The Effect of The Cooperative Learning Method on The Learning Interest of Students at Pisangan Timur 11 Elementary School in Science Laboratory Classes

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ABSTRACT

This study investigated the effect of implementing the Cooperative Learning method on the learning interest and learning outcomes of fourth-grade students at Pisangan Timur 11 Elementary School during science practicum activities. The research employed a descriptive quantitative approach with a quasi-experimental design. The experimental group was taught through Cooperative Learning, whereas the control group received conventional instruction. Data were collected through pretests, posttests, and a learning-interest questionnaire administered before and after the intervention. The results show a significant difference between the experimental and control groups, with the experimental class demonstrating greater gains in both achievement and learning interest. These findings indicate that Cooperative Learning is an effective approach for improving student engagement and learning outcomes in elementary science education.

ABSTRAK

Penelitian ini menelaah pengaruh penerapan metode Cooperative Learning terhadap minat belajar dan hasil belajar siswa kelas IV di SD Pisangan Timur 11 pada kegiatan praktikum IPA. Penelitian menggunakan pendekatan kuantitatif deskriptif dengan desain kuasi eksperimen. Kelompok eksperimen memperoleh pembelajaran melalui Cooperative Learning, sedangkan kelompok kontrol mengikuti pembelajaran konvensional. Data dikumpulkan melalui pretest, posttest, dan angket minat belajar yang diberikan sebelum dan sesudah perlakuan. Hasil penelitian menunjukkan adanya perbedaan signifikan antara kelompok eksperimen dan kelompok kontrol, dengan kelas eksperimen memperlihatkan peningkatan yang lebih tinggi pada hasil belajar maupun minat belajar. Temuan ini menunjukkan bahwa Cooperative Learning efektif digunakan untuk meningkatkan keterlibatan belajar dan hasil belajar siswa pada pembelajaran IPA di sekolah dasar.

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KEYWORDS
Cooperative Learning, Elementary School, Learning Interest, Science Practicum.

Received: 02/04/2026
Revised: 23/04/2026
Accepted: 24/04/2026
Online: 30/04/2026
Published: 30/04/2026

INTRODUCTION

Natural Science (IPA) is a core subject in elementary education because it helps students interpret phenomena in their immediate environment and build basic scientific understanding from an early age (Tursinawati & Widodo, 2019).

Evidence from the Programme for International Student Assessment (PISA) conducted by the Organisation for Economic Co-operation and Development (OECD) shows that Indonesia's science literacy performance is still below the average of OECD member countries. In 2022, Indonesia was ranked 69th out of 81 participating countries, with scores of 366 in mathematics, 383 in science literacy, and 359 in reading, while the OECD average was 369.3 (OECD, 2023). These findings imply that science learning, including at the elementary school level, has not yet optimally strengthened students' scientific literacy.

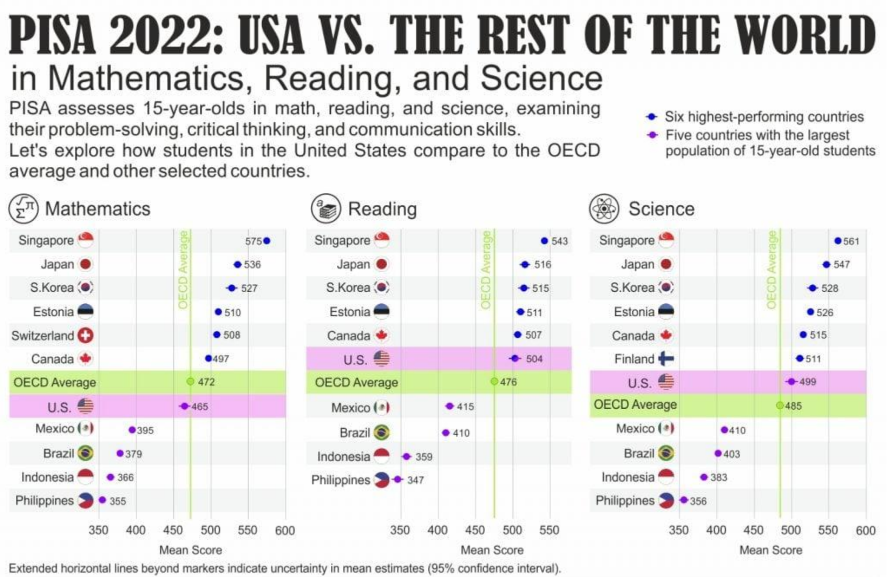

Figure 1. OECD, PISA. (2022).

The Forum for Innovative Science Assessment (FISA) also reported that science instruction in a number of countries, including Indonesia, continues to emphasize mastery of content rather than the cultivation of science process skills, critical thinking, and constructive attitudes toward science (FISA, 2023). Traditional teaching practices have likewise been associated with weak student performance in science subjects (Rustaman, 2020). This condition suggests that science education should not stop at content delivery, but must also develop inquiry skills and analytical habits.

National data point in the same direction. The 2023 National Education Survey reported that only 37% of elementary school students were interested in learning IPA, and just 22% stated that they enjoyed science practicum activities (Kemendikbudristek, 2023). The gap between these figures and the expected goals of science education indicates that existing classroom approaches have not fully responded to students' learning needs and preferences.

