JP (Jurnal Pendidikan) : Teori dan Praktik
Vol. 11, No. 1, April 2026, pp. 67-74
E-ISSN: 2527-6891, DOI: https://doi.org/10.26740/jp.v11n1.p67-74

Scientific Literacy as a Catalyst for Conceptual Understanding and Scientific Attitudes in Elementary Science Learning

Devi Cyndiyana Putri[1], Diah Widianingsih[2], Zidni Alfian Barif[3], Nabila Ariiqah[4]
[1,2,3]Elementary School Education Department, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[4]Educational Psychology, Victoria University of Wellington, Wellington, New Zealand

Article Info

Article history:

Received : November 12, 2025
Revised : December 03, 2025
Accepted : January 24, 2026

Keywords:

Scientific Literacy;
Science Learning;
Conceptual Understanding;
Scientific Attitudes;
Elementary School.

ABSTRACT

This study examines the implementation of scientific literacy in science learning and its contribution to strengthening elementary school students' conceptual understanding and scientific attitudes. Scientific literacy is viewed as an instructional approach that helps students connect scientific concepts with real-life phenomena, making learning more meaningful and contextual. This research used a qualitative case study design involving a school principal, a fifth-grade teacher, and students who actively participated in science learning activities. Data were collected through classroom observations, structured interviews, and documentation, then analyzed using an interactive analysis model consisting of data reduction, data display, and conclusion drawing. The findings show that integrating scientific literacy into science learning helps students understand scientific concepts more comprehensively by relating abstract knowledge to everyday experiences. This approach increases the relevance of learning and supports students in constructing conceptual meaning. In addition, scientific literacy encourages the development of scientific attitudes, such as curiosity, careful observation, confidence in asking questions, and environmental awareness. These findings indicate that scientific literacy is not merely an additional component of instruction, but a pedagogical framework that connects scientific knowledge with students' lived experiences. Therefore, the systematic integration of scientific literacy in science learning is a relevant strategy for improving the quality of science education at the elementary school level.

Corresponding Author:

Devi Cyndiyana Putri
Elementary School Education Department, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
Jl. Colombo No.1, Karang Malang, Caturtunggal, Kec. Depok, Kabupaten Sleman,
Daerah Istimewa Yogyakarta, Indonesia
Email: devicyndiyana.2025@student.uny.ac.id

INTRODUCTION

Scientific literacy is one of the essential competencies in 21st-century education, as it plays a crucial role in equipping students with critical thinking skills, enabling them to understand natural phenomena, and supporting evidence-based decision making within broader social, environmental, and justice-related contexts (Pratama, 2024; Zawawi & Setiawan, 2025). Globally, scientific literacy is regarded as a fundamental skill that younger generations must possess to navigate an increasingly complex and knowledge based world (Khairrunisa et al., 2025; Zawawi et al., 2025). However, findings from various international studies indicate that Indonesian students' scientific literacy remains below the average of other countries, highlighting the need to strengthen scientific literacy through more effective and meaningful learning practices (Parisu et al.,

2025). At the national level, several studies have also reported that the scientific literacy of elementary school students is still relatively low, thus necessitating contextual learning strategies that enable students not only to understand scientific concepts but also to apply them in everyday life (Rohmaya, 2022; Wijaya et al., 2023). Therefore, elementary education, as the foundational stage of formal education, plays a strategic role in fostering integrated scientific literacy within the learning process.

At the elementary school level, particularly in elementary school science learning contexts, learning facilities and infrastructure are generally well provided (Meisari et al., 2023; Prastiti & Adi, 2024). Various general literacy activities, such as reading books, discussions, and independent learning, have become part of the school's daily learning routines. Nevertheless, the specific implementation of scientific literacy has not been carried out consistently and systematically. Scientific literacy remains limited to its integration within science learning without being supported by instructional strategies deliberately designed to strengthen this competence in daily classroom activities. This condition is reflected in students' relatively low daily assessment results in science subjects, indicating that their conceptual understanding and scientific thinking skills have not yet developed optimally (Saad & Bancong, 2025). In fact, the school environment offers a variety of scientific phenomena such as the utilization of solar energy and the observation of plants that have the potential to serve as meaningful contexts for science learning. These findings are consistent with previous studies showing that although scientific literacy has begun to be introduced in elementary schools, improvements in students' scientific literacy still require more contextual and exploratory learning approaches (Juliana & Witarsa, 2023; Prastiti & Adi, 2024; Yasmidah & Zulfadewina, 2025).

