EDUKASIA: Jurnal Pendidikan dan Pembelajaran
Vol. 6, 2 (December, 2025), pp. 1275-1292
ISSN: 2721-1150; EISSN: 2721-1169; DOI: 10.62775/edukasia.v6i2.1529

Improving Understanding and Collaboration of Grade IV Students of SDN Pulau Tiga through Discovery learning in Social Science Subjects

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ARTICLE INFO

Keywords:

Discovery Learning;
understanding,
collaboration;
PAS

Article history:

Received 2025-06-13
Revised 2025-08-07
Accepted 2025-12-30

ABSTRACT

This study aims to improve students' understanding and collaboration skills through the application of the Discovery Learning model in fourth-grade science at Pulau Tiga Public Elementary School, Sombori Islands District, Morowali Regency, Central Sulawesi. The study used a descriptive qualitative approach, with one principal, one class teacher, one science teacher, and fifteen students as subjects. Data collection techniques included observation, interviews, tests, and questionnaires. The study showed a significant increase in student understanding, with an average N-Gain score of 0.5 (moderate category). The greatest improvement occurred in material contextualized to the students' environment. Furthermore, students' collaboration skills also improved, with an average N-Gain score of 0.4 for the contribution, time management, and problem-solving indicators. These findings demonstrate the effectiveness of the Discovery Learning model in improving elementary school students' conceptual understanding and collaboration skills in remote island areas. These findings provide practical implications for teachers in developing locally relevant learning strategies and opportunities for education policy in remote areas.

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1. INTRODUCTION

Education Education is a fundamental aspect of national development because it plays an important role in creating high-quality and competitive human resources (Wahid et al., 2024). Quality education can shape individuals who possess the skills, knowledge, and character needed to meet the demands of the times (Komarudin et al., 2025). In the Indonesian context, the government has developed various policies and curricula aimed at improving the quality of learning at all levels of education (Fauzi et al., 2024). The national curriculum has undergone several reforms to adapt to societal changes and the needs of students (Dwi et al., 2025). At present, the Merdeka Curriculum emphasizes flexibility in the learning process by focusing on the development of student competencies

through a project-based approach, active learning, and adjustment to individual learning needs (Situmorang et al., 2025). Nevertheless, one of the main challenges in implementing this curriculum is how teachers can select appropriate learning models that improve both students' conceptual understanding and their collaborative skills, particularly in Ilmu Pengetahuan Alam dan Sosial (IPAS/Science and Social Science) subjects (Rosa et al,, 2024).

At the elementary school level, science subjects play a crucial role because they introduce students to fundamental concepts about the natural and social environment, which serve as the basis for their daily life understanding (Lestari, 2025). However, science content often includes abstract and complex concepts that are difficult for students to grasp (Kurniati, & Ratnaningrum, 2025). Traditional teaching methods such as lectures and rote memorization continue to dominate, resulting in low student engagement, lack of active participation, and a monotonous learning atmosphere (Simbolon et al., 2025). These issues hinder students' comprehension and limit their opportunities to collaborate effectively with peers (Ramadan et al., 2024). One promising alternative is the Discovery Learning model (Hariyantini et al., 2025), which places students as active participants who are encouraged to explore, analyze, and construct knowledge independently through real-life learning experiences (Magdalena et al., 2025)

The relevance of Discovery Learning is particularly strong in the context of 21st-century education, which emphasizes the mastery of the so-called "4Cs": critical thinking, creativity, communication, and collaboration (Pohan, 2025). By applying this model, students are expected not only to understand scientific theories but also to develop problem-solving abilities, practice communication, and foster collaborative learning with peers (Nurcahyani & Hamdani, 2025). Previous studies have confirmed the effectiveness of Discovery Learning in improving both conceptual understanding and students' collaborative skills. For instance, Ujud et al. (2023) demonstrated that this model actively engages students in social studies learning, while Fauziah et al. (2024) found that discovery-based learning assisted by video media significantly improved conceptual mastery compared to conventional methods.

Although Discovery Learning has been widely studied, this research offers originality because it is conducted in Pulau Tiga, a remote island area located in the Sombori Archipelago, Morowali Regency, Central Sulawesi. Pulau Tiga is geographically isolated, with limited access to educational resources, infrastructure, and learning materials. Such a context remains underexplored in the literature, making this study important for broadening perspectives on the application of innovative learning models in disadvantaged and remote island schools. This geographical uniqueness also provides opportunities to understand how Discovery Learning can be adapted to local contexts and student needs in rural and island-based educational settings. Most of the previous literature has focused on Discovery Learning in urban schools or institutions with adequate facilities. There remains a gap in examining its application in geographically disadvantaged areas, where challenges are more complex and resources are scarce (Saputra, 2025). By focusing on SD Negeri Pulau Tiga, this study not only strengthens the evidence regarding the effectiveness of Discovery Learning but also contributes practical insights into how innovative pedagogy can address the pressing challenges of education in island communities.

