

# Development of Science Literacy-Based Student Worksheets on Ecosystem Materials to Improve the Learning Outcomes of Fifth-Grade Elementary School Students

Ita Fatimatuz Zahroh<sup>1\*</sup>, Agustiningsih<sup>2</sup>, Kendid Mahmudi<sup>3</sup>

<sup>123</sup> Universitas Jember, Jember, Indonesia

\*Corresponding author e-mail: [itafatimatuzz@gmail.com](mailto:itafatimatuzz@gmail.com)

## Abstract

*Elementary school students' scientific literacy skills still need to be strengthened through learning materials that connect scientific concepts with real-life contexts. This study aimed to develop science literacy-based Student Worksheets (LKPD) on ecosystem material and to examine their validity, effectiveness, and practicality in improving the learning outcomes of fifth-grade elementary school students. The study employed a Research and Development (R&D) approach using the Borg and Gall model, implemented up to the eighth stage. The effectiveness trial involved 56 fifth-grade students at SDN Tegal Besar 02 Jember, divided into an experimental class and a control class, with 28 students in each group. Data were collected through interviews, questionnaires, learning outcome tests, and documentation. The validation results showed feasibility scores of 85.4% for the media aspect, 87.2% for the language aspect, and 89.0% for the content aspect, all of which were categorized as highly feasible. Learning outcome analysis showed a *t* value of 7.587, which exceeded the *t*-table value of 1.673, while the experimental class obtained an N-Gain score of 0.57 or 57.48%, categorized as moderate/fairly effective. The relative effectiveness test yielded a score of 47.87%, indicating a moderate level of effectiveness. The practicality of the LKPD, based on student responses, reached 84.92% and was categorized as highly practical. Therefore, the developed science literacy-based LKPD met the criteria of validity, effectiveness, and practicality and showed potential to support students' learning outcomes on ecosystem material.*

**Keywords:** ecosystem material; learning outcomes; science literacy; student worksheets; elementary school.

## 1. INTRODUCTION

Scientific literacy has become an important competence in contemporary education because it enables students to understand scientific concepts, interpret evidence, and apply scientific knowledge to problems encountered in everyday life. At the elementary school level, science learning is expected not only to develop students' conceptual understanding but also to foster scientific reasoning, curiosity, critical thinking, and awareness of the relationship between science, technology, society, and the environment (Harpina et al., 2025; T. P. Lestari et al., 2025; Wardana et al., 2025). Scientific literacy therefore involves more than recalling scientific information; it includes the ability to understand and use scientific knowledge in meaningful real-life contexts (Bhoi & Binjha, 2025; Sakul et al., 2025a; Yanto et al., 2025a). International assessment results indicate that scientific literacy among Indonesian students remains a concern. In PISA 2018, Indonesia obtained an average science score of 396. The PISA 2022 results subsequently showed a science score of 383, indicating a decline compared with the previous assessment. These findings highlight the continuing need to strengthen learning experiences that help students connect scientific knowledge with authentic and contextual problems.

Several factors have been associated with students' limited scientific literacy, including monotonous learning resources, misconceptions, insufficiently contextualized instruction, limited reading interest, unsupportive learning environments, inadequate facilities, and differences in teacher capacity (Bakar et al., 2023; Kartikasari et al., 2025). One way to address these challenges is to provide learning materials that actively engage students with scientific concepts and contextual problems. Learning materials should not function merely as sources of information but should provide structured opportunities for students to observe phenomena, interpret information, solve problems, and relate scientific concepts to everyday experiences (Dewi et al., 2025).

