

THE EFFECT OF SCIENTIFIC THINKING ABILITIES IN SCIENCE LITERACY ON STUDENTS' LEARNING OUTCOMES IN THE SCIENCE PLANTS LESSON IN GRADE IV SDN 012 UJUNGBATU

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ABSTRACT

This study aims to examine the influence of scientific thinking ability in science literacy on students' learning outcomes in the topic of plants within the Natural Sciences subject for Grade IV at SDN 012 Ujungbatu. Employing a quantitative approach with a correlational method, the research involved all 28 students in the class using a saturated sampling technique. Instruments used included a Guttman scale questionnaire to assess scientific thinking ability and multiple-choice tests to evaluate learning outcomes. Validity and reliability tests were conducted using SPSS version 25, with all items meeting the standards (Cronbach's Alpha = 0.920 for the thinking skills questionnaire and 0.960 for the learning test). Item analysis revealed balanced levels of difficulty and good discriminating power. Prerequisite tests showed that the data met the assumptions of normality and homogeneity. The hypothesis test using linear regression analysis demonstrated a significant positive effect of scientific thinking ability on science learning outcomes, with a regression coefficient of 0.450 and a significance level of 0.000. The findings confirm that students with higher scientific thinking abilities tend to achieve better academic results. Therefore, fostering scientific thinking skills in the context of science literacy is essential to enhance students' academic performance and critical reasoning from an early age.

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INTRODUCTIONS

Education is essentially a process to help humans develop their potential for positive change. According to the National Education System Law Number 20 of 2003, education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to possess spiritual and religious strength, self-control, personality, intelligence, noble character, and the skills needed by themselves, society, the nation, and the state (Rahmi & Yuswanti, 2021:74). Basic education is the primary foundation for the ongoing

development of students' character and skills. The Indonesian government continues to strive to improve the quality of basic education, one of which is through strengthening the learning of Natural Sciences (IPA). Science subjects not only introduce students to scientific concepts, but also aim to develop critical, logical and systematic thinking skills as provisions for facing the challenges of the 21st century (Amelia et al., 2025:435). Strengthening science education aims to produce a generation that is able to analyze, evaluate, and solve problems rationally. This is in line with the direction of curriculum policy which places more emphasis on meaningful, active, and contextual learning. Science learning at the elementary school level must be a space for building strong scientific reasoning, as a basis for improving the quality of student learning outcomes and increasing the nation's competitiveness in the long term (Parisu et al., 2025:865).

Scientific literacy is the ability to understand scientific concepts, apply them in everyday life, and make decisions based on valid scientific information. Scientific literacy encompasses understanding, process skills, and scientific attitudes, which need to be developed from an early age. In the context of science learning in elementary schools, scientific literacy is an important indicator in assessing learning success. Learning that can improve scientific literacy will produce students who think critically, analytically, and provide solutions to the problems they face (Aprizanti, 2023:412). In the latest curriculum, the science learning approach is more directed at exploration and contextual problem-solving, thus encouraging students to actively explore information and construct their own knowledge (Parisu et al., 2025:867). However, there are still many teachers who have not optimally integrated aspects of scientific literacy into science learning, so that students are only limited to memorizing the material without in-depth understanding. Low scientific literacy has an impact on low learning outcomes and students' thinking abilities (Rahmawati, 2024:2). Therefore, it is important for schools to strengthen learning approaches that train scientific thinking skills as part of scientific literacy.

Scientific thinking is the ability to understand, examine, and solve problems logically based on scientific methods. Scientific thinking activities include the process of observation, problem identification, hypothesis formulation, experimentation, data analysis, and drawing conclusions. Scientific thinking skills are crucial as part of scientific literacy because they serve as the basis for students to objectively assess information and construct arguments based on evidence, especially in Natural Science (IPA) learning (Handayani et al., 2023:2237). Natural Science (IPA) is a subject developed with the primary objective of achieving three aspects of learning. Therefore, IPA plays a crucial role in improving students' scientific knowledge, attitudes, and skills. This subject consists of various logically and systematically structured concepts about the natural environment, acquired through experience and various scientific processes. At the elementary level, IPA is an essential subject because it is the core of various other disciplines. However, many students consider IPA a difficult subject, so they tend to be less interested in this field (Royannisa & Rahmi, 2025:2178).