Based on preliminary observations and interviews with grade IV teachers at SD Negeri Pulau Tiga, many students had not yet achieved the minimum learning mastery criteria (KKTP). The teaching process remained heavily lecture-based, which caused students to be passive, disengaged, and easily bored. This condition resulted in low levels of comprehension and poor learning outcomes. Therefore, a solution is required in the form of an active, contextual, and collaborative learning model. From this perspective, the researcher was encouraged to conduct a study entitled: "Improving Student

Understanding and Collaboration Through the Discovery Learning Model in Science Subjects Class IV at SD Negeri Pulau Tiga, Sombori District, Morowali Regency."

2. METHODS

The research method used by the researcher is the qualitative descriptive research method (Sugiyono, 2016). The purpose of this qualitative descriptive research is to get an overview and description of a phenomenon being studied so that accurate conclusions can be drawn. The focus of the research is to choose informants as data sources, collect data, assess data quality, analyze data, interpret data, and make conclusions on the findings so that this research will be more focused on reality that provides an understanding picture of "Improving Student Understanding and Collaboration Through *the Discovery Learning Learning* Model in Science Subjects Class IV SD Negeri Pulau Tiga Sombori District, Morowali Regency". This research was carried out in Class IV of SD Negeri Pulau Tiga, Somboli District, Morowali Regency, Central Sulawesi Province. The location of the elementary school is on an island, which is called Pulau Tiga. In this study, the subjects of the research are 1 school principal, 1 classroom teacher, 1 science subject teacher and 15 grade IV students of SD Negeri Pulau Tiga, Somboli District. The choice of the subject is because the principal, teachers and students can provide explanations at school. To obtain the primary data needed in this study, several supporting approaches were carried out, namely:

Observation

A method of data collection by direct observation and systematic recording of the object to be researched. Observation is carried out by the researcher by observing and recording the implementation of learning in grade IV of SD Negeri Pulau Tiga, Sombori Islands District. Observations were made to observe students' abilities and the implementation of *the Discovery learning model* in science subjects in grade IV. Observation in research is used to collect data or information by directly observing the object or phenomenon that is the focus of the research. This method allows researchers to obtain data that is authentic and in accordance with the real situation. Observation is used in research to observe certain behaviors, interactions, processes, or phenomena directly in *discovery learning*. It is important to obtain data that is accurate, contextual, and complements other data collection methods, so that research can produce valid and relevant findings.

Interview

An interview is a meeting of two people to exchange information and ideas through questions and answers, so that meaning can be constructed in a certain topic. Interviews are used as a data collection technique when the researcher wants to conduct a preliminary study to find out the problem that needs to be researched, but also if the researcher wants to know more in-depth things from the respondents. The interview was conducted to obtain information about the implementation of *the Discovery learning model*. The researcher conducted interviews with 1 principal, 1 classroom teacher and 3 students. The interview data collection technique in the study was used to obtain information directly from respondents through oral communication. Interviews were conducted by researchers to gather more in-depth, detailed, and contextual data. The interview was used to find out the responses of students and teachers about the application of *Discovery learning* to social studies learning.

Test Technique

The test used is a student comprehension test in the form of multiple-choice questions for IPAS material totaling 21 questions. The test is given to the research subjects to find out students' understanding in solving problems in science materials. The test of students' comprehension ability in the *Discovery learning* model was made directly by the researcher. In research, test techniques are used

as a method of data collection to measure abilities, knowledge, skills, or other aspects related to the research subject. The test is used to find out the extent to which students understand the material that has been taught. In the context of educational research, it is useful to evaluate the success of *the Discovery learning model*. Test techniques in research function as a tool to obtain objective and measurable data on the ability or understanding of the research subject

Questionnaire Technique

The Questionnaire Technique is carried out by distributing questionnaires to students which aims to measure the collaboration skills of grade IV students. The questionnaire technique is one of the data collection methods used in the research to obtain direct information from respondents through a series of questions that have been systematically arranged. Gather students' opinions on the effectiveness of *the Discovery learning* model in improving collaboration. Collect data on students' perceptions of the learning process. Assess students' satisfaction levels with the collaboration experience in the group. A research instrument is a tool or device used by researchers to collect the data needed in a research. This instrument is designed according to the research objectives and the type of data to be collected, both quantitative and qualitative data. A good instrument must be valid (measuring what is supposed to be measured) and reliable (consistent in delivering results). Research instruments are an important component of the research process because the quality of the data collected depends on how well they are designed. The research instruments used by the researcher are:

Observation sheet

An observation sheet is a guideline that contains indicators that are carried out to make an observation. The tool used is in the form of observation sheets to see the teacher's ability to implement learning using *discovery learning*. Meanwhile, observations are carried out for students in the form of observation sheet instruments to see student activities in participating in learning using *the discovery learning* model.