Student Worksheets (*Lembar Kerja Peserta Didik* or LKPD) are instructional materials designed to guide students through structured learning activities, including content exploration and exercises (Fitriani & Sapri, 2025; Iramahdewi et al., 2025; Kartini et al., 2025; Putra et al., 2024). When appropriately designed, worksheets can support more active learning by directing students toward specific tasks and learning processes. However, worksheets that rely mainly on textbook-based questions and routine exercises may provide limited opportunities for students to explore scientific phenomena in meaningful contexts. Integrating scientific literacy into LKPD may therefore provide a more contextual form of learning by encouraging students to connect scientific concepts with problems, evidence, and situations encountered in daily life (Satar, Ledoh, Nurbaya, & Listiani, 2025; Tihasanah et al., 2025; Yanto et al., 2025b).

The need for such learning materials was also identified at SDN Tegal Besar 02 Jember. Preliminary interviews with the Grade V teacher indicated that students had not previously used science literacy-based LKPD in science learning. The learning resources used primarily consisted of textbooks, presentation slides, and commercially published worksheets. The teacher also reported limited experience in developing learning materials specifically oriented toward scientific literacy. These preliminary findings indicate a practical need for learning materials that provide more structured opportunities for students to engage with science through contextual activities.

Previous studies have demonstrated the potential of science literacy-based worksheets in science education. Benhadj et al. (2023), for example, developed science literacy-based worksheets on environmental pollution and reported that the product was feasible for use in science learning and could support students in addressing environmental problems. Science learning itself is closely related to the study of natural phenomena and relationships among events in the environment. Ecosystems are particularly relevant for contextual science learning because interactions among living organisms and their environments can be directly related to situations encountered in students' everyday lives. This characteristic makes ecosystem material suitable for learning activities that require students to interpret scientific phenomena and connect scientific concepts with environmental issues (Mulyastuti et al., 2026; Taufikurrizal et al., 2026).

Although previous studies have developed science literacy-based worksheets for different science topics, the literature reviewed in this study provides limited discussion of science literacy-based LKPD specifically developed for Grade V ecosystem learning and systematically evaluated in terms of validity, effectiveness, and practicality. Existing studies have generally focused on product feasibility or scientific literacy outcomes in particular science topics, while fewer studies have simultaneously examined product quality, students' learning outcomes, and user responses within the context of elementary ecosystem learning (Fadlila et al., 2025; Murwani et al., 2025; Ningsih et al., 2024; Rahayu et al., 2023). Therefore, the novelty of the present study lies not merely in producing another worksheet, but in integrating science literacy-oriented activities into ecosystem learning and evaluating the resulting product through evidence of validity, effectiveness, and practicality. Based on this rationale, the present study aimed to develop a science literacy-based Student Worksheet (LKPD) on ecosystem material for fifth-grade elementary school students and to evaluate its validity, effectiveness, and practicality. Specifically, the study examined the feasibility of the product through expert validation, its effectiveness through students' learning-outcome data, and its practicality through students' responses after implementation.

## 2. METHOD

The development of the science literacy-based Student Worksheet (LKPD) resulted in a printed learning material designed for Grade V ecosystem learning. The worksheet was developed through the first eight stages of the Borg and Gall model and was designed to connect ecosystem concepts with contextual scientific phenomena and everyday environmental situations (Borg & Gall, 2003). The science literacy component primarily emphasized contextual aspects and the competency of explaining scientific phenomena.

The validity of the developed LKPD was assessed in terms of media, language, and content. The validation results are presented in Table 1.

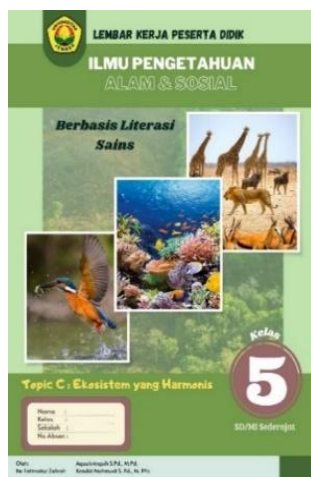
**Table 1.** Validation Results of the Science Literacy-Based LKPD

| Validation Aspect | Score (%) | Category        |
|-------------------|-----------|-----------------|
| Media             | 85.4      | Highly Feasible |
| Language          | 87.2      | Highly Feasible |
| Content           | 89.0      | Highly Feasible |

The validation results showed that all three aspects were categorized as highly feasible. The content aspect obtained the highest score (89.0%), followed by language (87.2%) and media (85.4%). These findings indicate that the developed LKPD was considered appropriate in terms of content, linguistic presentation, and media design before implementation with students.

