Jurnal Kependidikan:
Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jurnalkependidikan/index

Vol. 11, No. 1 : March 2025
E-ISSN: 2442-7667
pp. 365-374
Email: jklppm@undikma.ac.id

Development of Ethnoscience-Based Teaching Materials to Improve Students' Scientific Literacy

Lovy Herayanti[1]*, Fuaddunnazmi[2], Baiq Azmi Sukroyanti[3]
[1*,3]Physics Education, [2*]Information technology Education,
Universitas Pendidikan Mandalika, Indonesia.
*Corresponding Author. Email: lovyherayanti@undikma.ac.id

Abstract: This research aims to produce a product in the form of an ethnoscience-based learning tool to improve the scientific literacy of prospective physics teachers that is valid and effective. The products developed are Student Worksheets (LKMs), teaching materials, and test instruments. This study used the research and development with the 4D model which consists of Define, Design, Develop and Disseminate. Data collection techniques used validation sheets and evaluation tools. The validity of the device data was analyzed using a Likert scale. The validity of the product was assessed by three expert validators. Assessment by validators with valid to very valid criteria. The effectiveness of the teaching materials developed by the researcher can be seen through the improvement of students' scientific literacy based on the results of the N-Gain test after being given a pretest and posttest. The results of this study indicate that the integration of ethnoscience-based teaching materials has a positive impact on improving students' scientific literacy in physics learning. The average pre-test score of 70.48 describes the students' initial understanding before ethnoscience-based learning. After participating in the learning, the average score increased to 83.33 on the post-test, which indicates that the material adapted to the local culture helps in understanding physics concepts more deeply. In addition to the increase in the average score, the N-gain score of 37.56% shows the effectiveness of ethnoscience-based learning in improving scientific literacy at a fairly significant level. This shows that, although there is still room for improvement, this approach has succeeded in increasing students' understanding of physics through the integration of cultural aspects.

Article History
Received: 07-11-2024
Revised: 20-12-2024
Accepted: 29-01-2025
Published: 21-03-2025

Key Words:
Teaching Materials; Ethnoscience; Scientific Literacy.

How to Cite: Herayanti, L., Fuaddunnazmi, F., & Sukroyanti, B. (2025). Development of Ethnoscience-Based Teaching Materials to Improve Students' Scientific Literacy. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran, 11*(1), 365-374. doi:https://doi.org/10.33394/jk.v11i1.13429

https://doi.org/10.33394/jk.v11i1.13429

Introduction

Rapid developments in science, technology, and information in the 21st century have created new societal challenges. Many individuals are now more familiar with foreign cultures than with their own cultures and local wisdom (Dewi et al., 2022; Aza Nuralita, 2022). However, to adapt to the demands of this century, which emphasizes students' ability to investigate information from various sources, analyze problems, and think critically and collaboratively, it is important to integrate cultural knowledge into the learning process. Reconstructing local knowledge into relevant scientific knowledge is crucial in education (Sawitri et al., 2023; Yuliana, 2023). Therefore, developing ethnoscience-based teaching materials is an attractive solution to bridge this need.

Ethnoscience can be defined as an approach that connects scientifically developed knowledge with the community's traditional knowledge (Novitasari et al., 2023). By integrating culture and science into learning, ethnoscience offers educational innovations that can enrich students' learning experiences. This approach positively impacts understanding scientific concepts and increases students' awareness of the importance of the environment and sustainability (Putra et al., 2024; Rahmawati, 2023). Thus, ethnoscience serves as a tool to align scientific knowledge with existing cultural contexts, giving students the opportunity to learn in a more relevant context.

Apart from academic benefits, the application of ethnoscience in education also aims to minimize the negative impacts of globalization, which can erode local cultural values (Puspasari et al., 2022). The learning process that is integrated with local culture can create space for students to appreciate their cultural heritage while enriching their understanding of science. This is very important considering the challenges the younger generation faces in maintaining their cultural identity amid a rapid and often homogenous flow of information (Fauzi et al., 2023; Fitria et al., 2024). Ethnoscience, in this case, becomes a bridge to connect scientific knowledge and local values so that students can see the relevance of science in their daily lives.