These conditions suggest that the primary challenge in elementary school learning does not lie in the availability of learning facilities, but rather in the lack of sustained and optimal reinforcement of scientific literacy within the learning process. Recent studies reveal that scientific literacy in elementary schools is often still understood merely as the delivery of science content, rather than being directed toward the development of deep conceptual understanding and the cultivation of students' scientific attitudes (Dwisetiarezi & Fitria, 2021; Parisu & Saputra, 2025). In contrast, learning that integrates scientific literacy contextually can help students connect scientific concepts with their surrounding environment, thereby making learning more relevant and meaningful (Cahyani & Djudin, 2024). Furthermore, the low results of science learning evaluations indicate the need for more in depth investigations into the implementation of scientific literacy in classroom practice (Wardani et al., 2024; Xie et al., 2023). Despite the growing body of research on scientific literacy in elementary education, most studies have focused on measuring students' outcomes rather than examining how scientific literacy is systematically integrated into instructional components such as learning objectives, materials, processes, and assessment. Furthermore, limited studies have explored how such integration simultaneously contributes to both conceptual understanding and the development of scientific attitudes in classroom contexts.

Enhancing scientific literacy at the elementary school level is critically important, as scientific literacy is not only related to content understanding but also plays a role in shaping students' mindsets, attitudes, and scientific habits from an early age. Scientific literacy enables students to comprehend scientific concepts meaningfully, fosters curiosity, and habituates them to observe, question, and draw conclusions based on evidence encountered in their daily lives (Sanjiartha et al., 2024). At the elementary level, scientific literacy serves as a fundamental basis for developing students' understanding of natural phenomena around them, such as solar energy, plants, and environmental changes (Nurjanah et al., 2025). Moreover, recent studies indicate that contextual learning integrating scientific literacy can increase student engagement, strengthen conceptual understanding, and encourage the development of scientific attitudes such as accuracy, honesty, and environmental awareness (Gultom & Alwi, 2024; Susanti et al., 2025). This study offers a different perspective by exploring how scientific literacy is implemented in elementary science learning and how it contributes not only to students' conceptual understanding but also to the development of their scientific attitudes in classroom learning contexts.

Based on these considerations, this study aims to analyze the implementation of scientific literacy in science learning and examine its role in strengthening elementary school students' conceptual understanding and scientific attitudes. The novelty of this study focuses on an in-depth exploration of how scientific literacy is integrated into learning activities, how students comprehend the scientific concepts being taught, and how scientific attitudes are formed through students' interactions with scientific phenomena in everyday life. Using a qualitative approach, this research is expected to provide a concrete depiction of scientific literacy practices in learning as a foundation for the development of more meaningful science education in elementary schools.

METHOD

This study employed a qualitative approach with a case study design. The qualitative approach was selected because the research focuses on an in-depth exploration of the process of implementing scientific literacy in learning and the meanings derived from students' learning experiences. Qualitative methods generate descriptive data in the form of written and spoken words from research participants, as well as observable behaviors (Alwanda, 2025). The data used in this study were primary data obtained directly by the researcher during the research process. The study was conducted in an elementary school setting during the second semester of the 2024/2025 academic year. The participants consisted of one school principal, one fifth-grade teacher, and 25 students who were involved in science learning activities. The informants were selected purposively based on their direct involvement in the implementation of science learning. Teachers and the principal were selected as key informants due to their essential roles in planning and implementing scientific literacy-based learning, while students were selected as supporting informants to obtain data related to the development of conceptual understanding and scientific attitudes during the learning process. Informants were selected purposively based on their active involvement in the learning activities under investigation.

