.

1. The application of the Project-Based Learning learning model containing local wisdom significantly improves the learning outcomes of grade IV students of SDN Ngepungrojo 01 in the subject of Science. This is evident from the difference in the average pretest of 56.47 and posttest of 85.23, with the lowest value increasing from 27 to 67, and the highest value from 80 to 100.
2. There is a difference in the average value of the learning outcomes of grade IV students of SDN Ngepungrojo 01 before and after being given treatment using the Project Based Learning learning model containing local wisdom, this was obtained through the Paired Sample T-Test, namely a significant value (2-tailed) of 0.000 <0.05. This causes Ho to be rejected and Ha to be accepted.
3. There is an effectiveness of the Project-Based Learning learning model containing local wisdom to improve the learning outcomes of class IV SDN Ngepungrojo 01 Science, this is shown through the N-Gain test, obtaining a value of 0.6861, which is included in the moderate category. Meanwhile, the results of the N-Gain percentage obtained an average of 68.6059, which can be stated as quite effective.

Acknowledgemnt

The following suggestions are based on the results of the research and discussion that have been described.

1. For teachers, it is expected to increase innovation in carrying out learning activities in the subject of science with projects that contain local wisdom of other local areas so that the learning process carried out by students is not monotonous and increases student activity by carrying out projects and also increasing students' love for local wisdom that must be learned and preserved from an early age.
2. For students, it is expected to be able to actively participate in project-based learning containing local wisdom in the subject of science to hone conceptual understanding skills and process skills.
3. For other researchers, it is recommended to explore innovations in learning models containing the local wisdom of other local areas so as to create a learning atmosphere that is more enjoyable and easier for students to understand.

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