Ethnoscience-based learning is also expected to overcome the problem of low motivation and student learning outcomes that commonly occur in education today (Khoiriyah et al., 2022). By integrating local culture into learning, students become more active and involved in the learning process, which increases their interest in lessons. This is in line with the findings of Putri and Usmeldi (2023), which show that students who learn with an ethnoscience approach tend to be more creative and critical.

The application of this method makes learning more interesting and supports students in developing analytical thinking skills that are indispensable in this information age. The implementation of ethnoscience in learning is not only limited to science subjects but can also be applied to learning physics, chemistry, and biology (Parmin, 2023). By using this approach, students will gain a broader and deeper understanding and can relate scientific knowledge to their cultural context. This integration creates a more dynamic and contextual learning environment, improving learning outcomes and shaping students' positive attitudes toward science and technology (Iriani & Kurniasih, 2022). This shows that the ethnoscience approach has great potential in changing the paradigm of science learning in Indonesia.

Ethnoscience can also serve as a tool to increase students' understanding of diversity and the importance of protecting the environment (Marlina et al., 2023). In this context, ethnoscience not only increases scientific literacy but also equips students with the skills needed to contribute to preserving their environment. With this approach, students learn to recognize environmental problems from a local and global perspective and develop solutions that are appropriate to their cultural context (Nugraha et al., 2023). Therefore, developing teaching materials integrating ethnoscience is important for educators to create relevant and meaningful student learning.

In the current knowledge era, scientific literacy skills are becoming increasingly crucial. Scientific literacy helps students understand the world around them and equips them with the skills needed to participate actively in an increasingly complex and technology-based society (Afnan et al., 2023). By having strong scientific literacy, individuals can critically evaluate information, make appropriate decisions based on evidence, and contribute to the development of science and technology.

Scientific literacy skills not only help students analyse and disseminate scientific information critically but also equip them with effective communication skills to convey their ideas and arguments clearly and logically (Yacoubian, 2018). This ability allows students to actively participate in scientific discussions, collaborate with others, and communicate their findings to the public (Feinstein, 2019). In addition, scientific literacy can also stimulate participants' creative thinking by encouraging them to ask questions, look for innovative solutions, and design experiments to test their hypotheses (Kazempour, 2018). Previous studies have explored various approaches to improving students' scientific literacy, often focusing on standard teaching materials without explicitly incorporating ethnoscience-based elements (Rozi et al., 2025; Suryanti et al., 2020). While these studies have demonstrated effectiveness in enhancing scientific literacy, they may not fully leverage the cultural relevance and contextual understanding that ethnoscience can provide. Integrating ethnoscience into teaching materials offers a way to connect scientific concepts with students' lived experiences, potentially fostering deeper engagement and comprehension. ....

Based on the background and research gap which has been explained, this study introduces the integration of ethnoscience-based teaching materials to enhance students' scientific literacy by contextualizing scientific concepts within local cultural knowledge, offering a more meaningful and engaging learning experience. By adopting a research and development (R&D) approach, this research will compile, test and distribute teaching materials, which are expected to increase student motivation and learning outcomes in physics lessons. Thus, it is hoped that the results of this research can significantly contribute to the development of education that is more relevant, innovative and based on local wisdom, as well as encouraging students to be more active, creative and critical in the learning process.

Research Method

This research uses the development research method with the aim to produce certain products through testing (Gall & Borg, 2003). The development model used in this study is the 4D model (Define, Design, Develop, and Disseminate) developed by Thiagarajan (1974). The dissemination stage to assess effectiveness is conducted at Universitas Mandalika, with students from the Physics Education Department serving as the research samples. The Define stage includes initial analysis, student analysis, task analysis, and learning objective specifications. The Design stage prepares the draft lesson plan, LKM, and test instruments. The Develop stage obtains an assessment from the validator of the draft product that has been developed. Six validators carried out validation, consisting of three expert validators, in this case lecturers, and three practitioner validators, in this case teachers.