In science learning practices in elementary schools, the development of scientific thinking can be carried out through simple experiments, group discussions, and observation projects. The learning process is inseparable from the media, methods, and learning outcomes. Learning carried out by teachers can pay attention to each individual to achieve maximum learning outcomes and a teacher also has an interesting learning strategy to improve student learning outcomes (Rahmi et al., 2023: 788). There are several factors that influence the achievement of student learning outcomes in the learning process, both originating from within the student and their environment (Rahmi et al., 2023: 418). Various studies show that students who have good scientific thinking skills tend to have higher learning outcomes because they are able to understand concepts more deeply and apply them (Mursyid et al., 2024: 5). In addition, scientific thinking also trains students not to accept information at face value, but to validate and interpret the facts obtained. This is very important in today's information age, so that students are not easily influenced by misinformation. Therefore, strengthening scientific thinking is an effective strategy to improve the quality of scientific literacy and student learning outcomes simultaneously (Susilowati, 2023:112).

Plants are a key topic in fourth-grade science and are highly relevant for developing scientific thinking skills. In this material, students learn about plant parts, their functions, the process of photosynthesis, and plant reproduction. This material has significant potential for use as a context for scientific literacy-based learning due to its concrete nature and relevance to students' daily lives (Juhaeni et al., 2022:243). Learning about plants can be linked to direct observation activities in the school environment, such as observing leaves, stems and flowers. Through these observations, students are trained to ask questions, record, compare, and draw conclusions. This process is part of scientific thinking skills that can be developed through inquiry activities or simple experiments (Aprizanti, 2023:418). Furthermore, plant material provides opportunities to develop critical and collaborative thinking skills through group discussions and investigations. With the right learning strategy, learning about plants not only improves students' knowledge, but also their scientific literacy skills and scientific reasoning skills (Zamilah et al., 2024:298). Therefore, plant material is very appropriate to be used in this study to measure the influence of scientific thinking on learning outcomes.

Based on the results of initial interviews on February 17, 2025 at SDN 012 Ujungbatu, it was found that student learning outcomes in science subjects, especially on plant material, were still relatively low. Of the total of 28 students, only about half, namely 14 students (50%), managed to achieve the KKTP (Criteria for Achieving Learning Objectives) of 75, while the rest had not achieved completeness. Low active student participation during the learning process. Teachers tend to use lecture methods and give assignments without involving students in exploratory and scientific activities, which leads to low scientific thinking skills of students. In addition, there are not many learning activities that involve direct observation, group discussions, or simple investigations. Students are less accustomed to carrying out scientific processes such as formulating problems, making predictions, or drawing conclusions from observations. As a result, students have difficulty understanding concepts and the relationships between materials. This shows that there is a gap between the learning approach applied and the need to develop students' scientific thinking skills and scientific literacy. Therefore, it is important to conduct further research to determine how much influence scientific thinking skills have on students' learning outcomes in plant science material.

Seeing the conditions that occur at SDN 012 Ujungbatu, it is very important to conduct research on the influence of scientific thinking skills in scientific literacy on student learning outcomes. This research is important because it is able to provide an objective picture of the extent to which students' mastery of scientific thinking skills can influence learning achievement, especially in science material about plants. The results of this study are expected to be a reference for teachers in designing more effective and meaningful learning by emphasizing scientific activities and science literacy (Mursyid et al., 2024:6). Furthermore, the findings of this study can contribute to the development of science learning strategies in elementary schools to be more contextual and encourage active student engagement. This research will also enrich scientific references on the relationship between scientific literacy, scientific thinking, and learning outcomes, which has so far been limited at the elementary school level (Amelia et al., 2025:436). Therefore, the results of this study will not only be beneficial for improving the quality of learning at SDN 012 Ujungbatu but can also be adapted by other schools facing similar problems. Therefore, the implementation of this research is highly relevant and urgent.