Preliminary observations at Pisangan Timur 11 Elementary School, supported by an interview with one of the curriculum teachers, showed that IPA instruction is still largely delivered through one-way explanation or conventional lecturing. In this pattern, teachers dominate the lesson verbally, whereas students mainly listen and receive information. Practicum activities are also infrequent, and when they do take place, student participation is not always maximized.

An approach that relies heavily on memorization tends to limit students' opportunities to think creatively and to construct a more meaningful understanding of scientific concepts. For that reason, science learning requires a more participatory model that involves students directly in the learning process, encourages inquiry, and supports the development of positive attitudes toward science.

Within this context, Cooperative Learning offers a relevant alternative for elementary school students. According to Piaget, children at this stage are in the concrete operational phase, meaning that they learn more effectively through direct experiences, interaction with peers, and the use of tangible objects (Pratama & Antara, 2020). Cooperative Learning accommodates these characteristics by organizing students into heterogeneous small groups where they exchange ideas, help one another, and solve problems collaboratively (Johnson & Johnson, 2017).

Considering the empirical data and the findings of earlier studies, further investigation is needed into the effect of the Cooperative Learning method on students' learning interest at Pisangan Timur 11 Elementary School during IPA practicum activities. This study was therefore conducted to examine more closely how far Cooperative Learning can stimulate students' interest in science practicum. The results are expected to contribute to the development of instructional alternatives that are more compatible with the characteristics of elementary school learners.

In elementary science, practicum is not merely a supplementary activity that follows explanation. It is the setting in which concepts become visible and testable for students who are still developing scientific understanding through direct experience. In the topic of changes in the states of matter, students can observe melting, freezing, evaporation, condensation, and crystallization through simple phenomena that are close to daily life. When this kind of experience is reduced, science easily becomes a subject of memorized terms rather than a field of inquiry.

Because of that, the quality of practicum organization has a direct bearing on how students interpret IPA as a school subject.

Learning interest in this research was also approached as more than a statement of liking or disliking a lesson. Interest includes emotional response, the value students assign to the lesson, their sense of growing knowledge, and their willingness to participate actively in learning tasks. This broader view is important because a student may report that science is enjoyable but still remain passive during discussion or observation. For that reason, the present study examined interest together with achievement so that the instructional effect of Cooperative Learning could be interpreted in both motivational and academic terms.

The relevance of Cooperative Learning becomes stronger when the developmental characteristics of elementary learners are considered. Students at this level usually benefit from concrete objects, peer interaction, immediate feedback, and structured opportunities to speak about what they observe. Cooperative Learning organizes these elements into a purposeful sequence of collaboration. During practicum activities, students do not only watch a phenomenon; they are required to compare results, formulate explanations, and communicate findings with others. Such a structure can reduce passivity because each student is drawn into the learning process through shared responsibility.

Preliminary information from the school context further strengthened the rationale for this study. The supporting research report records that science instruction at SD Pisangan Timur 11 still often relied on explanation and textbook-oriented teaching, while practicum was carried out only occasionally because of limited time and facilities. The teacher also indicated that students generally responded positively to group-based tasks, even though cooperative practicum had not yet become a regular pattern. This gap between curricular expectations and everyday classroom practice made the present study relevant as a classroom-based attempt to test a feasible alternative under ordinary conditions.

Another contribution of the study lies in its local specificity. Many previous studies have shown the general advantages of cooperative models, but instructional effects are shaped by subject matter, age level, classroom management, and available resources. This research focuses on fourth-grade students, on IPA practicum activities, and on the topic of changes in matter within one public elementary school context. It therefore contributes evidence that is closer to actual classroom decision making. In addition, the study links interest scores and posttest scores using the same participants, which makes it possible to examine whether students who became more engaged also tended to perform better after the intervention.

METHODS

This study used a descriptive quantitative approach with a quasi-experimental design to examine the effect of the Cooperative Learning method on the learning interest and learning outcomes of fourth-grade students in IPA practicum activities at Pisangan Timur 11 Elementary School. A quasi-experimental design was chosen because the research compared an experimental group and a control group without random assignment, which is a common condition in school-based research (Creswell & Creswell, 2018).

The study applied a pretest-posttest control group design. Both the experimental group, which received instruction through the Cooperative Learning method, and the control group, which was taught through conventional instruction, were assessed before and after the treatment. This design makes it possible to observe score changes within each group as well as differences between groups after the intervention has been implemented (Fraenkel et al., 2019).

Table 1. Research Design

Group	O_1 (*Pretest*)	Treatments (X / -)	O_2 / O_4 (*Posttest*)	Description
Experimental Group	O_1	X	O_2	Experimental group pretest and posttest
Control Group	O_3	-	O_4	Control group pretest and posttest

The population consisted of all fourth-grade students at Pisangan Timur 11 Elementary School. Two groups with relatively similar academic backgrounds were selected through purposive sampling. The experimental class included 25 students who learned through the Cooperative Learning method, whereas the control class included 25 students who followed conventional instruction. The selection considered students' active classroom participation and the availability of parental consent for involvement in the study.

Data collection relied on pretest and posttest instruments to capture students' learning outcomes and learning interest. The instruments were prepared to measure both mastery of IPA content and students' attitudes toward the subject. In addition, a learning-interest questionnaire was distributed to both groups before and after the treatment to identify changes in motivation and engagement during IPA practicum activities.

1. **Pretest and Posttest:**
   - The pretest was administered prior to the treatment to identify students' initial knowledge and baseline interest in IPA.
   - The posttest was given after the intervention to determine changes in learning outcomes and learning interest in both the experimental and control groups.