Collaboration Questionnaire

A list of events or questionnaire is a means of collecting data to obtain a true picture of a situation. Questionnaires have an important role because they cover all the objectives of the survey/research. The Collaboration Questionnaire instrument grid is described in the table.

Table 1. Collaboration questionnaire instrument grid

No	Indicator	No Question	Sum
1	Contributions	1 - 3	3
2	Time management	4 - 6	3
3	Problem *solving*	7 – 9	3
4	Working with *others*	10 - 12	3
5	Research Techniques	13 -15	3
6	Sintesis (*Synthesis*)	16-18	3
Total amount			18

Student Comprehension Test

The test instrument used was a student comprehension test in the form of multiple-choice questions for science science class IV material totaling 21 questions. The test is given to the research subjects to find out students' understanding in solving problems in science materials. The student comprehension test in *the Discovery learning learning model* is created directly by the researcher. The comprehension test grid is described in table 2.

Table 2. Comprehension Test Grid

No	Learning Materials	Capability Indicators	No Question	Sum
1	The kingdom is Hindu-Buddhist.	Interpret Exemplifies Classify Summarize Conclude Compare Explain	1-7	7
2	Relics of the Hindu- Buddhist Kingdom	Interpret Exemplifies Classify Summarize Conclude Compare Explain	8-14	7
3	Natural Wealth in the Residential Area	Interpret Exemplifies Classify Summarize Conclude Compare Explain	15-21	7
Total amount				21

Interview Guidelines

The interview guidelines are unstructured guidelines with interview topics related to the application of science learning in schools, learning with *the Discovery learning* model in the classroom, and the response of students and teachers to learning with *discovery learning*. Interviews were conducted with the principal related to social studies learning. Classroom teachers were interviewed related to the learning models that had been carried out. Teachers and students were interviewed regarding their responses to *discovery learning*. The next stage carried out in this study is to analyze data from the research results. The data analysis used in this study includes four stages, namely: (1) Data collection, (2) Data reduction, (3) Data presentation, (4) Drawing conclusions (Sugiyono, 2019:84). Data collection was obtained from the process of observation, interviews, test techniques, questionnaire techniques. Data reduction/data classification, the researcher reduces data by sorting out the data obtained to answer the research problem. Data Presentation, after the data is reduced, continues to present data in a narrative and organized manner so that it is easy for students to understand. Conclusion Drawing is carried out after the data classification and data presentation activities are completed. The observation sheet in the form of a checklist consists of six (6) indicators, namely Contributions, Time management. Problem *solving*, *Working with others*, *Research techniques*, and Synthesis. The calculation of the percentage of student collaboration is calculated individually. Each indicator is calculated using the formula:

$$\boldsymbol{Grade} = \frac{\sum \boldsymbol{Score\ Obtained}}{\sum \boldsymbol{Total\ Score}} \ \boldsymbol{x}\ \mathbf{100\%}$$

The data obtained were interpreted descriptively for each indicator of collaboration skills that emerged during the learning process as shown in table 3.

Table 3. Student Collaboration Criteria

No	Interval	Criterion
1	90 % - 100%	Excellent
2	80% - 89%	Good
3	65% - 79%	Enough
4	55% - 64%	Less good
5	≤ 54%	Bad

The results of the student ability test are analyzed using the following formula:

$$\boldsymbol{bility\ Score} = \frac{\sum \boldsymbol{Score\ Obtained}}{\sum \boldsymbol{Total\ Maximum\ Score}} \ \boldsymbol{x}\ \mathbf{100\%}$$

Then the results are converted to the student's ability criteria as in Table 4.