The urgency of conducting this research lies in the effort to investigate the extent to which scientific thinking skills in scientific literacy contribute to the achievement of student learning outcomes. This study is intended to reveal whether or not there is a significant relationship between scientific thinking skills and student learning outcomes in the context of learning Plant material in the fourth grade science subject at SDN 012 Ujungbatu.

METHOD

This research was conducted with a quantitative approach using a correlational method to examine the influence of scientific thinking skills in scientific literacy as an independent variable on science learning outcomes in plant material as a dependent variable in grade IV students of SDN 012 Ujungbatu. Scientific thinking skills are

constructed as analytical skills that include observation, reasoning, and interpretation in understanding scientific concepts, while learning outcomes are measured through multiple-choice test scores. The research was conducted in the 2024/2025 academic year with all 28 fourth grade students as samples using a saturated sampling technique. The instruments used included a Guttman scale questionnaire to measure scientific thinking skills and a written test to measure learning outcomes. Data collection was carried out through distributing questionnaires and conducting tests, while data analysis included validity tests, reliability (Cronbach's Alpha), level of difficulty, and question discrimination. The prerequisite test was carried out using normality and homogeneity tests, then continued with a t-test to determine the significance of the influence between variables. The decision is determined based on a comparison of the calculated and ttable values at a significance level of 5%.

RESULT AND DISCUSSIONS

Result

1. Uji Instrumen

In carrying out this study, the researcher implemented the validity testing of the measurement instrument by utilizing SPSS version 25 statistical software. An instrument is declared valid if it is able to measure the intended theoretical construct precisely and consistently in data collection. The validity of the questionnaire representing scientific thinking skills in scientific literacy, which is assumed to be related to student learning outcomes in the science subject of plant material, was evaluated using the Pearson Product Moment correlation technique. This procedure compares the empirical correlation coefficient (r count) generated by SPSS with the critical value of the r table distribution at a significance level of 5% and a sample size of 28 students, resulting in an r table value of 0.381. A questionnaire item is categorized as valid if r count $>$ r table; conversely, if r count $\leq$ r table, then the item is considered invalid. Based on the analysis results presented in Tables 1 and 2, it was found that all 10 items in the questionnaire showed r count values that consistently exceeded the r table value, so it can be concluded that all statements in the instrument meet the construct validity criteria. To assess the internal consistency of the instrument, a reliability test was also conducted using the Cronbach's Alpha index. The test results are shown in the following table and show that the instrument is not only valid, but also has high reliability in measuring students' scientific thinking abilities in the context of scientific literacy.

Table 1the Reliability Test of Scientific Thinking Ability

Reliability Statics		Information
Cronbach's Alpha	N Item	
0. 920	10	Reliable / good

(Source: Researcher Processed Data: 2025)

Table 2the Learning Outcomes Reliability Test

Reliability Statics		Information
Cronbach's Alpha	N Item	
0.960	10	Reliable / good

(Source: Researcher Processed Data: 2025)

Based on the results of the internal consistency test of the instrument, it is known that the Cronbach's Alpha coefficient for the scientific thinking ability questionnaire in science literacy reached 0.920, while for the student learning outcomes instrument on plant material, the value obtained was 0.960, each with 10 items. These values indicate a very high level of reliability, reflecting that both instruments have good internal stability and consistency in measuring the intended construct. Referring to the interpretative convention of Cronbach's Alpha, an instrument is declared reliable if it has an alpha value above 0.70 . Thus , both instruments in this study meet the reliability

requirements and are suitable for use as data collection tools in measuring the relationship between scientific thinking ability and science learning outcomes of fourth-grade students of SDN 012 Ujungbatu.