Table 2. Pretest-Posttest Instrument

No	Learning Outcomes	Learning Objective	Materials	Question Indicators	Levels	Question Items
1	Explain the form and function of the five senses; analyze the life cycle of living things and efforts to preserve them; produce solutions to	Students can describe the melting process and the factors that influence it.	Change in the state of matter (melting)	Through contextual analysis, students can describe the melting changes in objects in detail.	Level 3 C4 (Describe)	Ice cream that left in the open air will turn into liquid. Why does it happen?
2	problems related to the preservation of natural resources as a means of mitigating climate change; conclude the process of changing the form of substances; explain the sources and forms of energy, as well as the process of changing the form of energy in everyday life; distinguishing types of forces and their effects on the direction, motion, and shape of objects; explaining the roles, duties, and responsibilities	Students can compare the conditions required for the freezing process.	Change in the state of matter (freezing)	Students can compare the results of freezing experiments with various variables.	Level 3 C5 (Comparing)	In the freezing experiment, there are three containers containing: • Container A: 100ml of fresh water. • Container B: 100ml of salt water (1 spoonful of salt). • Container C: 100ml of sugar water (2 spoonfuls of sugar). All containers are placed in the freezer at the same time. After 2 hours, the fresh water is completely frozen, the salt water is half frozen, while the sugar water is still in a thick liquid form. Evaluate the results of this experiment! Why is there a difference in the freezing speed of the three solutions? Explain the factors that cause this difference and give examples of how this concept is applied in everyday life!
3	as well as social interactions that occur around the home and school; recognizing the location of the district/city and province of residence using conventional/digital maps; classifying various landscapes and their relationship to community professions and the	Students can distinguish each process of change in the form of objects from liquid to gas in everyday life.	Change in the state of matter (evaporation)	Through illustrations of daily activities, students can distinguish the evaporation process that occurs.	Level 3 C4 (Distinguishing)	Preparing three plastic cups of the same size, each containing 30 ml of water, with different treatments: • Plastic cup A: contains cold water, placed in a shaded area. • Plastic cup B: contains warm water, placed in a shaded area. • Plastic cup C: contains hot water, placed under a fan. After 10 minutes of observation, it was seen that the volume of water in plastic cup A remained almost unchanged, plastic cup B began to decrease slightly, and plastic cup C decreased significantly.

	various cultures that preserve them; as well as efforts to analyze the history					Analyze why there is a difference in the evaporation rate of the three plastic cups! Explain the factors that affect the evaporation rate!
4	of the community in the neighborhood; explain the value of currency and its functions, as well as how to manage finances wisely.	Students can separate the conditions necessary for the condensation process to occur.	Change in the state of matter (condensation)	Given various conditions, students can separate the appropriate conditions for condensation.	Level 3 C5 (Separating)	A child wants to conduct a simple experiment to demonstrate the condensation process. He has several options for conditions, as follows: •Gelas berisi air panas diletakkan di ruang terbuka •A glass filled with hot water is placed in an open space. •A glass filled with ice cubes is placed in a warm or open space. •An empty glass is placed in direct soap. Evaluate these three conditions! Which one is most appropriate for demonstrating the condensation process? Provide a scientific reason why this condition can produce condensation.
5		Students can distinguish crystallization processes based on practice.	Change in the form of an object (crystallization)	Through various experiments, students can distinguish the results of crystallization practices using different methods.	Level 3 C5 (Distinguishing)	Experiment A: Ice cubes are heated outside a can filled with sand and camphor. After a while, white crystals appear on the inside walls of the can. Experiment B: A saturated salt solution is heated to boiling point, then cooled slowly. After a few hours, salt crystals form at the bottom of the container. Evaluate both experiments! Explain why both experiments produced crystals even though the processes were different, and analyze what type of phase change occurred in each experiment!

2. Learning Interest Questionnaire:

- The questionnaire used Likert-scale items to measure several dimensions of students' learning interest, including emotional involvement, perceptions of the usefulness of IPA, and participation in practicum-based learning activities (Luo et al., 2019).

Table 3. Learning Interest Questionnaire

No.	Aspect	Indicators	Questions Number
1	Emotions	Enjoying learning activities	1
		Feeling happy while learning	2
		Feeling interested in exploring the material	3
		Feeling enthusiastic about attending classes	4
		Learning with enthusiasm	5
		Feeling happy when doing assignments	21

		Feeling proud when successfully understanding a topic	22
2	Value	Considering this lesson important for the future	6
		Understanding how useful this lesson is for life	7
		This lesson contributes to personal development	8
		Feeling that learning this will help me achieve my goals	9
		Seeing the long-term benefits of this lesson	10
		Assessing that this lesson contributes to career development	23
		Seeing that this lesson is useful for the future	24
3	Knowledge	Knowing various things about this topic	11
		Understanding many concepts in the subject matter	12
		Having in-depth knowledge about this topic	13
		Feeling confident about my knowledge of this subject	14
		Being able to connect new information with prior knowledge	15
		Feeling that I have a lot of information that can be applied	25
		Increasing my knowledge with each subject studied	26
4	Engagement	Actively participate in learning activities	16
		Ask questions related to the lesson	17
		Seek additional information outside of class	18
		Engage in class discussions	19
		Look for new ways to understand the material	20
		Try harder to understand the lesson	27
		Try to participate in every activity related to the lesson	28
		Complete assignments with full attention	29