Data were collected through classroom observations, semi-structured interviews, and documentation, Table 1 shows the interview instrument items. Observations were conducted to examine the implementation of scientific literacy in science learning activities, while interviews were used to obtain in-depth information from teachers regarding their teaching practices. Interviews were conducted with the informants to obtain information on the culture of scientific literacy, students' conceptual understanding of science, and their scientific attitudes. Documentation served as supporting data, including lesson plans, evaluation results, and other documents relevant to the study.

Data analysis followed the interactive analysis model of Miles and Huberman, which includes data reduction, data display, and conclusion drawing (Sugiyono, 2022). Data reduction involved selecting and focusing on information relevant to the research objectives. Data display was presented in the form of systematically organized narrative descriptions to facilitate an understanding of the research findings. Finally, conclusions were drawn based on patterns and relationships among the collected data. Data trustworthiness was ensured through technique and source triangulation by comparing data obtained from observations, interviews, and documentation to enhance the credibility and reliability of the findings.

Table 1. Research Interview Instrument Items

Sub Indicator	Question Number
Teachers' understanding of science literacy	1.2
Science literacy-based learning planning	3.4
The learning process integrates science literacy	5.6
Science literacy culture in learning activities	7.8
Science literacy strategies in learning activities	9.10
Students' understanding of science concepts	11.12
Students' scientific attitudes in science learning	13.14
The relevance of science learning to everyday life	15.16
Supporting factors for the implementation of science literacy	17.18
Factors hindering the implementation of science literacy	19.20

Data collection was carried out through structured interviews based on indicators of science literacy implementation in science learning. These indicators included learning objectives, learning materials, learning processes, and learning evaluations. The interviews were conducted to obtain an in-depth picture of how science literacy was applied in the practice of science learning in the classroom and how teachers played a role in integrating science literacy into teaching and learning activities.

RESULTS

Scientific Literacy in Learning Objectives and Materials

This study was conducted in an elementary school involving fifth-grade teachers and students who participated in science learning activities. Based on interview results with the fifth-grade classroom teacher, the objectives of science learning were found to be not solely directed toward achieving the basic competencies outlined in the curriculum. The teacher stated that, from the lesson planning stage, learning objectives were formulated to enable students to recognize and understand scientific phenomena closely related to their environment, such as the use of solar energy, the role of plants, and human–environment interactions. These findings indicate that scientific literacy is positioned not only as a complementary element but as a foundational orientation in designing learning objectives, consistent with contextual learning principles in which knowledge is constructed through connections between academic content and real-life contexts (Cahyani & Djudin, 2024; Nurjanah et al., 2025).

The development of science learning materials was carried out by utilizing the school environment as the primary learning resource. The teacher did not rely solely on textbooks, but consciously connected the material to real phenomena that students frequently encounter in everyday activities, including the growth of plants in the school yard, daily weather changes, and the condition of environmental cleanliness within the school. The teacher stated that learning materials are adapted to the local context so that students can more easily understand scientific concepts and do not perceive science as content distant from their lives. Students were found to be involved in the processes of observing, discussing, and drawing simple conclusions based on what they encountered in their environment. This finding indicates that learning materials are oriented toward contextual and experience-based approaches that support meaningful knowledge construction (Dwi et al., 2025; Khafidotul et al., 2025).

Scientific Literacy in Learning Process and Evaluation

The science learning process was observed to be carried out through various activities that actively involved students, including observing the school environment, engaging in group discussions, and presenting observation results orally in front of the class. The teacher did not merely act as a transmitter of content, but also served as a facilitator who provided opportunities for students to participate directly in the learning process. Students were given opportunities to ask questions, express their opinions, and present observation findings based on their everyday experiences. Throughout the process, the teacher guided students' observations so that they aligned with the scientific concepts being studied, connecting observed phenomena with science content. This student-centered, inquiry-based approach reflects scientific literacy principles emphasizing the ability to investigate phenomena and communicate findings effectively (Gultom & Alwi, 2024; Sanjiartha et al., 2024).