Furthermore, to ensure the technical quality of the questions used as a tool for evaluating learning outcomes, a study was conducted on the degree of difficulty of each item. This analysis is intended to evaluate the proportion of students who are able to answer each question correctly, so that the level of cognitive accessibility of the question for respondents can be determined. More detailed information regarding the results of the analysis of the level of difficulty of the test items is presented systematically in Table 3 below.

Table 3 the Question Difficulty Level Test

Question No.	Difficulty of Questions	Interpretation / Criteria
1	0.50	Moderate / Sufficient
2	0.77	Easy
3	0.28	Difficult
4	0.60	Moderate / Sufficient
5	0.81	Easy
6	0.27	Difficult
7	0.67	Moderate / Sufficient
8	0.72	Easy
9	0.52	Moderate / Sufficient
10	0.62	Moderate / Sufficient

(Source: Researcher Processed Data: 2025)

Based on Table 3, it can be concluded that of the 10 items analyzed, the distribution of difficulty levels shows a dominant proportion in the moderate or sufficient category, which theoretically indicates optimal item quality for measuring variations in student abilities. In detail, item number 1 has a difficulty index of 0.50 which is included in the moderate category, as are questions number 4 (0.60), number 7 (0.67), number 9 (0.52), and number 10 (0.62) which are all in the moderate difficulty range. Three other items, namely number 2 (0.77) , number 5 (0.81), and number 8 (0.72) are classified in the easy category, while two items, namely number 3 (0.28) and number 6 (0.27), show a high level of difficulty and are included in the difficult category. Thus, the composition of the questions reflects a constructive balance.

As a follow-up to the analysis of the level of difficulty, a test was also carried out on the discrimination or differentiating power of each question item. The results of the study are presented systematically in Table 4 below.

Table 4. Results of the Question Distinguishing Power Test

Question No.	Distinguishing Power	Interpretation / Criteria
1	0.818	Good
2	0.854	Good
3	0.751	Good
4	0.878	Good
5	0.821	Good
6	0.856	Good
7	0.880	Good
8	0.769	Good
9	0.813	Good
10	0.830	Good

(Source: Researcher Processed Data: 2025)

Referring to Table 4, it can be concluded that all the test items have very good discriminatory ability in differentiating students based on their level of academic ability. The range of the obtained discrimination coefficients ranged from 0.751 to 0.880, all of which fell into the "Good" category according to the classification used. In detail, question number 1 showed a discrimination power of 0.818; number 2 was 0.854; number 3 was 0.751; number 4 was

0.878; and number 5 was 0.821. Furthermore, questions numbers 6 to 10 also showed high values with coefficients of 0.856; 0.880; 0.769; 0.813; and 0.830, respectively. This high consistency of discrimination scores indicates that the instrument used has met quality standards in the context of both formative and summative evaluation. Therefore, it can be concluded that all the questions are worth retaining because they have the effective ability to differentiate the level of students' mastery of concepts proportionally.

2. Prerequisite Test

A total of 10 statements presented in the Scientific Thinking Ability in Science Literacy questionnaire have passed the validity verification stage and show statistically significant correlation coefficients. This instrument was distributed to 28 fourth-grade students of SDN 012 Ujungbatu as samples in a study that focused on the influence of scientific thinking skills on science learning outcomes in plant material. Before further analysis is carried out, a prerequisite test in the form of a normality test is first carried out to determine whether the data from the Scientific Thinking Ability and Learning Outcomes variables are normally distributed. Because the sample size was less than 50 respondents, the Shapiro-Wilk test was used, which is more appropriate for small samples. Decision making in this test is based on the significance value (Sig.). If the Sig. value is > 0.05 , then the data is considered normally distributed; conversely, if Sig. < 0.05 , then the data is considered abnormal.

Table 4 Normality Test Results

Tests of Normality			
	Statistics	df	Sig.
Scientific Thinking Skills	.941	28	.118
Learning outcomes	.939	28	.103

(Source: Researcher Processed Data: 2025)

Based on the results of the normality test using the Shapiro-Wilk method, a significance value of 0.118 was obtained for the scientific thinking ability data and 0.103 for the learning outcomes data. Because both values are greater than 0.05, it can be concluded that all data are normally distributed. Thus, this research data meets the requirements for parametric statistical testing in the next inferential analysis stage.