Source: Luo et al., 2019

Table 4. Likert Scale

Score	Descriptions
5	Strongly agree
4	Agree
3	Neutral
2	Disagree
1	Strongly disagree

Source: Sugiyono, 2019

Data analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 26.0. The analytical procedures included the following stages:

1. Descriptive Statistics: This analysis was used to summarize the pretest scores, posttest scores, and learning-interest questionnaire results for both groups.
2. Paired Sample t-Test: This test was employed to compare the pretest and posttest scores within each group in order to identify whether a significant change occurred after the intervention.
3. Independent Sample t-Test: This test was used to compare posttest scores and learning-interest scores between the experimental and control groups so that the effect of Cooperative Learning could be contrasted with the conventional method.
4. Pearson Correlation: This analysis examined the relationship between students' learning interest and their posttest achievement.
5. The research was conducted in a regular public elementary school environment, namely SD Pisangan Timur 11, East Jakarta. This setting matters because the intervention was designed for ordinary classroom conditions rather than for a specially equipped laboratory. As shown in the supporting PDF, the school context includes practical constraints related to time allocation and facilities. Therefore, the practicum activities in this study were arranged around simple materials and observable phenomena so that the method remained realistic for daily implementation. This decision increased the practical relevance of the study because the findings can be interpreted within a context that resembles many elementary classrooms.
6. The study used two intact fourth-grade classes in line with the logic of a quasi-experimental design. The experimental class received instruction through Cooperative Learning during IPA practicum, whereas the control class continued with more conventional teaching procedures. Both groups were exposed to the same general topic and completed comparable pretest and posttest instruments. Using intact classes was appropriate because school-based research rarely allows full random assignment. At the same time, selecting two classes within the same school reduced major contextual variation, since both groups learned in the same institutional environment and under the same grade-level curriculum.
7. In the experimental class, the intervention was implemented through a structured sequence of cooperative actions. The teacher introduced the topic and the problem situation, after which students worked in heterogeneous groups to observe materials, discuss procedures, record findings, and formulate explanations together. The activity was not limited to task completion. Students were also expected to compare answers, respond to different viewpoints, and present their conclusions to the class. In this arrangement, the teacher acted primarily as a facilitator who clarified procedures, monitored group interaction, and guided students when their reasoning needed support.
8. This sequence is important because Cooperative Learning is not equivalent to merely placing students in groups. The method requires a learning structure in which collaboration has academic purpose. In the present study, that purpose was closely tied to practicum tasks on melting, freezing, evaporation, condensation, and crystallization. These topics are particularly suitable for cooperative investigation because students can observe differences in conditions and outcomes directly. Group work thus became a means for transforming observation into explanation. By contrast, in a teacher-centered lesson, the same content can be covered, but the opportunity for students to construct understanding together is far more limited.
9. The control class studied the same content through conventional instruction. The teacher explained the lesson, provided examples, and guided students through the material without using the cooperative structure as the central mode of work. Students still received instruction on the same topic and completed

the same assessment framework, but peer collaboration was not systematically embedded into the lesson design. This difference between the two classes is essential to the study because it allows the comparison to focus on the instructional effect of the method rather than on differences in content.

10. The pretest and posttest instrument was aligned with fourth-grade science content on changes in the states of matter, as detailed in the supporting PDF on pages 60 to 70. The items did not focus only on recall. Students were asked to explain why ice cream melts in open air, evaluate the freezing speed of different solutions, analyze conditions that influence evaporation, identify the most appropriate condition for condensation, and compare two crystallization processes. Because these questions required explanation, comparison, and evaluation, the instrument was suitable for measuring understanding that grows through practicum and discussion rather than through memorization alone.
11. The learning-interest questionnaire was adapted from the Academic Interest Scale for Adolescents and was organized into four aspects: emotion, value, knowledge, and engagement. This multidimensional structure made the instrument particularly useful for the present study. It allowed learning interest to be interpreted not only as enjoyment, but also as perceived usefulness, confidence in understanding, and willingness to take part in classroom activities. In practicum-based learning, these dimensions are likely to interact. Students who feel emotionally comfortable in a group may participate more, and those who participate more may also feel that the lesson is more valuable and understandable.
12. The supporting PDF also indicates that the questionnaire framework had been backed by content validation, exploratory factor analysis, confirmatory factor analysis, reliability testing, and measurement invariance across several conditions. In addition, the pretest-posttest questions received expert validation related to content suitability, wording clarity, construct alignment, and appropriateness for students. These steps are methodologically important because statistical significance is meaningful only when the instrument itself is conceptually appropriate. By combining curriculum alignment, expert review, and a theoretically grounded interest instrument, the study strengthened the credibility of its measurement procedures.
13. Data analysis followed a sequential procedure. Descriptive statistics were first used to summarize the distribution of scores in both classes. Normality testing was then conducted to determine whether the assumptions for parametric analysis were satisfied. After that, paired sample t-tests were employed to compare pretest and posttest scores within each class, while independent sample t-tests were used to compare the experimental and control classes after treatment. Pearson correlation analysis was finally used to examine the relationship between learning interest and posttest achievement. This sequence allowed the findings to be interpreted from several angles rather than from a single comparison only.
14. In operational terms, the treatment in the experimental class can be understood as a cycle of orientation, cooperation, observation, discussion, and reporting. Students first received a contextual problem related to a visible science phenomenon. They then worked with group members to prepare materials, observe change, compare what happened under different conditions, and record the outcome in written form. After the hands-on phase, they discussed why the observed change occurred and prepared a group response. This sequence was designed to ensure that practical action was followed by scientific explanation. Without that sequence, practicum can become an activity of doing without understanding.
15. The choice of topic also supported the intervention design. Changes in the states of matter are suitable for elementary science because the concepts can be connected to common household experience, including ice cream melting, water freezing, water evaporating, dew forming on cold surfaces, and crystals appearing from a solution. When tasks are built from phenomena that students recognize, discussion becomes easier to start and explanation becomes more meaningful. This contextual character may have strengthened the effectiveness of Cooperative Learning because students were not reasoning from unfamiliar or overly technical situations. They were reasoning from events that could be seen, felt, and compared directly.
16. Another methodological strength lies in the alignment between treatment, assessment, and construct measurement. The cooperative method emphasized interaction, observation, explanation, and shared reasoning. The pretest-posttest instrument measured analytical understanding of the same content, while the interest questionnaire captured emotional response, value, knowledge growth, and engagement. Because the intervention and the measurements pointed toward related dimensions of learning, the analysis could interpret improvement more coherently. This alignment reduces the risk of judging a collaborative lesson with an assessment that only rewards isolated memorization.
17. Although this study was primarily quantitative, its design was informed by initial qualitative information from the teacher interview contained in the supporting report. The interview did not function as the