The Disseminate stage is carried out by providing products that have been revised according to comments and suggestions from validators. The research instrument used in this study was a learning tool validation sheet to get an assessment and comments, and suggestions from validators regarding the tools that were developed. The data types obtained in this study are quantitative, qualitative, and data on increasing scientific literacy. Expert validators obtained Quantitative data from the assessment results on the validation sheet. As outlined in the expert validity sheet, qualitative data were obtained from comments, input, criticism, and suggestions by expert validators. Apart from that, data on increasing scientific literacy was also obtained through pre-tests and post-tests.

The validity of learning tools is the quality of learning tools (RPS, SAP, LKM, textbooks), which validators assess using a learning tool validation sheet. Learning tools are declared valid for use if the minimum validity level reaches a valid category. The learning tool validity sheet is used to obtain data on the validity of learning tools regarding content, consistency of components in the tool, and the correctness of the developed tools. The validation sheet is filled in by experts who act as validators to review and assess the developed learning tools. The validation sheet consists of validation sheets for RPS, SAP, textbooks, LKM, and tests. This validation sheet is in the form of a table with columns containing the aspects that will be observed. The validation sheet is filled in by experts who

Vol. 11, No. 1 : March 2025
E-ISSN: 2442-7667
pp. 365-374
Email: jklppm@undikma.ac.id

are competent in their fields. Validation gives a score based on the assessed aspects with a range of numbers from 1-4. Table 1 (Sunyoto & Setiawan, 2014) shows the expert validity assessment score for learning tools.

Table 1. Expert validity assessment score for learning tools

Score Range	Category	Information
$1{,}0 \le P \le 1{,}75$	Very Invalid	Cannot be used and still requires consultation
$1{,}75 \le P \le 2{,}75$	Invalid	Can be used with extensive revisions
$2{,}75 \le P \le 3{,}25$	Valid	Can be used with minor revisions
$3{,}25 \le P \le 4{,}0$	Very Valid	Can be used without revisions

The interpretation of the resulting percentage results is shown in Table 2 (Sunyoto & Setiawan, 2014).

Table 2. Interpretation of validity percentage results

Percentage (%)	Description
0-20	Very weak
21-40	Weak
41-60	Fair
61-80	Valid
81-100	Very Valid

The increase in science literacy and the effectiveness of learning tools can be calculated using the N-Gain test. The amount of N-Gain is calculated using the formula:

$$g = \frac{S\,pos - Spre}{Smax - Spre}$$

Description:

- Spos = Posttest score
- Spre = Pretest score
- Smax = Maximum score

The results of the N-Gain calculation are then interpreted using the classification that has been stated by Meltzer (in Eka et al, 2017) as in Table 3.

Table 3. N-Gain Classification

Value of g	Interpretation
$g > 0{,}7$	High
$0{,}3 < g \le 0{,}7$	Medium
$g \le 0{,}3$	Low

Results and Discussion

This study followed the 4D model through the *Define*, *Design*, and *Develop* stages to create ethnoscience-based teaching materials aimed at enhancing scientific literacy. The results of the 4D model stages are as follows: In the *Define* stage, all components of the variables, including both ethnoscience and ethnoscience-based teaching materials, were clearly defined and aligned with the concept of scientific literacy. In the *Design* stage, the ethnoscience-based teaching materials were developed, integrating ethnoscience elements into selected physics topics and connecting them with the indicators of scientific literacy. In the *Develop* stage, these teaching materials were further refined and validated. The effectiveness of the materials was then tested on the specified sample, as outlined in the methodology section, with the results presented in the subsequent sections.

The development of ethnoscience-based teaching materials is expected to positively impact improving good science literacy skills following learning objectives. The difference in the percentage of scientific literacy before and after using ethnoscience-based teaching materials is shown in the following table.