Furthermore, to ensure that the variance structure between data groups does not show inhomogeneity that could interfere with the validity of the analysis, a homogeneity of variance test was carried out. This test aims to identify the consistency of variance of each observation group involved in the study. The results of the homogeneity test are systematically presented in Table 6 below as part of the classical assumption verification process that accompanies the use of parametric techniques in analyzing relationships between variables.

Table 5 of Homogeneity Test

Test of Homogeneity of Variances			
Learning outcomes			
Levene Statistics	df1	df2	Sig.
0.674	5	19	.648

(Source: Researcher Processed Data: 2025)

Based on the homogeneity of variance test conducted using Levene's Test, a significance value of 0.648 was obtained with Levene Statistic of 0.674, $df1 = 5$, and $df2 = 19$. Because the significance value is greater than the significance limit of 0.05 (Sig. > 0.05), it can be concluded that the data variance between groups on the Learning Outcomes variable is homogeneous. This indicates that the assumption of homogeneity of variance as one of the prerequisites for continuing the analysis using parametric statistical tests has been met. Thus, the data is worthy of further analysis using inferential statistical methods.

3. Hypothesis Testing

In order to evaluate the significance of the influence caused by the scientific thinking ability variable on student learning outcomes, this study applies a hypothesis testing procedure.

Table 6Hypothesis Test Results

		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	12,500	1,800		6,944	.000
	Scientific Thinking Skills	.450	.105	.610	4,286	.000

a. Dependent Variable: Learning Outcomes

(Source: Researcher Processed Data: 2025)

Based on the data in Table 7, it is known that Scientific Thinking Ability in Science Literacy has a significant influence on students' Science Learning Outcomes in the Plant material. This is indicated by a significance value (Sig.) of 0.000, which is smaller than the significance level of 0.05 . Therefore , the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. The regression coefficient of 0.450 indicates that every one unit increase in scientific thinking ability will increase student learning outcomes by 0.450 units. In addition, the t-count value of 4.286 which exceeds the t-table value (at a significance level of 5% and $df = n-2$) strengthens that the effect is statistically significant. The standard Beta value of 0.610 indicates that the contribution of scientific thinking ability to learning outcomes is strong and positive. This finding confirms that students' scientific thinking skills are an important aspect in encouraging academic achievement in science subjects, especially in plant material at the elementary school level.

Discussions

The results of this study indicate a significant influence between scientific thinking skills in scientific literacy and student learning outcomes in science lessons, especially plant material. This reflects that students with higher levels of scientific thinking skills tend to achieve better learning outcomes. Scientific literacy is not merely the ability to understand concepts, but also involves the ability to reason, predict, and solve problems based on scientific evidence (Irsan, 2021:5632). In a study conducted by Gaol, Silaban, & Sitepu (2022:770), it was found that critical thinking skills have a significant influence on elementary school students' learning outcomes in environmental topics, which are also part of the science curriculum. In the context of elementary education, scientific literacy is crucial because it can foster students' curiosity and intellectual independence regarding the natural phenomena they encounter daily. Therefore, students with strong scientific thinking skills will be better prepared to receive, understand, and integrate the science learning material taught.

Scientific thinking skills also play a role in shaping students' logical thinking frameworks, particularly in observing, classifying, and drawing conclusions about scientific phenomena. This process aligns with the scientific approach that underpins the Independent Curriculum and emphasizes the importance of hands-on experience in building conceptual understanding (Siregar et al., 2020:245). Therefore, when students are guided to develop scientific thinking skills through experiments, discussions, and reflection, they will demonstrate improved mastery of the material. Learning that integrates scientific activities can activate higher-order thinking skills, positively impacting students' long-term learning outcomes.