The evaluation of science learning was conducted not only through written tests, but also through observation of students' learning processes during instruction. The teacher assessed students' understanding by paying attention to their level of engagement in activities, their ability to ask questions, and their ability to explain scientific concepts using examples related to everyday life. For instance, students were asked to explain the use of solar energy in daily life or the relationship between plants and the environment based on their school observations. The evaluation process was carried out continuously and integrated with learning activities, including informal assessment through discussions, question-and-answer sessions, and presentations. This continuous, process-oriented evaluation reflects an authentic assessment orientation in which understanding is measured through meaningful performance rather than solely through formal testing (Alwanda, 2025; Gultom & Alwi, 2024).

Impact of Scientific Literacy Implementation on Students' Learning

The implementation of scientific literacy had a positive impact on students' engagement in the learning process. Students demonstrated more active participation, increased curiosity, and greater confidence in expressing their opinions and asking questions related to observed phenomena. Contextual learning enabled students to understand the material more easily because scientific concepts were directly connected to their daily experiences (Roy et al., 2025). In addition, the learning process encouraged the development of students' scientific attitudes, such as careful observation, critical thinking, and awareness of the surrounding environment. These outcomes indicate that scientific literacy plays a role not only in supporting conceptual mastery but also in fostering the development of scientific attitudes (Ahmad & Rahayu, 2023; Imakulata et al., 2024).