The high content-validation score is important because science literacy-oriented materials should not merely present scientific information accurately but should also provide opportunities for students to connect scientific concepts with contextual phenomena and everyday problems. Clear language and appropriate visual organization are also particularly important for elementary school students because the readability and accessibility of instructional materials may influence their understanding of learning instructions and activities (Ermawan et al., 2025; Kurniawan et al., 2024; T. Lestari & Untung, 2025).

These findings are consistent with (Kooiker-den Boer et al., 2024), who reported that science literacy-based worksheets can be feasibly implemented in science learning when their content and learning activities are appropriately aligned with instructional objectives. However, the validation findings should be interpreted as evidence of product feasibility rather than direct evidence of effectiveness in improving learning outcomes. Following validation and revision, the product was tested on a limited scale with 20 fifth-grade students at SDN Tegal Besar 04 Jember. The limited try-out was conducted before the main effectiveness test to identify weaknesses and improve the developed product.



**Figure 1.** Development Design of the Science Literacy-Based LKPD

The effectiveness test involved two Grade V classes at SDN Tegal Besar 02 Jember. Class VA served as the control group, whereas Class VB served as the experimental group. The experimental group used the developed science literacy-based LKPD, while the control group used the existing worksheet. Both groups completed pretest and posttest assessments.

Before hypothesis testing, normality was examined using the Shapiro–Wilk test. The significance values were .443 for the experimental pretest, .221 for the experimental posttest, .316 for the control

pretest, and .472 for the control posttest. Because all values were greater than .05, the score distributions were considered normally distributed.

An independent-samples *t*-test was then used to compare the learning outcomes of the experimental and control groups. The experimental group obtained a higher mean score ( $M = 31.43$ ) than the control group ( $M = 19.29$ ). The analysis showed a statistically significant difference between the two groups,  $t(54) = 7.587$ ,  $p < .001$ . These findings indicate that students who used the science literacy-based LKPD achieved higher learning outcomes than students who used the existing worksheet.

The improvement in the experimental group was further examined using N-Gain analysis. The experimental group obtained an N-Gain score of 0.57, equivalent to 57.48%, which was categorized as moderate improvement and fairly effective. In addition, the relative effectiveness (ER) analysis yielded a value of 47.87%, which was categorized as moderate effectiveness according to the criteria adopted in the study (Masyhud, 2021).

Taken together, the *t*-test, N-Gain, and relative effectiveness results indicate that the developed LKPD was associated with better learning outcomes during the study. One possible explanation is that the worksheet presented ecosystem concepts through contextual activities that required students to relate scientific ideas to environmental phenomena rather than merely recall factual information. Contextual science learning may support conceptual understanding by enabling students to connect scientific knowledge with situations that are meaningful and familiar to them (Hulwah & Suriani, 2025; Yolanda et al., 2024).

The ecosystem topic is particularly suitable for science literacy-oriented learning because interactions among living organisms, environmental components, and ecosystem balance can be directly connected with phenomena observed in students' surroundings. Through such contextual activities, students are provided with opportunities to interpret scientific phenomena and apply scientific concepts to real-life situations. This approach is consistent with the broader concept of scientific literacy, which emphasizes the ability to understand and use scientific knowledge in meaningful contexts.

The findings also show the feasibility of science literacy-based worksheets in environmental science learning. The present study provides additional evidence from Grade V ecosystem learning by evaluating the product not only through validation but also through learning-outcome and student-response data. Nevertheless, further comparison with recent empirical studies on science literacy-based worksheets and contextual elementary science learning is needed to strengthen the interpretation of these findings (Sakul et al., 2025b; Salsabila et al., 2025).