Table 4. Student Ability Criteria

Percentage Score	Criterion
1 % - 20 %	Very bad
21 % - 40 %	Less good
41 % - 60 %	Pretty good
61 % - 80 %	Good
81 % - 100 %	Excellent

To determine the improvement of learning outcomes and student collaboration after being given *the Discovery learning* treatment taken from *the pretest* and *post-test scores* obtained by students, the N-Gain calculation was used according to Richard R. Hake, (1998). The calculation of *the normalized gain* score (N-Gain) is expressed in formula (1), with the criteria as shown in table 5.

$$\langle \boldsymbol{g} \rangle = \frac{\langle \boldsymbol{sf} \rangle - \langle \boldsymbol{si} \rangle}{\mathbf{100} - \langle \boldsymbol{si} \rangle} \ \boldsymbol{x}\ \mathbf{100\%}$$

Information:

$\langle g \rangle$ = normalized gain (N-Gain)

$\langle sf \rangle$ = post-test score

$\langle si \rangle$ = pre-test

Table 5. N-Gain Value Criteria

N-Gain Value	Criterion
g > 0,7	Tall
0,3 ≤ g ≤ 0,7	Keep
0 < 0,3	Low

Additional Procedure (FGD):

Besides observations, interviews, tests, and questionnaires, this study also used Focus Group Discussions (FGDs) to strengthen qualitative findings. FGDs were conducted with groups of teachers and students to discuss their experiences during the implementation of Discovery Learning. The discussions focused on challenges in science learning, students' collaboration patterns, and teacher strategies, thereby complementing the individual interview results.

Instrument Validation:

The research instruments (observation sheet, interview guide, student comprehension test, and collaboration questionnaire) were validated by two experts, namely an education researcher and a senior science teacher. Their feedback was used to improve the clarity, content relevance, and accuracy of the instruments. In addition, a small-scale pilot test was conducted in another school within the same region to ensure readability and practicality before implementation.

Data Analysis and Justification of N-Gain:

Data analysis included four stages: (1) Data collection, (2) Data reduction, (3) Data presentation, and (4) Conclusion drawing (Sugiyono, 2019). Qualitative data from observation, interviews, and FGDs were analyzed thematically. Meanwhile, test and questionnaire results were processed quantitatively. To measure the improvement of learning outcomes and student collaboration after being given the Discovery Learning treatment, the normalized gain (N-Gain) calculation was applied (Prasetyo & Lenggono, 2024). Although N-Gain is usually applied in quantitative research, in this study it was used only as a supporting tool to complement qualitative findings, by providing measurable evidence of improvement levels (low, medium, or high). Thus, the use of N-Gain strengthens the descriptive narrative without changing the qualitative nature of this study.

3. FINDINGS AND DISCUSSION

Description of the Feasibility of Using the Discovery Learning Model

1. Observation results

Based on the observations of fourth grade students at SDN Pulau Tiga, the Discovery Learning model was implemented to improve student understanding and collaboration. This research consisted of five meetings, namely one pre-test, three learning sessions, and one post-test. In addition, a collaboration questionnaire was administered at the end of each lesson.

During the first meeting, which focused on the Hindu-Buddhist kingdom, a pre-test was conducted to measure students' initial abilities. The lesson sequence began with greetings, followed by the presentation of pictures and videos, group formation, and the distribution of worksheets (LKPD) and teaching materials. Students were asked to discuss, work on group assignments, present results, and reflect at the end of the lesson. At this stage, both teachers and students still encountered obstacles, mainly because they were not accustomed to the new model and needed time to adapt. By the second meeting, with material on Hindu-Buddhist heritage, student and teacher adaptation had improved.

Students began to understand the structure of the learning process, and their participation increased. The teacher also showed better classroom management in guiding group activities.

At the third meeting, on natural resources in the local environment, Discovery Learning was implemented more effectively. Students were actively engaged, increasingly independent, collaborative, and confident during discussions. They demonstrated initiative in completing tasks, seeking additional learning resources, and supporting one another in groups. Teachers shifted to a facilitative role, intervening mainly to provide guidance when students faced difficulties. Group discussions also enhanced students' communication and listening skills.

The progressive improvement across the three learning sessions demonstrates that Discovery Learning requires an adjustment period before students fully engage with it. Initial resistance was natural, given that traditional lecture methods were previously dominant. The significant improvement observed when learning was tied to local and contextual material (e.g., natural resources in students' own environment) highlights the importance of culturally and geographically relevant content (Mugara & Ali, 2025). However, several limitations were also observed. Not all students participated equally; some remained shy or hesitant, which may reflect cultural norms in Pulau Tiga, where children are often taught to be respectful and reserved in group interactions. This cultural dynamic can both support harmony and hinder critical debate. Furthermore, limited teaching resources, such as digital media and reference materials, restricted the diversity of stimuli that could be integrated into the Discovery Learning process (Rahayu & Musadad, 2025). Overall, the observations suggest that Discovery Learning has strong potential to improve understanding and collaboration in remote island contexts, provided that teachers receive adequate support to adapt the model to cultural dynamics and infrastructural limitations.