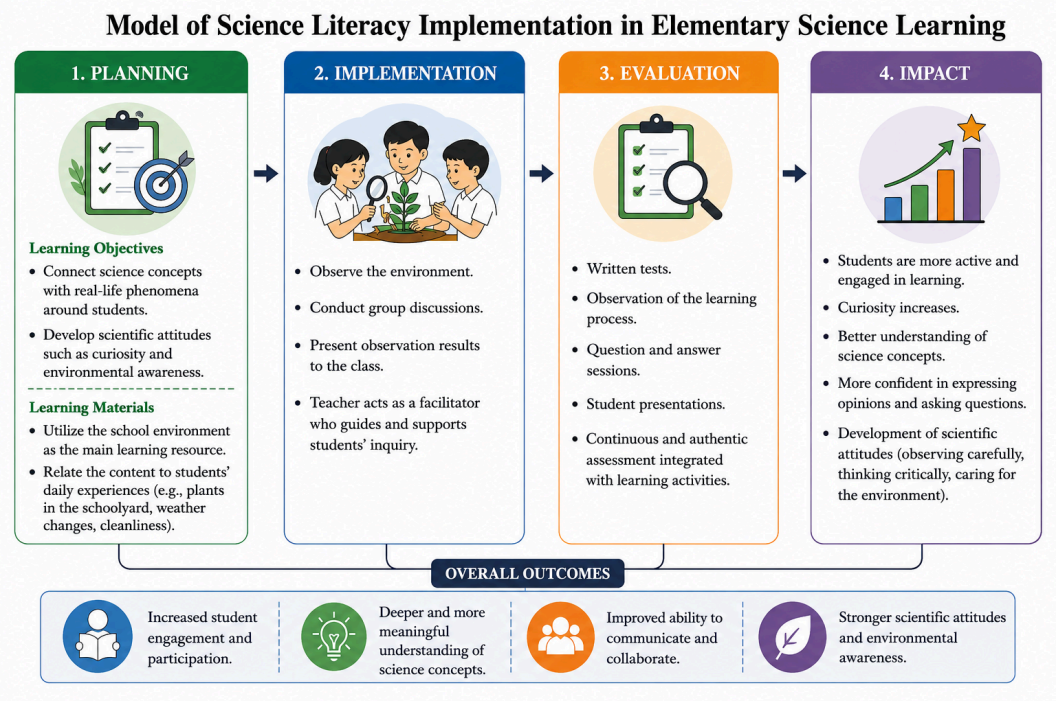

Figure 1 Model of Science Literacy Implemnetation in Elementary Science Learning

DISCUSSION

Scientific Literacy in Learning Planning: Objectives and Materials

The formulation of learning objectives integrating scientific literacy reflects an effort to shift from content-oriented learning toward meaning-oriented learning. This approach aligns with the principles of contextual learning, in which knowledge is constructed through connections between academic content and students' lived experiences (Cahyani & Djudin, 2024; Nurjanah et al., 2025). Contextual learning objectives encourage students not only to study scientific concepts theoretically, but also to understand their applications in real-life situations, which enhances engagement and comprehension. At the same time, this approach supports the development of scientific attitudes—such as curiosity and environmental awareness—which are essential components of scientific literacy (Sanjiartha et al., 2024). Furthermore, learning objectives that integrate scientific literacy serve as a guideline for teachers in designing meaningful learning activities, enabling science learning to become more structured and capable of supporting the gradual development of students' conceptual understanding. These findings are consistent with Barokah et al. (2025), which states that scientific literacy plays a role in helping students build conceptual understanding through meaningful and contextual learning experiences.

The use of the surrounding environment as a primary learning resource reflects an effort to position science not merely as abstract knowledge, but as knowledge embedded in students' real-life contexts. Learning materials that are concrete and context-based enable students to explain scientific concepts using examples drawn from their surroundings, making the learning process more active and reflective. These findings are consistent with the views of Dwi et al. (2025) and Khafidotul et al. (2025), who state that scientific literacy serves as a means of connecting scientific concepts with students' social and environmental contexts, thereby making learning more relevant and meaningful. This is also in line with OECD (2019), which emphasizes that scientifically literate individuals are able to explain phenomena, evaluate and design scientific enquiry, and interpret data and evidence—capacities that are fundamentally supported by learning materials anchored in students' real-world contexts. This underscores the importance of contextualized learning materials as a core component of scientific literacy, enabling students to construct knowledge through meaningful interactions with their environment.

Scientific Literacy in Learning Implementation: Process and Evaluation

The involvement of students in observing, questioning, and communicating findings demonstrates that the learning process is oriented toward the development of scientific processes rather than merely content acquisition. Such practices are aligned with the principles of scientific literacy, which emphasize the ability to investigate phenomena, construct explanations, and communicate ideas effectively (Gultom & Alwi, 2024; Sanjiartha et al., 2024). The teacher's role as scaffolder is particularly significant: by linking experiential learning with conceptual knowledge, the teacher ensures that scientific literacy is not taught explicitly as a separate component but is integrated within the learning experience itself. The learning process that integrates scientific literacy encourages students to think actively and reflectively, transforming them from passive recipients of information into active constructors of knowledge through interaction with their environment and peers. These findings are consistent with the studies of Krishantari et al. (2025) and Parisu et al. (2025), which emphasize that scientific literacy plays an important role in fostering students' scientific attitudes through contextual, exploratory, and experience-based learning activities.

The evaluation practices described in this study reflect an authentic assessment orientation, in which students' understanding is measured through meaningful performance and real-life application rather than solely through formal testing. The use of process-oriented evaluation provides a more comprehensive picture of students' cognitive and affective development, capturing not just correct answers but also how students construct understanding, relate concepts to everyday experiences, and demonstrate scientific attitudes. This approach is consistent with the view that scientific literacy-based assessment should capture both conceptual understanding and the development of scientific attitudes in a balanced manner (Alwanda, 2025; Gultom & Alwi, 2024). The integration of scientific literacy in evaluation practices also enables teachers to monitor students' learning development more holistically, encompassing both knowledge acquisition and the formation of scientific attitudes.