main source of evidence, but it helped define the classroom problem, identify relevant constraints, and justify the selection of a cooperative practicum approach. In this sense, the study demonstrates how limited contextual information can strengthen quantitative classroom research. Statistical comparison becomes more meaningful when the reason for the intervention is clearly grounded in actual instructional conditions.

RESULTS AND DISCUSSIONS

This section outlines the findings derived from the pretest, posttest, and learning-interest questionnaire by comparing the experimental and control groups. The interpretation is based on descriptive statistics, paired sample t-tests, and independent sample t-tests to identify the effect of the Cooperative Learning method on learning outcomes and learning interest.

Before inferential testing is considered, the descriptive results already suggest a different classroom pattern between the two groups. In the experimental class, posttest scores ranged from 11 to 20, while in the control class they ranged from 7 to 16. The experimental class also recorded a higher mean score for learning interest, namely 108.32, compared with 95.60 in the control class. These values do not automatically establish causation, yet they show that students who learned through Cooperative Learning ended the intervention with a stronger academic profile and a more positive orientation toward IPA practicum than those who learned through the conventional approach.

A closer look at score improvement reinforces this interpretation. The experimental class increased from a mean of 12.28 on the pretest to 15.88 on the posttest, which represents an average gain of 3.60 points. The control class rose from 10.20 to 11.48, or an average gain of 1.28 points. In practical classroom terms, the improvement in the experimental class was almost three times the increase recorded in the control class. Since both groups studied the same topic within the same school environment, this difference supports the view that the collaborative structure of the treatment contributed meaningfully to the stronger learning outcome.

Table 5. Normality Test Results

Variable	Kolmogorov-Smirnov Statistic	df	Sig. (K-S)	Shapiro-Wilk Statistic	df	Sig. (S-W)
Pretest experiment	0.098	25	0.200*	0.979	25	0.859
Posttest experiment	0.120	25	0.200*	0.967	25	0.566
Pretest control	0.090	25	0.200*	0.978	25	0.853
Posttest control	0.141	25	0.200*	0.963	25	0.480
experimental interest	0.092	25	0.200*	0.985	25	0.968
control interest	0.153	25	0.136	0.976	25	0.787

The normality test results based on Kolmogorov-Smirnov and Shapiro-Wilk indicate that all variables, including pretest, posttest, and learning interest in both groups, are normally distributed. This can be seen from the significance values, all of which are above 0.05. Because the data do not show a substantial deviation from normal distribution, parametric analysis could be continued at the next stage.

Table 6. Results of the Paired Samples Test Statistics

Pair	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Pretest experiment	12.28	25	2.951	0.590
Pair 1 Posttest experiment	15.88	25	2.438	0.488
Pair 2 Pretest control	10.20	25	2.677	0.535
Pair 2 Posttest control	11.48	25	2.347	0.469

6 indicates that the experimental group experienced a marked increase from a mean pretest score of 12.28 to a mean posttest score of 15.88. The control group also improved, but only from 10.20 to 11.48. In addition, the smaller standard error of the posttest mean in the experimental group suggests that the score improvement was relatively more consistent, which strengthens the indication that Cooperative Learning was more effective in improving learning outcomes.

Table 7. Results of the Paired Sample Correlations Test

Pair	N	Correlation	Sig.
Pair 1 Experiment Pretest & Experiment Posttest	25	0.984	0.000
Pair 2 Pretest control & Posttest control	25	0.992	0.000

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The correlation coefficients for both pairs are very high, namely 0.984 in the experimental group and 0.992 in the control group, showing a strong positive relationship between pretest and posttest scores. The significance value of 0.000 in both groups means that the correlations are statistically significant. In other words, posttest performance is closely related to students' initial scores, and the observed improvement is unlikely to have occurred by chance.