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2. Interview Results

Based on an interview with a fourth grade teacher, Mrs. W.A, when asked "What models have been used in science learning?", she explained that a variety of models are commonly applied depending on learning objectives and student characteristics. Among them are Discovery Learning, Project-Based Learning (PjBL), Problem-Based Learning (PBL), and inquiry. Regarding the factors that must be considered in teaching, she highlighted students' readiness, the need for a supportive learning environment, checking comprehension, and managing class time effectively. When asked about students' difficulties in science, the teacher admitted that many still struggle, caused by low interest, different learning styles, limited focus, and insufficient time to master materials. On the Discovery Learning model, she emphasized that while not all topics are equally suitable, several IPAS materials match very well, particularly those involving concrete experiences. She defined Discovery Learning as a model that actively encourages students to seek, explore, and construct understanding through their own discovery. She also mentioned its advantages: increasing participation, motivation, independence, and critical thinking, while also noting a limitation some students remained shy or lacked confidence in expressing their ideas.

Students shared similar perspectives. Nadita, for instance, expressed enjoyment when working in groups and watching learning videos, explaining that collaboration makes learning easier because students can share tasks, explain concepts to peers, and learn from one another. Ramadan admitted he enjoyed video-based learning but found group work challenging when peers were quiet or when differences of opinion arose. He explained that usually they tried to listen to each other, and if needed, asked for the teacher's advice. Similarly, Aksa described how groups divided tasks fairly and ensured all members had opportunities to speak by taking turns and directly inviting quieter students to contribute (Kusumawati, 2022).

Critical Reflection:

The interviews highlight both the potential and the limitations of Discovery Learning in a remote island context. Teachers recognize that while the model increases student engagement, its success is uneven confident students thrive, while more reserved students may struggle to participate fully. This reflects a cultural dynamic in Pulau Tiga, where values of politeness and modesty sometimes inhibit children from voicing disagreement openly, even in group learning. As Ramadan noted, disagreements are often resolved by deferring to the teacher, showing reliance on authority figures rather than independent peer negotiation. From the student side, the enthusiasm for videos and visual aids indicates the importance of multimodal resources in sustaining motivation. However, the limited access to technology and materials in Pulau Tiga restricts the consistent integration of such media. Moreover, the teacher's acknowledgment of diverse learning styles suggests that while Discovery Learning provides opportunities for exploration, it may need to be combined with scaffolding strategies to ensure inclusivity (Utami et al. 2025).

Conclusion from Interviews:

The teacher's and students' perspectives together confirm that Discovery Learning is both feasible and beneficial in fostering understanding and collaboration. Yet, its effectiveness in Pulau Tiga depends on teacher adaptability to local conditions, the provision of culturally sensitive group structures, and access to even simple learning technologies. Without these supports, the model risks reinforcing participation gaps between confident and less assertive students.

Student Comprehension Test Results

1. First meeting

The first meeting was held on February 10, 2025. At this stage, a pre-test consisting of 21 multiple-choice questions was administered before the application of Discovery Learning. The pre-test aimed to capture students' baseline knowledge in the subject. The results are shown in Table 6.

Table 6. Results of Pre-test for Fisheries Subject

No	Student's name	Percentage of Grades	Information
1.	Adelia	57,14 %	Pretty good
2.	Aksa	52,38 %	Pretty good
3.	Anisa	57,14 %	Pretty good
4.	April	57,14%	Pretty good
5.	Arpia	52,38%	Pretty good
6.	Irmansyah	61,90%	Good
7.	Mirsad	61,90%	Good
8.	Muh. adil	52,38%	Pretty good
9.	Nadita	76,90%	Good
10.	Nurhasifa	57,14%	Pretty good
11.	Nurlela	61,90%	Good
12.	Ramadan	57,14%	Pretty good
13.	Sitti	61,90%	Good
14	Sukrillah	52,38%	Pretty good
15	Zulfikar	57,14%	Pretty good
	Average	58 ,53%	Pretty good

Based on Table 6, most students were in the "fair" category, with only a few achieving "good" performance. This indicates that before the intervention, students' conceptual understanding was still relatively limited. Several factors likely influenced these outcomes: restricted access to diverse learning resources in Pulau Tiga, limited exposure to multimedia-based teaching, and the dominance of teacher-centered instruction in prior classes.

2. Second meeting

This second meeting was the first learning implementation using the *Discovery learning* model which was held on February 15, 2025 with Hindu-Buddhist royal learning materials. There are also learning results at the second meeting can be seen in table 7.