Impact of Scientific Literacy on Students' Learning

Contextual learning enables students to understand the material more easily because scientific concepts are directly connected to their daily experiences (Roy et al., 2025). Scientific literacy plays a role not only in conceptual mastery but also in the development of students' scientific attitudes (Ahmad & Rahayu, 2023). These findings are consistent with the views of Muliastrini (2025) and Sariyyah et al. (2025), who state that scientific literacy is an important foundation for science learning in elementary schools. Previous studies also show that science learning materials designed using a scientific approach can effectively support the development of students' scientific literacy and learning activities (Irmasari et al., 2023). Scientific literacy can support deeper conceptual understanding while simultaneously fostering the development of students' scientific attitudes in a sustainable manner (Imakulata et al., 2024).

The impact of scientific literacy can therefore be seen across multiple dimensions, including increased learning engagement, the development of scientific attitudes, and the strengthening of conceptual understanding. These interconnected outcomes illustrate that scientific literacy functions as a comprehensive approach that enhances both the cognitive and affective aspects of students' learning in elementary science education. By integrating scientific literacy into science learning, teachers can create more meaningful, relevant, and developmentally appropriate learning experiences—these interconnected contributions constitute the primary finding of this study.

CONCLUSION

This study shows that the implementation of scientific literacy in science learning plays an important role in improving the quality of learning in elementary schools. The integration of scientific literacy encourages students to connect scientific concepts with real-life phenomena, which helps them understand the material more meaningfully and contextually. In addition, the learning process also supports the development of students' scientific attitudes, such as curiosity, critical thinking, and active participation in classroom discussions. These findings indicate that scientific literacy is not only important for strengthening students' conceptual understanding but also for fostering positive scientific attitudes in the learning process. Therefore, the integration of scientific literacy in science learning needs to be continuously developed so that learning becomes more relevant, contextual, and able to support the development of students' scientific competencies.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to all parties who supported the completion of this research. Special thanks are addressed to the school principal, teachers, and students who participated in this study and provided valuable information during the research process. The authors also appreciate the support and guidance from colleagues and all individuals who contributed directly or indirectly to the completion of this study.

REFERENCES

Ahmad, M. S., & Rahayu, Y. S. (2023). Training scientific literacy skills through inquiry learning with chemcollective ' s virtual laboratory on chemical equilibrium. *JPPS (Jurnal Penelitian Pendidikan Sains),* 12(2), 155–175. https://doi.org/10.26740/jpps.v12n2.p155-175

Alwanda, M. A. (2025). Efektivitas media pembelajaran interaktif dalam meningkatkan literasi sains siswa sekolah dasar : systematic literature review (2020 – 2025). *Advances In Education Journal,* 2(2), 797-811. https://journal.al-afif.org/index.php/aej/article/view/280

Barokah, A., Mukhlis, S., Srianita, Y., & Wirutami, T. W. (2025). Pendampingan implementasi projek penguatan profil pelajar pancasila (p5) di sekolah dasar untuk meningkatkan literasi sains. *Dedikasi: Jurnal Pengabdian Lentera*, *02*(05), 147–152.

Cahyani, C. W., & Djudin, T. (2024). Pembelajaran IPA berbasis lingkungan untuk siswa sekolah dasar: sebuah kajian literatur. *Jurnal Pendidikan Dasar Perkhasa: Jurnal Penelitian Pendidikan Dasar,* 10(2), 1102-1116. https://doi.org/10.31932/jpdp.v10i2.3842

Dwi, R., Maghfira, S., Agusdianita, N., Habib, M., & Lorenza, S. (2025). Pengaruh penggunaan bahan ajar STEAM-PjBl untuk meningkatkan kemampuan literasi sains siswa sekolah dasar. In *Social, Humanities, and Educational Studies (SHES): Conference Series* (Vol. 8, No. 3, pp. 1682-1690). *8*(3), 1682–1690. https://doi.org/10.20961/shes.v8i3.107431

Dwisetiarezi, D., & Fitria, Y. (2021). Analisis kemampuan literasi sains siswa pada pembelajaran IPA terintegrasi di sekolah dasar. *Jurnal Basicedu,* 5(4), 1958-1967. https://doi.org/10.31004/basicedu.v5i4.1136