Table 8. Results of the Paired Sample Test

Pair	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
Pair 1 Pretest_eksperimen - Posttest_eksperimen	-3.600	0.707	0.141	Lower: -3.892, Upper: -3.308	-25.456	24	0.000
Pair 2 Pretest_kontrol - Posttest_kontrol	-1.280	0.458	0.092	Lower: -1.469, Upper: -1.091	-13.966	24	0.000

The paired sample t-test revealed significant differences between pretest and posttest scores in both classes. In the experimental group, the mean difference was -3.600, with t = -25.456 and Sig. 0.000, which indicates a substantial increase after Cooperative Learning was applied. In the control group, the mean difference was -1.280, with t = -13.966 and Sig. 0.000. Although both groups improved, the gain in the experimental class was clearly larger, indicating that Cooperative Learning produced a stronger effect than the conventional approach.

Table 9. Results of Homogenity Test with Independent Samples Test

Variable	Levene's Test for Equality of Variances	t-test for Equality of Means	95% Confidence Interval of the Difference
Posttest_EK	F = 0.000, Sig. = 0.994	t = 6.501, df = 48, Sig. (2-tailed) = 0.000	Mean Difference = 4.400, Lower = 3.039, Upper = 5.761
Interest_EK	F = 0.310, Sig. = 0.580	t = 2.745, df = 48, Sig. (2-tailed) = 0.008	Mean Difference = 12.720, Lower = 3.404, Upper = 22.036

The Independent Samples test also identified significant differences between the two groups. For Posttest_EK, the test produced t = 6.501 with Sig. 0.000, while for Minat_EK it produced t = 2.745 with Sig. 0.008. Because Levene's Test for both variables yielded significance values above 0.05, the assumption of homogeneity of variance was satisfied. These results support the conclusion that the Cooperative Learning method significantly affected both student learning outcomes and learning interest.

Table 10. Experimental Group Correlation Test Results

Variable	Posttest_eksperimen	Minat_eksperimen
Experiment Posttest	1	0.959**
Experimental Interest	0.959**	1
Sig. (2-tailed)	0.000	0.000
N	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation between Posttest_eksperimen and Minat_eksperimen is 0.959, which reflects a strong positive association between posttest achievement and learning interest in the experimental class. The Sig. (2-tailed) value of 0.000 shows that this relationship is statistically significant at the 0.01 level. This means that students who showed stronger interest in learning also tended to obtain higher posttest scores.

Table 11. Control Group Correlation Test Results

Variable	Posttest_kontrol	Minat_kontrol
Posttest Control	1	0.981**
Control Interest	0.981**	1
Sig. (2-tailed)	0.000	0.000
N	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation between Posttest_kontrol and Minat_kontrol is 0.981, indicating a very strong positive relationship between learning interest and posttest performance in the control class. With a Sig. (2-tailed) value of 0.000, the relationship is statistically significant at the 0.01 level. Thus, even in the control group, students with higher learning interest tended to achieve better academic results.

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Pretest-Posttest Results

The pretest results indicate that the experimental and control groups began the study with relatively comparable levels of prior knowledge in IPA. After the treatment period, both groups showed improvement in the posttest, but the increase recorded by the experimental group was greater than that of the control group.

- Experimental Group: The mean pretest score in the experimental class was 12.28 and increased to 15.88 on the posttest. This gain was statistically significant, with p = 0.000, showing that the Cooperative Learning method contributed positively to student achievement.
- Control Group: The control class showed an increase from a mean pretest score of 10.20 to a mean posttest score of 11.48. Although this improvement was also significant at p = 0.000, the magnitude of change was lower than that observed in the experimental group.

Learning Interest Questionnaire Results

The learning-interest questionnaire was used to identify students' engagement, motivation, and attitudes toward IPA. The results demonstrate that the experimental group achieved a higher increase in learning interest after the intervention than the control group.

- Experimental Group: The mean learning-interest score in the experimental class rose from 75.60 to 108.32, with a significant mean difference of 12.72 (p = 0.000). This substantial increase indicates that Cooperative Learning effectively strengthened students' interest in IPA.
- Control Group: The mean learning-interest score in the control class increased from 74.20 to 95.60. Even though this change was significant (Mean Difference = 4.40, p = 0.008), the increase remained smaller than that of the experimental class.
- Although the questionnaire outcome is reported as a total score, the underlying structure of the instrument provides a helpful interpretive lens. The higher score in the experimental class can be read as a sign that students responded more positively not only at the emotional level, but also in how they valued the lesson, how strongly they perceived knowledge growth, and how willing they were to participate in class activity. In a cooperative practicum setting, these dimensions are likely to reinforce one another. Students who enjoy working with peers often become more willing to ask questions, complete tasks, and discuss results, and such engagement can in turn strengthen their sense that the lesson is useful and understandable.

Discussions

The findings of this study indicate that the Cooperative Learning method improved both learning outcomes and learning interest in IPA practicum activities. This pattern is consistent with earlier studies reporting that Cooperative Learning can enhance student participation, motivation, and academic achievement (Johnson & Johnson, 2017; Wijaya & Arismunandar, 2022).

In the experimental class, Cooperative Learning created broader opportunities for students to interact, exchange ideas, and participate actively in the lesson. Such collaborative conditions support students in understanding the material more deeply and in strengthening their critical thinking skills (Supriyanto et al., 2020). The rise in learning interest found in this group also shows that students became more motivated to engage in practicum activities, which is in line with the literature emphasizing the benefits of interactive and student-centered instruction (Mulyadi et al., 2023).

By contrast, the control class, which continued to use conventional instruction, showed a smaller increase in both achievement and learning interest. This result reinforces previous findings that teacher-centered learning often places students in a more passive position and limits meaningful classroom interaction (Rustaman, 2020).