Table 7. Learning Outcomes 1

No	Student's name	Percentage of Grades	Information
1.	Adelia	71.43%	Good
2.	Aksa	57.14%	Pretty Good
3.	Anisa	85.71%	Excellent
4.	April	57.14%	Pretty Good
5.	Arpia	71.43%	Good
6.	Irmansyah	85.71%	Excellent
7.	Mirsad	71.43%	Good
8.	Muh. adil	57,14%	Pretty Good
9.	Nadita	85.71%	Excellent
10.	Nurhasifa	57.14%	Pretty Good
11.	Nurlela	71.43%	Good
12.	Ramadan	85.71%	Excellent
13.	Sitti Hunul	57.14%	Pretty Good
14	Sukrillah	85.71%	Excellent
15	Zulfikar	85.71%	Excellent
	Average	73,28%	Good

Compared to the pre-test, student scores showed a clear improvement, with more students achieving "good" and "excellent" results. This suggests that the introduction of Discovery Learning, even in its early stages, successfully engaged students in active exploration and group-based learning.

However, despite this improvement, challenges remained. Some students (e.g., Aksa, April, Muh. Adil, and Nurhasifa) still hovered around the "fairly good" level, reflecting difficulties in adapting to new learning approaches. This may relate to differing learning paces and the tendency of quieter students to remain passive during group tasks, a phenomenon consistent with the cultural norm of modesty in Pulau Tiga. Moreover, since students were still unfamiliar with Discovery Learning at this stage, group discussions were sometimes dominated by a few active individuals, while others contributed less. Another limitation was the reliance on teacher-provided materials (Indah, 2024). Although students began to engage more actively, their exploration was still scaffolded heavily by visual aids and teacher guidance, which raises questions about the sustainability of independent learning in resource-limited island schools.

3. Third Meeting

This second meeting is the implementation of the third learning using the *Discovery learning model* which will be carried out on February 24, 2025 with learning materials on the Legacy of the Hindu-Buddhist Kingdom, there are also learning results at the third meeting can be seen in table 8.

Table 8. Learning Outcomes II

No	Student's name	Percentage of Grades	Information
1.	Adelia	85,71%	Excellent
2.	Aksa	85,71%	Excellent
3.	Anisa	57,14%	Pretty Good
4.	April	71,43%	Good
5.	Arpia	57,14%	Pretty Good
6.	Irmansyah	71,43%	Good
7.	Mirsad	71,43%	Good
8.	Muh. adil	71,43%	Good
9.	Nadita	100%	Excellent
10.	Nurhasifa	71,43%	Good
11.	Nurlela	57,14%	Pretty Good
12.	Ramadan	85,71%	Excellent
13.	Sitti Hunul	85,71%	Excellent
14	Sukrillah	85,71%	Excellent
15	Zulfikar	85,71%	Excellent
Average		81,07 %	Excellent

Compared to the previous meeting, the average score increased from 73.28% to 81.07%. More students achieved "excellent" scores, although some (e.g., Anisa, Arpia, Nurlela) remained at the "fairly good" level.

This improvement indicates that students were adapting better to the Discovery Learning approach. However, variations in achievement suggest unequal participation within groups. Interviews revealed that quieter students often hesitated to express their ideas, preferring to follow more dominant peers. This reflects a cultural dynamic in Pulau Tiga, where respect for authority and avoidance of conflict sometimes lead to passive learning behaviors. Such dynamics highlight the need for structured facilitation strategies for instance, assigning rotating group roles to ensure equal participation (Ishak & Hos, 2025).

4. Fourth Meeting

At this third meeting, it was the implementation of learning using the *Discovery learning* model which was carried out on March 10, 2025 with Natural Resources learning materials in the area where they lived, and the learning results at the third meeting can be seen in table 9.

Table 9. Learning Outcomes III

No	Student's name	Prenstase Value	Information
1.	Adelia	85,71%	Excellent
2.	Aksa	85,71%	Excellent
3.	Anisa	85,71%	Excellent

4.	April	85,71%	Excellent
5.	Arpia	85,71%	Excellent
6.	Irmansyah	85,71%	Excellent
7.	Mirsad	85,71%	Excellent
8.	Muh. adil	100 %	Excellent
9.	Nadita	100 %	Excellent
10.	Nurhasifa	71,43%	Good
11.	Nurlela	71,43%	Good
12.	Ramadan	100%	Excellent
13.	Sitti Hunul	85,71%	Excellent
14	Sukrillah	85,71%	Excellent
15	Zulfikar	85.,1%	Excellent
	Average	92,37%	Excellent

By this session, nearly all students consistently achieved "excellent" scores, with only two remaining in the "good" category.