Gultom, L. N., & Alwi, N. A. (2024). Implemensi literasi sains dalam pembelajaran IPA di sekolah dasar. *Jurnal basicedu*, 5(6), 5631-5639. https://doi.org/10.31004/basicedu.v5i6.1682

Imakulata, M. M., Santrum, M. J., Dama, W. V., Bangngu, N. C., Wiltin, G. F., & Tukan, E. S. (2024). Empowering scientific literacy skills through an integrated SSCS learning model with RQA strategies. *Biosfer: Jurnal Pendidikan Biologi*, 17(2), 540-549.

Irmasari, E., Marianti, A., Kariada, N., Martuti, T., & Riawan, A. S. (2023). Development of CIRCSA-Based E-module on virus materials to improve students ' critical thinking and scientific literacy. *JPPS (Jurnal Penelitian Pendidikan Sains)*, 13(1), 16–28. https://doi.org/10.26740/jpps.v13n1.p16-28

Juliana, R., & Witarsa, R. (2023). Penerapan Gerakan Literasi terhadap Kemampuan Literasi Sains dan Literasi Membaca di Sekolah Dasar. *Journal of Education Research*, *4*(3), 951–956.

Khairrunisa, A. N., Yusup, I. R., Paujiah, E., Education, B., Training, T., Sunan, U. I. N., Djati, G., & Jakarta, U. N. (2025). Improving students' scientific literacy through a problem-based learning model integrated with socio-scientific issues on ecosystem learning. *Biosfer: Jurnal Pendidikan Biologi,* 18(2), 276–289. https://doi.org/10.21009/biosferjpb.55744

Khoriyah, K., & Ariefka, R. (2025). Pengaruh model pembelajaran project based learning terhadap kemampuan literasi sains siswa. *Didaktika: Jurnal Kependidikan, 14*(3 Agustus), 5691–5700. https://doi.org/10.58230/27454312.2357

Krishantari, D. Y., Ardhiantoro, A., Tafaroh, H., & Lestiyarini, K. B. (2025). Pembelajaran ipa berbasis kearifan lokal : penguatan literasi sains melalui dolanan anak (Lisa Dolan). In *Prosiding Seminar Nasional Pendidikan Dasar* (Vol. 3, No. 1, pp. 331-344).

Meisari, D. P., Kune, S., & Bancong, H. (2023). The Effect of the Quantum Teaching Model on the Science Process Skills of Class V Elementary School Students. *JP (Jurnal Pendidikan): Teori dan Praktik*, *8*(2), 120-128.

Muliastrini, N. K. E. (2025). Pengembangan strategi pembelajaran berbasis karakter untuk meningkatkan literasi sains siswa sekolah dasar. *Jurnal Citra Pendidikan Anak,* 4(1), 1-14.

Nurjanah, I., Fauzi, A., & Widia. (2025). Profil literasi sains siswa sekolah dasar pada kurikulum merdeka: analisis fenomena, penyelidikan dan interpretasi data. *Jurnal Pendidikan dan Kebudayaan*, 2(4), 32-40.

OECD. (2019). *PISA 2018 assessment and analytical framework*. OECD Publishing. https://doi.org/10.1787/b25efab8-en

Parisu, C. Z. L., & Saputra, E. E. (2025). Integrasi Literasi Sains Dan Pendidikan Karakter Dalam

Pembelajaran IPA Di Sekolah Dasar. 5(1), *Journal Of Human And Education (JAHE)*, 5(1), 864–872. https://doi.org/10.31004/jh.v5i1.2281

Parisu, C. Z. L., Sisi, L., & Juwairiyah, A. (2025). pengembangan literasi sains pada siswa sekolah dasar melalui pembelajaran IPA. *Jurnal Pendidikan Multidisiplin*, 1(1), 11-19.