Based on the results of the hypothesis test, a regression coefficient of 0.450 and a significance level of 0.000 were obtained, indicating a strong positive relationship between scientific thinking skills and science learning outcomes. This finding aligns with research by Astutik (2021:80), which states that the implementation of guided

inquiry-based learning involving aspects of scientific thinking can significantly improve student learning outcomes. These results emphasize that when students are actively involved in the scientific process, they will more easily understand the material and develop the cognitive skills necessary to solve science problems. This is especially important in the elementary school context, which serves as the foundation for developing children's systematic thinking.

The high reliability of the instrument as shown in the Cronbach's Alpha table supports the validity of the research results. Reliable instruments ensure that the data collected reflects the actual conditions of students in terms of their scientific thinking abilities and academic achievements. As stated by Nugraha (2022:156), the relationship between scientific literacy and learning outcomes can be known accurately if the measurement instrument is designed carefully and is able to reveal differences between individuals. In this study, the scientific thinking ability and science learning outcomes instruments showed reliability values of 0.920 and 0.960, respectively, which indicated very high internal consistency.

Analysis of the level of difficulty and the discriminating power of the questions also strengthens the quality of the evaluation tools used. The majority of questions are in the moderate difficulty category and have good discriminating power, meaning that the questions are able to differentiate between students who have mastered the concept and those who have not. This is in accordance with the principles of scientific literacy which emphasize the importance of mastering concepts in depth, not just memorization (Suparya et al., 2022:160). Question items with a high discrimination index indicate that students with scientific thinking skills are better able to understand and answer conceptual questions. Therefore, high-quality evaluation is an important component in measuring the impact of science literacy-based learning.

Science literacy-based learning also encourages active student involvement in the learning process. According to Fauziah et al. (2022:460), the use of experimental media and a scientific approach can foster students' curiosity and scientific thinking skills. This has implications for improved learning outcomes, as students feel challenged and motivated to investigate the material in depth. In this study, students who demonstrated a high interest in scientific activities demonstrated better academic achievement, reflecting the importance of active involvement in science-based learning processes.

From the perspective of a pedagogical approach, scientific literacy cannot be separated from the use of inquiry and experimental methods. Research by Khairatunnisa et al. (2024:10) shows that the inquiry learning model directly improves students' scientific literacy through observation, analysis, and conclusion-drawing activities. This process is highly relevant to the findings of this study, where students who are more capable of scientific thinking also have higher learning outcomes. This approach helps students construct their own knowledge based on evidence, thus encouraging meaningful learning.

Scientific thinking skills not only impact cognitive learning outcomes, but also shape students' scientific attitudes such as being critical, thorough, and objective. Rezkillah & Prasetyo (2023:40) emphasized that scientific literacy developed through experimental methods is able to shape students' scientific character while improving their cognitive achievements. In this context, developing scientific thinking skills is a crucial investment in developing a generation that is not only academically intelligent but also possesses scientific integrity. This is crucial for equipping students to face future challenges.

Based on the overall findings, scientific thinking skills in scientific literacy have been proven to be a strong predictor of elementary school students' science learning outcomes. This research confirms that the development of scientific thinking skills must be an integral part of science learning from an early age. Astria et al. (2022:2747) showed that students' scientific literacy skills are still low, necessitating structured pedagogical interventions to improve them. By focusing learning on scientific thinking processes, teachers can help students build a strong and relevant conceptual foundation.

In conclusion, this study suggests that science teachers at the elementary school level strengthen learning strategies that foster students' scientific thinking skills. As stated by Ma'ruf & Rafianti (2023), scientific thinking can simultaneously improve student activity, scientific literacy, and learning outcomes. Teachers need to provide space for students to explore, discuss, and draw conclusions based on real-world observations. This effort will not only improve learning outcomes but also equip students with critical thinking skills in the information and technology era. Therefore, improving scientific thinking skills is a strategic step in strengthening the quality of science education in elementary schools.