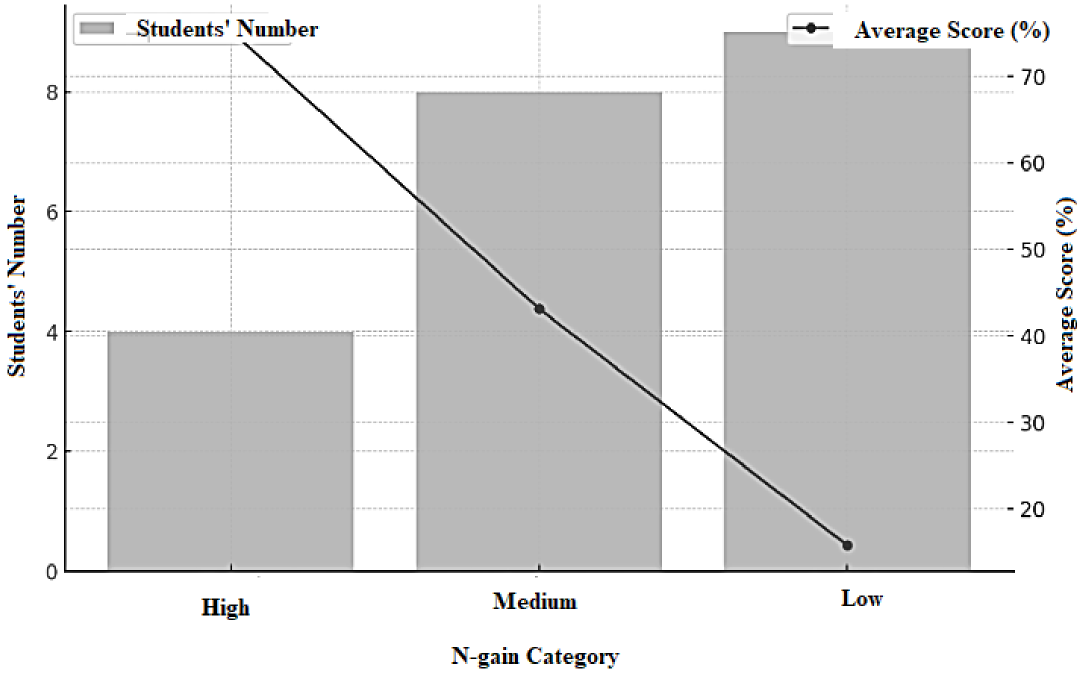

Figure 1. Average N-gain Score Data Per-category

From the results of the analysis, it can be seen that the majority of students have science literacy skills in the low and medium categories after studying physics material with ethnoscience-based teaching materials. This shows that even though the ethnoscience approach is considered relevant in linking scientific concepts with cultural contexts, its application has not fully improved students' science literacy significantly to a higher level. According to Sutopo and Waluyo (2020), using ethnoscience in science education can help contextualise concepts. Still, challenges arise when students are unfamiliar with relating scientific knowledge to complex local phenomena. Similarly, the results of a study by Handayani and Suharto (2022) found that ethnoscience-based science literacy can generate high learning interest but requires more time and in-depth understanding to improve significant results.

However, in the high category, several students showed an increase in science literacy, indicating that ethnoscience-based teaching materials can positively impact understanding concepts for some students. This is in line with the research findings by Habibi et al (2023) and Zulfikar and Prasetyo (2021), which found that integrating ethnoscience in physics teaching can improve students' understanding of scientific concepts through a contextual approach. According to Nurhayati and Gunawan (2023), this success is strongly influenced by learning methods that allow students to relate physics concepts to their daily lives, thus increasing critical thinking skills and scientific literacy.

On the other hand, some studies suggest additional approaches to apply ethnoscience-based teaching materials more effectively, such as combining them with project-based or inquiry-based learning. Wati and Rizal (2022) show that a combinative approach can strengthen understanding of concepts by increasing student interaction in investigative and reflective learning. Similar results were also reported by Hamzah and Fitriani (2021), who stated that collaborative learning methods in the context of ethnoscience could encourage

Vol. 11, No. 1 : March 2025
E-ISSN: 2442-7667
pp. 365-374
Email: jklppm@undikma.ac.id

students to be more involved, thereby strengthening their mastery of science literacy in all categories.