The statistical analyses used in this study provide complementary information. The independent-samples *t*-test indicates whether learning outcomes differed significantly between the experimental and control groups, whereas N-Gain describes the magnitude of improvement from pretest to posttest in the experimental group. The ER analysis provides an additional estimate of relative effectiveness based on the criteria adopted in this study.

The practicality of the developed LKPD was evaluated using a 10-item student-response questionnaire administered to 28 students in the experimental group after implementation. The analysis yielded a score of 84.92%. Based on the interpretation criteria used in the study, this result indicates that the developed LKPD was highly practical for use in learning. The term "highly practical" is more appropriate than "highly effective" because student-response data in this section represent product practicality rather than changes in learning outcomes. Practicality generally refers to the usability, acceptability, and ease of implementation of an instructional product for its intended users. The high student-response score therefore suggests positive user acceptance of the developed worksheet.

Overall, the findings indicate that the science literacy-based LKPD met the criteria examined in this study in terms of validity, effectiveness, and practicality. Its contextual orientation may have supported students in connecting ecosystem concepts with environmental situations encountered in everyday life. Science literacy-oriented learning materials are expected to encourage students to move beyond factual

recall toward understanding, interpreting, and applying scientific knowledge (Satar, Ledoh, Nurbaya, Listiani, et al., 2025).

Several limitations were identified during implementation. The developed LKPD was produced in printed form and was therefore susceptible to physical damage, required considerable preparation time, and did not encompass all dimensions of scientific literacy because it mainly focused on contextual aspects and the competency of explaining scientific phenomena. In addition, the limited number of printed worksheets required approximately six to seven students to share one worksheet, while differences in students' willingness to read the material also affected participation during learning activities.

These limitations suggest that future development should broaden the dimensions of scientific literacy represented in the worksheet, provide sufficient printed copies or digital alternatives for individual access, and incorporate more interactive activities to encourage student engagement. Future studies should also involve larger and more diverse samples and report more complete statistical information, including effect sizes and assumption testing, to provide stronger evidence regarding the effectiveness of the developed learning material.

#### 4. CONCLUSION

This study successfully developed a science literacy-based Student Worksheet (LKPD) on ecosystem material for fifth-grade elementary school students using the Borg and Gall Research and Development model, implemented through eight stages from preliminary research to effectiveness testing. The developed LKPD met the criteria of validity, effectiveness, and practicality. Validation results showed scores of 85.4% for the media aspect, 87.2% for the language aspect, and 89.0% for the content aspect, all categorized as highly feasible.

The effectiveness analysis showed a statistically significant difference in learning outcomes between the experimental and control groups,  $t(54) = 7.587$ ,  $p < .001$ . The experimental group obtained an N-Gain score of 0.57 (57.48%), categorized as moderate improvement, while the relative effectiveness value was 47.87%, indicating moderate effectiveness. The student-response questionnaire yielded a practicality score of 84.92%, categorized as highly practical. These findings indicate that the developed science literacy-based LKPD is feasible, effective, and practical for supporting ecosystem learning. Further development is recommended to incorporate broader dimensions of scientific literacy and to test the product with larger and more diverse student populations.

#### AI USAGE STATEMENT

During the preparation of this manuscript, the authors used ChatGPT to assist with language editing, improving sentence clarity, and refining the academic presentation of the manuscript. All AI-assisted content was reviewed, verified, and revised by the authors. The authors take full responsibility for the accuracy, interpretation, originality, and final content of the manuscript.