This sharp increase reflects two important factors:

Contextual Relevance of Content The topic of natural resources was closely related to students' lived experiences on Pulau Tiga, making it easier for them to understand and apply knowledge.

Increased Familiarity with the Model - After three rounds of practice, students were more accustomed to Discovery Learning routines, such as group discussions, presentations, and independent exploration.

Yet, the fact that a small minority (e.g., Nurhasifa, Nurlela) remained in the "good" category indicates that differentiated instruction is still necessary. Not all students benefit equally from group-based tasks, especially those with lower confidence or limited literacy skills.

5. 5. N-Gain Analysis

Table 10. Percentage of learning evaluation results

Learnersn	**Material**	**Average Score**		**N-Gain**
		Pre-test	Post-test	
1	The kingdom is Hindu-Buddhist.	58,10	73,28	0,3
2	Relics of the Hindu Kingdom-Budha	58.10	81,07	0,5
3	Natural Wealth in the Residential Area	58,10	92,37	0,8
Average N-Gain		58	76,80	0,5

The data indicate steady improvement across three sessions. The third learning session produced the highest N-Gain (0.8, high category), underscoring the importance of contextualized material.

The results confirm that Discovery Learning is most effective when the subject matter is closely tied to students' daily lives. However, the reliance on local context also poses a limitation: for abstract topics less connected to lived experience, the same level of improvement may not be achieved. Thus, teachers in Pulau Tiga need to adapt Discovery Learning by combining real-life examples with guided scaffolding to prevent uneven learning gains.

Student Collaboration Results

The *Discovery Learning Model* Questionnaire in the Science Subject where the researcher measures the ability of students as seen from the student collaboration questionnaire observed in this learning consists of six aspects, namely: *Contributions*, Time *management*. Problem *solving*, *Working with others*, *Research techniques*, and Synthesis. The results of collaborative observations obtained from the observation sheets can be seen in table 11.

Table 12. N-Gain Results of Collaboration for Each Meeting Based on Indicators

Indicator	N-Gain (%)			Average
	Learning 1	Learning 2	Learning 3	
Contributions	0,27	0,32	0,50	0,4
Time management	0,25	0,30	0,43	0,3
Problem solving	0,24	0,32	0,37	0,3
Working with others	0,19	0,32	0,48	0,3
Research Techniques	0,13	0,21	0,22	0,2
Synthesis	0,11	0,15	0,34	0,2
Average	0.2	0.3	0.4	

The strongest improvement occurred in contributions and working with others, showing that Discovery Learning effectively encouraged participation and teamwork. Problem-solving and time management also showed moderate gains, reflecting developing critical thinking and organizational skills. However, research techniques and synthesis remained weak, with low N-Gain values (0.2). This reveals a gap in higher-order collaboration skills, likely due to limited access to diverse learning resources in Pulau Tiga. Students often relied heavily on teacher-provided materials instead of conducting independent inquiry (Aldi & Azis, 2025).

Implications:

While Discovery Learning improved participation and basic collaboration, there is still a need to strengthen information processing and integration skills. Teachers could address this by introducing guided worksheets, structured inquiry tasks, or simple digital resources that scaffold research and synthesis (Jalil, 2019).

Discussion

1. Discovery learning *model* in IPAS subjects

The results show that the application of the Discovery Learning model contributes significantly to improving both student understanding and collaboration. Consistent N-Gain improvements across indicators such as contribution, problem-solving, and time management suggest that Discovery Learning not only increases individual engagement but also strengthens cooperation through meaningful group activities (Jariyah & Efendi, 2024). Pedagogically, this approach positions students as active agents who question, observe, conclude, and discuss rather than passive recipients of information (Riyadi & Robandi, 2025).

However, the findings also reveal unique cultural and contextual dynamics. In Pulau Tiga, a remote island community, students tend to show respect for authority and avoid open disagreement, which sometimes leads to uneven participation in discussions (Reba & Mataputun 2025). Quiet or shy

students often rely on more dominant peers, which limits the full potential of collaboration (Switri, 2025). This indicates a cultural bias that teachers need to anticipate by introducing role-rotation systems, peer feedback, or structured group work rules that guarantee equal opportunities for all members (Nasution, 2024).