The strong relationship between learning interest and academic performance in both groups suggests that interest is an important factor in improving student achievement. Students who are more interested in the subject are generally more willing to invest effort in understanding the material, which in turn supports better outcomes (Rahmawati & Suryadi, 2022). In addition, Cooperative Learning appears to contribute not only to cognitive growth, but also to social and emotional development because it requires students to communicate, share perspectives, and solve problems together (Wijaya & Arismunandar, 2022).

Based on these findings, teachers should consider using Cooperative Learning more consistently, particularly in IPA lessons that involve practicum and direct student activity. A classroom environment that is interactive and collaborative can increase interest and motivation, which in turn may improve achievement and students' attitudes toward learning.

One important explanation for the better performance of the experimental class lies in the nature of the practicum topic itself. The concept of changes in the states of matter is especially suitable for Cooperative Learning because students can observe differences, compare conditions, and reason from concrete evidence. When students work together to explain why fresh water freezes faster than salt water, or why water evaporates more rapidly under moving air, they are required to verbalize their thinking. This is pedagogically important because explanation is not simply the product of learning. It is part of the process through which learning becomes deeper and more stable.

Another relevant factor is the redistribution of responsibility in the classroom. In teacher-centered instruction, many students can remain silent while only a few answer the teacher's questions. In a cooperative arrangement, by contrast, each student is more visible to peers and more likely to take part in observation, recording, comparison, and reporting. This shift may seem small, but for elementary students it can have a large effect because participation is strongly shaped by immediate social expectations. The classroom becomes a place where contribution is normal rather than exceptional. Such a climate helps explain why the experimental group showed stronger gains in both interest and posttest performance.

The interview information summarized in the supporting PDF also helps interpret the findings. The teacher reported that science lessons often became less engaging when they were dominated by explanation and textbook use, whereas students generally responded well to group activity. The same interview also pointed to limited practicum facilities and restricted instructional time. These remarks are significant because they suggest that the success of the intervention did not depend on unusual resources. The improvement seems to have emerged mainly from the reorganization of classroom interaction. This means that pedagogical design, even with simple materials, can substantially influence how students experience science learning.

The strong positive correlations between learning interest and posttest scores in both classes also deserve careful reading. A high correlation does not mean that interest alone determines achievement, because many other factors can affect performance. However, the results do indicate that in this study students who showed stronger interest also tended to reach higher academic outcomes. The experimental class is especially notable because it achieved both a higher average interest score and a higher average posttest score. This pattern suggests that Cooperative Learning did not only improve performance directly, but also strengthened the motivational conditions that support performance.

These findings are consistent with the broader theoretical argument that elementary learners understand science more effectively when they can connect concrete observation with social meaning making. Cooperative Learning creates a bridge between the cognitive demands of science and the emotional security of peer support. Students face tasks that require reasoning, but they do not face them alone. Group members can question, confirm, or refine each other's thinking while the teacher provides direction when necessary. Such a classroom environment may reduce hesitation, increase confidence, and make science activities feel more approachable for students who would otherwise remain passive.

At the same time, the results should not be interpreted as evidence that Cooperative Learning automatically guarantees improvement in every situation. The method depends on careful lesson design, clear task structure, and active monitoring by the teacher. Group work can lose its effectiveness if instructions are vague, if one student dominates the task, or if collaboration becomes an excuse for reduced individual effort. Therefore, the positive outcomes of this study need to be read alongside the quality of implementation. What the findings support is not the value of grouping alone, but the value of structured collaborative learning in which each student is drawn into a meaningful academic role.

A further implication concerns the role of practicum in building learning interest. In some classrooms, practicum is treated as an additional activity conducted after conceptual explanation is completed. The present study points toward another possibility. Practicum, especially when integrated with Cooperative Learning, can function as the main route through which conceptual understanding and interest are developed together. When students observe real change, compare evidence, and formulate explanations with peers, the science concept gains purpose. Interest grows not because the lesson is made superficially entertaining, but because students can see that the concept helps them interpret phenomena that they have directly encountered.

The study also has practical relevance for curriculum implementation. The supporting report notes that the school had already adopted the Merdeka curriculum, which emphasizes active participation and meaningful learning. The current findings show that Cooperative Learning can serve as an operational strategy for translating those principles into classroom action. Instead of treating active learning as a broad ideal, teachers can embody it through small-group observation, shared worksheets, discussion routines, and collaborative presentation of findings. In this sense, the method contributes not only to higher scores but also to a classroom practice that is more aligned with contemporary expectations for elementary science education.

Finally, the limitations of the study should be acknowledged without diminishing its contribution. The sample was limited to one school and two classes, so the findings should be generalized with caution. The intervention also focused on one content area rather than on science learning as a whole. Even so, the study offers useful evidence because it combines classroom data, validated instruments, inferential statistics, and contextual interpretation. For teachers and schools, this type of evidence is valuable precisely because it grows from ordinary practice. It shows that improvement in science learning does not always require major structural change. In some cases, it begins with a better way of organizing students to learn with and from one another.

A point that deserves additional attention is why the control class also showed improvement even though the gain was smaller. The most reasonable interpretation is that both groups still participated in the learning process, studied the same topic, and completed similar assessments. Any well-delivered instruction on a new topic can produce some increase in posttest scores. The important issue is not whether the control class learned nothing, but whether the experimental class learned more under the cooperative condition. The statistical results indicate that it did. This distinction is important because it prevents the comparison from becoming unrealistic. Cooperative Learning is presented here as a method that improves ordinary teaching outcomes, not as a method that creates learning where none existed before.