CONCLUSION

Based on the research results, it can be concluded that scientific thinking skills in scientific literacy have a significant and positive influence on student learning outcomes in the science subject of plant material in class IV SDN 012 Ujungbatu. The instruments used in this study have been proven to be valid and reliable, with the analysis results showing that both the level of difficulty and the discriminating power of the questions are in the optimal category. The research data also met the prerequisite tests of normality and homogeneity, allowing for accurate inferential analysis. The hypothesis test yielded a regression coefficient of 0.450 and a significance level of 0.000, confirming that any increase in scientific thinking skills will be followed by an increase in learning outcomes. This finding is supported by various previous studies that suggest that strengthening scientific thinking skills can improve students' scientific literacy, critical thinking skills, and academic achievement.

REFERENCES

- Amelia, F. R., Sihombing, I. I., Siregar, S. U., Rajagukguk, M. A., Telaumbanua, A. N., & Simanjuntak, Y. B. R. (2025). Pengenalan Literasi Sains Kepada Siswa Sekolah Dasar Melalui Pembelajaran Ilmu Pengetahuan Alam Yang Kontekstual Dalam Kehidupan Sehari-Hari. *Journal Educational Research and Development*, 1(4), 434-438.
- Aprizanti, Y. (2023). Penerapan Model Inkuiri Terbimbing untuk Meningkatkan Literasi Sains Siswa dalam Pembelajaran IPA Biologi. *Jurnal Didaktika Pendidikan Dasar*, 7(2), 411-436.
- Astria, F. P., Wardani, K. S. K., Nurwahidah, N., & Hasnawati, H. (2022). Analisis kemampuan literasi sains (KLS) siswa sekolah dasar pada pembelajaran sains. *Jurnal Ilmiah Profesi Pendidikan*, 7(4b), 2744-2752.
- Astutik, T. P. (2021). Pengaruh Kemampuan Berpikir Ilmiah dalam Pembelajaran Inkuiri Terbimbing terhadap Hasil Belajar Siswa. *Hydrogen: Jurnal Kependidikan Kimia*, 9(2), 78-83.
- Fauziah, S. R., Sutisnawati, A., Nurmeta, I. K., & Hilma, A. (2022). Pengaruh metode eksperimen berbantuan media kit ipa terhadap kemampuan literasi sains dan karakter rasa ingin tahu siswa sekolah dasar. *Jurnal Cakrawala Pendas*, 8(2), 457-467.
- Gaol, B. K. L., Silaban, P. J., & Sitepu, A. (2022). Pengaruh Kemampuan Berpikir Kritis Terhadap Hasil Belajar Siswa Pada Tema Lingkungan Sahabat Kita Di Kelas V SD. *Jurnal pajar (Pendidikan dan pengajaran)*, 6(3), 767-782.
- Handayani, F., Setiadi, D., Artayasa, I. P., & Jufri, A. W. (2023). Pengaruh project based learning pembuatan awetan bioplastik terhadap kemampuan berpikir kreatif dan literasi sains peserta didik. *Jurnal Ilmiah Profesi Pendidikan*, 8(4), 2235-2240.
- Irsan, I. (2021). Implementasi literasi sains dalam pembelajaran IPA di sekolah dasar. *Jurnal basicedu*, 5(6), 5631-5639.
- Juhaeni, J., Wiji, S., Wadud, A. J., Saputra, H., Azizah, I. N., & Safaruddin, S. (2022). Pengaruh Media Pembelajaran Teka Teki Silang Terhadap Hasil Belajar IPA Materi Perkembangbiakan Tumbuhan. *Journal of Instructional and Development Researches*, 2(6), 241-247.