#### REFERENCES

- Bakar, M. R. A., Halim, L., & Arsad, N. M. (2023). Factor Influencing Students' Scientific Literacy: An Exploratory Factor Analysis. *International Journal of Academic Research in Business and Social Sciences*, 13(12), 5844–5863. <https://doi.org/10.6007/IJARBSS/v13-i12/20393>
- Benhadj, N., Hairida, H., Ulfah, M., Masriani, M., & Lestari, I. (2023). PENGEMBANGAN LEMBAR KERJA PESERTA DIDIK (LKPD) BERBASIS LITERASI SAINS PADA MATERI PENCEMARAN LINGKUNGAN DI SMP NEGERI 2 TANAH PINOH. *JURNAL EDUCATION AND DEVELOPMENT*, 11(2), 255–261. <https://doi.org/10.37081/ed.v11i2.4732>

- Bhoi, S., & Binjha, D. P. B. (2025). Fostering sustainability through scientific literacy. *IJFMR - International Journal For Multidisciplinary Research*, 7(5). <https://doi.org/10.36948/ijfmr.2025.v07i05.56315>
- Borg, W. R., & Gall, M. D. (2003). *Educational Research: An Introduction* (7. Ed). Logman. Inc.
- Dewi, N. P. P. M. S., Prasetyo, Y. D., Ulkulbi, M. S., & Nahri, S. D. A. (2025). Enhancing Science Literacy and Critical Thinking Through Project-Based Chemistry Labs with Natural Materials. *Journal of Educational Chemistry (JEC)*, 7(1), 15–28. <https://doi.org/10.21580/jec.2025.7.1.27863>
- Ermawan, M. H., Pratama, A., Barus, A. F. B., Sari, F. M., Purba, P. F., Dongoran, S., & Waruwu, Y. I. F. (2025). Peningkatan Pemahaman Konsep Dasar Peta melalui Pemanfaatan Media Interaktif pada Siswa Kelas IV Yayasan Al-Hidayah. *GURUKU: Jurnal Pendidikan Dan Sosial Humaniora*, 3(4), 35–44. <https://doi.org/10.59061/guruku.v3i4.1219>
- Fadlila, S. N., Paujiah, E., Solikha, M., Hadiansah, H., & Cahyanto, T. (2025). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Literasi Sains pada Materi Ekosistem. *Bioscientist: Jurnal Ilmiah Biologi*, 13(2), 1047–1061. <https://doi.org/10.33394/bioscientist.v13i2.16102>
- Fitriani, F., & Sapri, S. (2025). The Effect of Student Worksheets (LKPD) on Indonesian Language Learning Outcomes in Grade IV Madrasah Ibtidaiyah. *Journal of General Education and Humanities*, 4(3), 1369–1378. <https://doi.org/10.58421/gehu.v4i3.673>
- Harpina, H., Darfin, S. A., & Kholifatun, U. N. (2025). Science Literacy and Climate Change Issues in Elementary School Science Learning as a Green Education Effort. *Journal of Humanities, Social Sciences, and Education*, 1(2), 55–68. <https://doi.org/10.64690/jhuse.v1i2.34>
- Hulwah, L., & Suriani, A. (2025). Pentingnya Pembelajaran Kontekstual dalam Meningkatkan Pemahaman Konsep Sains pada Siswa SD. *Jurnal Arjuna: Publikasi Ilmu Pendidikan, Bahasa Dan Matematika*, 3(3), 365–373. <https://doi.org/10.61132/arjuna.v3i3.1989>
- Iramahdewi, Widodo, M., Maulina, D., & Suyanto, E. (2025). PENGEMBANGAN LEMBAR KERJA PESERTA DIDIK (LKPD) BERBASIS PROBLEM BASED LEARNING (PBL) DI SEKOLAH DASAR PADA MATERI MENULIS KALIMAT AKSARA LAMPUNG. *J-Symbol: Jurnal Magister Pendidikan Bahasa Dan Sastra Indonesia*, 13(1), 327–335. <https://doi.org/10.23960/symbol.v13i1.545>
- Kartikasari, Septiani, C. M., Noviarani, A., Darwis, P., & Pratiwi, R. H. (2025). Strategi Peningkatan Literasi Sains dan Matematika Siswa SD. *Jurnal Pendidikan, Sains Dan Teknologi*, 4(4), 481–488. <https://doi.org/10.47233/jpst.v4i4.3819>
- Kartini, K., Agustina, D. A., & Lein, M. O. (2025). Development of Discovery Learning-Based Student Worksheets for IPAS Learning in Elementary School. *Empiricism Journal*, 6(4), 2032–2039. <https://doi.org/10.36312/7a5c7w52>
- Kooiker-den Boer, H. S., Sanders, T. J. M., & Evers-Vermeul, J. (2024). Integrating Text Structure Instruction in Science Education: A Design-Based Study. *Journal of Science Teacher Education*, 36(1), 48–71. <https://doi.org/10.1080/1046560X.2024.2373548>
- Kurniawan, N., Sugiarto, M. A., & Cahyono, A. E. (2024). Microlearning Media for Language Literacy: A Learning Innovation for Elementary School Students. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran, Dan Pembelajaran*, 10(4), 1517–1527. <https://doi.org/10.33394/jk.v10i4.12961>
- Lestari, T. P., Suharini, E., & Ahmadi, F. (2025). Development of IPAS Teaching Modules Using the SETS Approach (Science, Environment, Technology, and Society) to Enhance Cognitive Learning