The learning-interest findings can also be interpreted at the level of classroom behavior. In cooperative practicum, students are more likely to speak, ask for clarification, compare answers, and negotiate disagreement. These actions matter because interest is not only a private feeling. It often appears in visible participation. A student who volunteers to handle materials, records observations carefully, or comments on another group's result is displaying engagement as part of learning interest. Thus, the rise in questionnaire scores is consistent with the type of classroom activity promoted by the treatment. The method appears to encourage the outward behaviors through which interest becomes educationally productive.

From the perspective of science education, the results are relevant because they connect Cooperative Learning with process-oriented understanding. Science in elementary school should not stop at naming facts. It should help students observe patterns, explain mechanisms, and relate evidence to conclusion. The practicum questions in this study were constructed at analytical and comparative levels, which means that students had to do more than recall a definition. The stronger posttest performance of the experimental class therefore suggests that Cooperative Learning supported not only surface participation but also a higher quality of conceptual reasoning within the specific topic that was taught.

The study also highlights the practical value of simple materials. In many schools, limited facilities are used as a reason for reducing practicum frequency. The present findings suggest that this limitation should be interpreted carefully. While facilities certainly matter, meaningful practicum can still be designed with accessible objects when the activity structure is clear and the scientific question is well chosen. Cooperative Learning may strengthen this possibility because students can share tasks and interpret observations together, making efficient use of limited materials. For schools with constrained resources, this is an encouraging implication.

Teacher facilitation remains central in this process. Cooperative Learning does not remove the teacher from instruction. Instead, it changes the teacher's role from primary source of explanation to organizer of learning conditions. The teacher sets the task, ensures that students understand the purpose of the practicum, monitors participation, and helps groups move from raw observation to reasonable explanation. In elementary classrooms, where students still need clear direction, this role is especially important. The findings of this study should therefore be interpreted as support for guided cooperation rather than for unrestricted group activity.

There is also a social dimension to the result. Group-based practicum gives students repeated opportunities to listen to peers, wait for turns, share materials, and respond to different ideas. These behaviors may appear secondary in relation to achievement scores, yet they contribute to a classroom environment that supports sustained learning. When students feel that they can take part without excessive fear of making mistakes, they may become more willing to test explanations and revise their thinking. This supportive climate can be especially important in science, where students often hesitate when faced with questions that do not have immediately obvious answers.

In relation to previous studies, the present research adds a narrower but practically relevant case. Earlier literature has reported that cooperative models can improve motivation, social skills, and academic performance. The current study supports those broader claims while locating them in a specific combination of grade level, subject, topic, and school context. Its contribution is therefore not merely to repeat what is already known, but to show how the method operates in a concrete elementary science practicum on changes in matter. Such contextual evidence is valuable because teachers usually implement methods in real classrooms, not in abstract theoretical settings.

The findings may also inform future research design. Subsequent studies could examine whether similar effects appear across longer intervention periods, across different science topics, or across different cooperative structures such as STAD, Jigsaw, or Group Investigation. Researchers could also explore which dimension of learning interest is most sensitive to cooperative practicum at the elementary level. For example, it may be useful to know whether the largest change appears in emotional enjoyment, in engagement behavior, or in perceived knowledge growth. Such analysis would help refine both theory and classroom practice.

In sum, the present discussion indicates that the effect of Cooperative Learning in this study can be understood through several linked mechanisms: more active participation, more opportunities to verbalize reasoning, stronger peer support during practicum, better alignment between task and developmental stage, and a classroom climate that makes science feel more meaningful. These mechanisms do not replace statistical evidence. Rather, they help explain why the statistical differences emerged. This combination of numerical result and pedagogical interpretation strengthens the conclusion that Cooperative Learning was not simply associated with better outcomes, but was educationally plausible as a source of those outcomes.

A final practical implication concerns scalability. Because the treatment relied on simple practicum situations and ordinary classroom organization, the method is potentially adaptable to other elementary schools that work under similar constraints. Implementation would still require teacher preparation, especially in designing group roles, task instructions, and discussion prompts. However, it does not require a radical restructuring of the school system. This makes Cooperative Learning a promising option for gradual instructional improvement. Schools can begin with one topic, one grade level, and one teacher, then expand the practice as confidence and experience grow.

CONCLUSIONS

This study examined the effect of the Cooperative Learning method on students' learning outcomes and learning interest in IPA practicum activities at Pisangan Timur 11 Elementary School. The findings show that the experimental group, which was taught through Cooperative Learning, achieved stronger improvements in both academic performance and learning interest than the control group. The paired sample t-test and independent sample test confirmed that the differences within groups and between groups were statistically significant. A strong positive relationship was also found between students' learning interest and their academic outcomes. These results indicate that Cooperative Learning is effective in strengthening engagement and improving achievement, especially in practical science learning at the elementary school level.

In practical terms, the study suggests that Cooperative Learning can be recommended as a feasible strategy for elementary science lessons that involve observation and simple experimentation. Its value does not lie only in raising scores, but also in helping students experience IPA as an active and socially meaningful subject. For schools that face limitations in laboratory facilities, the findings imply that thoughtful classroom organization can still make practicum more engaging and more effective.

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