To optimize outcomes, teachers should design stimulating yet resource-feasible learning environments, combining Discovery Learning with simple digital tools available in remote areas (Silvester et al., 2024). For example, using offline interactive quizzes, locally produced short videos, or digital worksheets (e-LKPD) on shared devices can enrich student engagement. Formative evaluations 'through group reflection can also strengthen metacognitive awareness of each student's role. Thus, Discovery Learning in the Pulau Tiga context is not just about academic improvement, but also about cultivating 21st-century skills critical thinking, communication, collaboration, and adaptability within the constraints of limited resources (Santiani et al., 2024).

2. Improving Student Understanding Through the Discovery Learning Model in Science Subjects.

The N-Gain analysis indicates that Discovery Learning effectively stimulates curiosity and engagement, especially when the subject matter connects directly to students' lives. This was most evident in the third learning session (Natural Wealth in the Local Area), where the N-Gain reached 0.8 (high category). This suggests that contextualized learning materials rooted in students' environment can significantly enhance comprehension. Nevertheless, this raises a key limitation: not all IPAS topics are equally contextual. Abstract materials such as climate concepts or distant historical events may not yield the same learning gains without creative adaptation (Permatasari et al., 2024). This demonstrates a content bias within the model: while locally relevant topics flourish, abstract knowledge may require supplementary strategies. Teachers, therefore, need to design bridging activities that connect abstract content with students' lived experiences, for instance through local analogies, simple experiments, or mini-projects (e.g., mapping rainfall patterns in their village) (Jufri et al., 2023).

Moreover, since Pulau Tiga is geographically isolated, access to learning resources is limited. This reality underlines the importance of teacher creativity in using local materials (e.g., fishing practices, farming tools, or traditional stories) as entry points for abstract scientific concepts (Ilhami, 2023). In this sense, Discovery Learning becomes more than just a method it acts as a bridge to contextual and meaningful learning, preparing students not only academically but also socially by strengthening their connection to local culture and environment (Maharani et al., 2024).

3. Increasing Student Collaboration Through the Discovery Learning Model in Social Science Subjects

The Collaboration improved steadily across the three sessions, with the average N-Gain rising from 0.2 to 0.4. The most significant growth was found in the contribution indicator (N-Gain = 0.4), suggesting that students increasingly valued participation and idea-sharing within groups. This aligns with the cultural finding that students perform better when their voices are explicitly invited and validated.

The problem-solving indicator also improved (from 0.24 to 0.37), reflecting students' growing ability to address challenges collectively. This supports earlier findings Ahmed et al. (2021) that collaborative project-based tasks foster critical and systematic thinking. However, research techniques and synthesis indicators remained the lowest (0.2), highlighting a limitation in higher-order collaborative skills. Students were more confident in contributing and discussing but less skilled at systematically collecting, analyzing, and synthesizing information (Tusyana, 2025).

This limitation reflects the structural constraints of remote island schools, where access to diverse sources of information is scarce. Teachers often serve as the main or only resource, which limits

opportunities for students to practice independent inquiry (Praekanata et al., 2024). To address this, low-cost innovations could be introduced, such as guided inquiry worksheets, peer-led mini research projects using locally available materials, or the use of simple digital tools (voice recorders, basic cameras) to document findings. Gamification strategies, such as time-tracking games for group work, could also help strengthen weaker indicators like time management. From a policy perspective, these findings suggest that teacher training programs in remote areas should emphasize collaborative pedagogy and the use of simple, context-based technological tools. Furthermore, the government could support schools in islands like Pulau Tiga by providing low-bandwidth offline learning resources to strengthen inquiry and synthesis-based skills.

4. CONCLUSION

This study concludes that the Discovery Learning model is not only an effective teaching method but also a bridge to authentic and meaningful learning experiences for elementary school students. Consistent improvements in N-Gain scores show its effectiveness in enhancing students' understanding and collaboration. By engaging in exploration, observation, and discovery, students become more active, independent, and critical, while also developing 21st-century skills such as cooperation and environmental awareness.

The findings further show that Discovery Learning strengthens collaboration skills, as seen in the improvement of indicators like contribution, time management, problem-solving, and teamwork. This approach creates a positive and interactive learning environment, encouraging students to communicate and respect each other's perspectives. The most significant progress occurred when learning materials were directly related to students' daily lives, such as natural resources in their local environment. Although the study was limited to one remote school context, it highlights the importance of adapting Discovery Learning to cultural and resource-based realities. Teachers can optimize its effectiveness by using simple media, local materials, and structured group work. For policymakers, this model reinforces the need for teacher training tailored to remote areas. For researchers, it opens opportunities to explore Discovery Learning's impact on broader competencies such as creativity and scientific literacy. In summary, Discovery Learning has proven to improve both understanding and collaboration while preparing students to become critical, cooperative, and reflective learners for the future.

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