- Outcomes of Fourth Grade Elementary School Students. *International Journal of Research and Review*, 12(1), 55–65. <https://doi.org/10.52403/ijrr.20250109>
- Lestari, T., & Untung, B. (2025). DEVELOPMENT OF INTERACTIVE SCIENCE TEACHING MATERIALS FOR ELEMENTARY SCHOOL STUDENTS. *Magister Scientiae*, 53(1), 35–42. <https://doi.org/10.33508/mgs.v53i1.7215>
- Mulyastuti, H., Hadi, W. P., & Qodriyah, L. (2026). Analysis of Earth and Environmental Science Concepts Based on the Toroan Waterfall Phenomenon to Assess Problem-Solving Skills. *IOP Conference Series: Earth and Environmental Science*, 1631(1), 012034. <https://doi.org/10.1088/1755-1315/1631/1/012034>
- Murwani, S., Syarifuddin, & Jaenudin, R. (2025). Development of AI-Based Hypercontent E-LKPD for IPAS Learning in Grade V Elementary School. *Jurnal Penelitian Pendidikan IPA*, 11(8), 1167–1173. <https://doi.org/10.29303/jppipa.v11i8.12403>
- Ningsih, R., Dewi, N. K., Erfan, M., & Hasnawati. (2024). Development of LKPD with Ethnoscience Content of Lombok Island to Train Science Literacy Skills in Learning IPAS Class V SDN 27 Ampenan. *Jurnal Pendidikan, Sains, Geologi, Dan Geofisika (GeoScienceEd Journal)*, 5(3), 436–453. <https://doi.org/10.29303/goescienceed.v5i3.415>
- Putra, A., Damayanti, P. S., Pujiarti, T., & Nafisa, N. (2024). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Kontekstual Teaching and Learning (CTL) Pada Pembelajaran Tematik. *NUSRA: Jurnal Penelitian Dan Ilmu Pendidikan*, 5(2), 674–683. <https://doi.org/10.55681/nusra.v5i2.2715>
- Rahayu, N., Hasairin, A., & Saragi, D. (2023). Development of Learning Media (LKPD) Themes of Ecosystem Based on 'Salingtemas'. *Randwick International of Education and Linguistics Science Journal*, 4(2), 308–322. <https://doi.org/10.47175/rielsj.v4i2.699>
- Sakul, R. A., Fobia, P., & Pane, E. E. (2025a). Discovering the essence of scientific literacy: A historical–grammatical hermeneutic analysis of contextual learning in science education. *Indonesian Journal of Science and Mathematics Education*, 8(3), 745–760. <https://doi.org/10.24042/08h02874>
- Sakul, R. A., Fobia, P., & Pane, E. E. (2025b). Discovering the essence of scientific literacy: A historical–grammatical hermeneutic analysis of contextual learning in science education. *Indonesian Journal of Science and Mathematics Education*, 8(3), 745–760. <https://doi.org/10.24042/08h02874>
- Salsabila, T., Siringoringo, I. M., Sipahutar, S., Kasih, J. C. O., Hutabarat, N., Tambunan, S. E., & Panggabean, D. D. (2025). The Role of Science Literacy in Improving the Quality of Physics Learning at High School Level: A Literature Review. *Venn: Journal of Sustainable Innovation on Education, Mathematics and Natural Sciences*, 4(3), 157–163. <https://doi.org/10.53696/venn.v4i3.288>
- Satar, S., Ledoh, C. C., Nurbaya, & Listiani, H. (2025). Pengembangan LKPD Berbasis Stem Melalui Kegiatan Pembuatan Paving Block Berbahan Sampah Plastik Untuk Meningkatkan Literasi Sains Siswa. *NOVAE GUINEA Jurnal Biologi*, 390–397.
- Satar, S., Ledoh, C. C., Nurbaya, Listiani, H., & Kasanofa, A. (2025). Pengembangan LKPD Berbasis STEM melalui Kegiatan Pembuatan Paving Block Berbahan Sampah Plastik untuk Meningkatkan Literasi Sains Siswa: Penelitian. *Jurnal Pengabdian Masyarakat Dan Riset Pendidikan*, 4(2), 13293–13299. <https://doi.org/10.31004/jerkin.v4i2.4248>
- Taufikurrizal, Z., Isnawati, I., Purnomo, T., Susantini, E., Rachmadiarti, F., & Hasan, A. (2026). Contextual Science Learning Through Mangrove Ecosystems: A Needs Analysis for Elementary Education. *Jurnal Pemberdayaan Masyarakat*, 5(3), 673–684. <https://doi.org/10.46843/jpm.v5i3.830>