Prastiti, M. R., & Adi, B. S. (2024). Science digital library : Innovation in improving science literacy of elementary school students. *Jurnal Prima Edukasia*, 12(2), 216-227.

Pratama, A. (2024). Exploring trends dan focus of science literacy research : bibliometric analysis 2019-2024. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 9(04), 828-837.

Rohmaya, N. (2022). Peningkatan Literasi Sains Siswa Melalui Pembelajaran IPA Berbasis Socioscientific Issues(SSI). *Jurnal Pendidikan MIPA,* 12(2), 107-117.

Roy, G., Sikder, S., & Danaia, L. (2025). Adopting scientific literacy in early years from empirical studies on formal education : a systematic review of the literature. *International Journal of STEM Education*, 1–24. https://doi.org/10.1186/s40594-025-00547-1

Saad, R., & Bancong, H. (2025). Science literacy and its impact on scientific knowledge acquisition: A review of current research and practices. *PPSDP International Journal of Education*. 4. 586-607. doi.org/10.59175/pijed.v4i2.761

Sanjiartha, I. G. D., Suwindia, I. G., & Winangun, I. M. A. (2024). Peran literasi sains dalam membentuk generasi berfikir kritis dan inovatif : kajian literature review. *Education and Social Sciences Review*. 5. 120. 10.29210/07essr499900.

Sariyyah, N., Korain, E. F., Faradila, K., Bela, A. S., Mere, R. L., Bunga, M. A., Nitti, V. A. F., & Floresi, U. (2025). Meningkatkan literasi sains siswa Sekolah Dasar Swasta Muhammadiyah melalui pendekatan pembelajaran interaktif berbasis video edukatif dan konteks kehidupan nyata. *PEDAMAS (Pengabdian Kepada Masyarakat),* 3(04), 1593-1601.

Sugiyono. (2022). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Susanti, N. I., Rozy, F. S., Munawaroh, L., & Alfiyah, A. S. (2025). Analisis tingkat keterampilan berpikir kritis siswa kelas VI sekolah dasar pada mata pelajaran IPAS. DIDAKTIKA : Jurnal Pemikiran Pendidikan, *31*(2), 325–336. https://doi.org/10.30587/didaktika.v31i2.9847

Wardani, D. A. P., Pujiastutik, E. F., & Sholekha, N. (2024). Efektivitas model pembelajaran project based learning terhadap kemampuan literasi numerasi untuk meningkatkan berfikir kritis siswa. *Primary Education Journals (Jurnal Ke-SD-An),* 4(3), 321-326.

Wijaya, I. K. W. B., Yasa, I. M. W., & Muliani, N. M. (2023). Menumbuhkan literasi sains siswa sekolah dasar di lingkungan keluarga. *Jurnal Pendidikan MIPA,* 13(4), 1012-1016.

Xie, Y., Wang, J., Li, S., & Zheng, Y. (2023). *Research on the* influence path of metacognitive reading strategies on scientific literacy. *Journal of Intelligence*, 11(5), 78.

Yasmidah, S., & Zulfadewina. (2025). analisis penerapan literasi sains dalam pembelajaran IPAS di kelas IV sekolah dasar. *WASPADA (Jurnal Wawasan Pengembangan Pendidikan)*, 10, 258–269.

Zawawi, A. A., & Setiawan, R. (2025). Introduction to global social problems: Understanding inequalities of power and social justice: Isaac Zvi Christiansen. (2025). New York: Routledge, 528 pp., $190 hardcover, €49.99 paperback. ISBN 9781003602880. *Journal of Human Behavior in the Social Environment*, 1–3. https://doi.org/10.1080/10911359.2025.2575819

Zawawi, A. A., Suryani, M., & Museyibzada, R. (2025). Globalisasi pendidikan tinggi Indonesia: Analisis program beasiswa IISMA sebagai representasi mobilitas akademik internasional. *Al-Irsyad: Journal of Education Science, 4*(2), 188–200. https://doi.org/10.58917/aijes.v4i2.220