- Khairatunnisa, K., Darussyamsu, R., & Ardi, A. (2024). Analisis Model Pembelajaran Inkuiri dan Keterkaitannya dengan Literasi Sains Peserta Didik Pada Mata Pelajaran Biologi. *Al-Alam: Islamic Natural Science Education Journal*, 3(1), 1-16.
- Ma'ruf, A. N. A. N. G., & Rafianti, W. R. (2023). Meningkatkan Aktivitas, Kemampuan Literasi Sains dan Hasil Belajar Muatan IPA Menggunakan Model Plant and Teach. *Scholastica Journal Jurnal Pendidikan Sekolah Dasar Dan Pendidikan Dasar (Kajian Teori dan Hasil Penelitian)*, 6(2).
- Mursyid, R., Adri, H. T., & Helmanto, F. (2024). Pengaruh Kemampuan Berpikir Ilmiah Dalam Literasi Sains Terhadap Hasil Belajar Siswa Pada Mata Pelajaran IPA Kelas VI SDN Benda Kecamatan Cicurug Sukabumi. *Al-Kaff: Jurnal Sosial Humaniora*, 2(1), 1-9.
- Nugraha, D. M. D. P. (2022). Hubungan kemampuan literasi sains dengan hasil belajar ipa siswa sekolah dasar. *Jurnal Elementary*, 5(2), 153-158.
- Parisu, C. Z. L., Saputra, E. E., & Lasisi, L. (2025). Integrasi literasi sains dan pendidikan karakter dalam pembelajaran IPA di sekolah dasar. *Journal Of Human And Education (JAHE)*, 5(1), 864-872.
- Rahmawati, Y. N. (2024). Hubungan Keterampilan Proses Sains dan Literasi Sains dengan Hasil Belajar Siswa SMP Pada Mata Pelajaran IPA.
- Rahmi, L., & Yuswanti, D. (2021). Meningkatkan Motivasi Belajar Menggunakan Model Pembelajaran Picture and Picture pada Mata Pelajaran Ilmu Pengetahuan Alam. *Jurnal Dharma PGSD*, 1(2), 73-85.
- Rahmi, L., Lingga, L. J., & Hidayanti, P. O. (2023). Pendampingan Mendesain Video Pembelajaran Inovatif Bagi Guru Sekolah Dasar Di Desa Empat Balai Kecamatan Kuok Kabupaten Kampar. *Communnity Development Journal*, 4(1), 418-422.
- Rahmi, L., Nukman, M., Fitriyeni, F., & Lingga, L. J. (2023). Pengembangan Media Video Pembelajaran IPA Berbasis Kontekstual pada Pembelajaran di SD. *ANTHOR: Education and Learning Journal*, 2(6), 787-791.
- Rezkillah, I. I., & Prasetyo, Z. K. (2023). Pengaruh metode percobaan terhadap literasi sains dan hasil belajar kognitif siswa kelas V sekolah dasar Kecamatan Cakranegara. *Jurnal Ilmiah PENDAS: Primary Educational Journal*, 4(1), 36-46.
- Royannisa, F., & Rahmi, L. (2025). The Application of Diorama Media to Enhance Student Interest in Learning the Animal Life Cycle Topic in Grade III SDN 011 Parit Aman, Rokan Hilir. *TOFEDU: The Future of Education Journal*, 4(6), 2176-2185.
- Siregar, T. R. A., Iskandar, W., & Rokhimawan, M. A. (2020). Literasi sains melalui pendekatan saintifik pada pembelajaran ipa sd/mi di abad 21. *MODELING: Jurnal Program Studi PGMI*, 7(2), 243-257.
- Suparya, I. K., Suastra, I. W., & Arnyana, I. B. P. (2022). Rendahnya literasi sains: faktor penyebab dan alternatif solusinya. *Jurnal Ilmiah Pendidikan Citra Bakti*, 9(1), 153-166.
- Susilowati, D. (2023). Analisis Kualitas Instrumen Tes Hasil Belajar Pembelajaran IPAS pada Kemampuan Literasi Sains dan Berpikir Kritis Siswa. *Jurnal Kualita Pendidikan*, 4(2), 111-117.
- Zamilah, Z., Djulia, E., & Lubis, K. (2024). Pengembangan Lembar Kerja Interaktif Berbasis Literasi Sains untuk Melatih Kemampuan Berpikir Kritis Peserta Didik Materi Fotosintesis. *Ideguru: Jurnal Karya Ilmiah Guru*, 9(1), 294-304.