- Tihasanah, T., Saminan\*, S., Evendi, E., & Afdzaluddin, A. M. (2025). Science Learning Innovation Through STEM-Based LKPD to Improve Science Literacy in the Industrial Revolution 4.0 Era. *Jurnal Pendidikan Sains Indonesia*, 13(3), 955–972. <https://doi.org/10.24815/jpsi.v13i3.47571>
- Wardana, T. K., Widodo, W., & Suryanti, S. (2025). Curiosity and Spatial Interest as Mediators of Conceptual Understanding and Learning Outcomes in Elementary Science Education. *Journal of Innovation and Research in Primary Education*, 4(4), 3631–3639. <https://doi.org/10.56916/jirpe.v4i4.2392>
- Yanto, N., Sari, N. I., & Yahya. (2025a). Exploring Scientific Literacy in Science Classrooms: A Literature Study. *Venn: Journal of Sustainable Innovation on Education, Mathematics and Natural Sciences*, 4(3), 164–173. <https://doi.org/10.53696/venn.v4i3.292>
- Yanto, N., Sari, N. I., & Yahya. (2025b). Exploring Scientific Literacy in Science Classrooms: A Literature Study. *Venn: Journal of Sustainable Innovation on Education, Mathematics and Natural Sciences*, 4(3), 164–173. <https://doi.org/10.53696/venn.v4i3.292>
- Yolanda, A., Sihotang, M., Zebua, J. A., Hutasoit, M., & Sinaga, Y. L. (2024). Strategi Pembelajaran Kontekstual untuk Meningkatkan Pemahaman Konsep Siswa Sekolah Dasar. *Pragmatik: Jurnal Rumpun Ilmu Bahasa Dan Pendidikan*, 2(3), 301–308. <https://doi.org/10.61132/pragmatik.v2i3.941>