Table 4. Pre-Test and Post-Test Data on Science Literacy Ability

Average Pre-test Score	Average Post-test Score	N-gain Score
70.48	83.33	37.56%

Based on Table 1, the results of this study indicate that the integration of ethnoscience-based teaching materials has a positive impact on improving students' science literacy in physics learning. The average pre-test score of 70.48 describes the students' initial understanding before ethnoscience-based learning. After participating in the learning, the average score increased to 83.33 in the post-test, which indicates that the material adapted to the local culture helps in understanding physics concepts more deeply. Several recent studies have shown that an ethnoscience-based approach can strengthen students' connection to learning material because cultural relevance helps relate science concepts to their daily lives, making them easier to understand (Andini et al., 2022; Nugroho & Rahmawati, 2023). The use of the ethnoscience approach is also in line with constructivist theory, which emphasizes the importance of contextual and meaningful learning for students (Hidayat et al., 2022).

In addition to the increase in the average score, the N-gain score of 37.56% shows the effectiveness of ethnoscience-based learning in improving science literacy at a significant level. This shows that, although it still has room for improvement, this approach has succeeded in increasing students' understanding of physics by integrating cultural aspects. A study by Prasetyo and Lestari (2023) showed that using cultural elements in science education allows students to participate more actively and critically, thus improving their learning outcomes. Furthermore, Susanto et al. (2022) found that ethnoscience-based learning can foster critical thinking skills and scientific literacy because the cultural context provides a familiar framework for students to explore abstract scientific concepts. Therefore, ethnoscience-based learning has been proven to be quite effective in increasing students' science literacy, in line with the results of these recent studies. This increase shows that ethnoscience helps students understand physics concepts and strengthens their perceptions of the relevance of science in their daily lives and their culture. A study by Sari and Widodo (2023) shows that an approach that considers cultural aspects in science learning encourages a more comprehensive and critical understanding. Meanwhile, Ismail et al. (2022) found that presenting local culture in science material makes learning more attractive and can increase students' motivation to learn science. Thus, the results of this study support ethnoscience-based learning as an effective strategy to increase students' science literacy in the context of physics education.

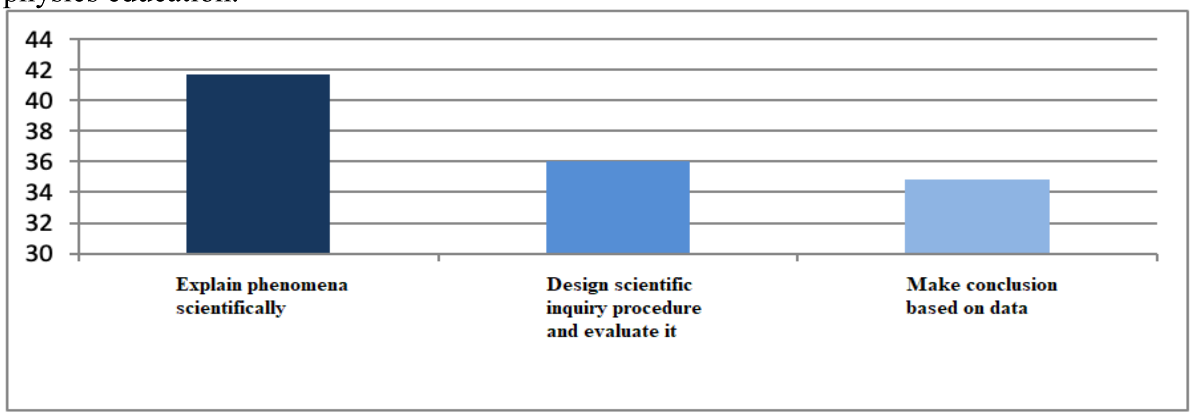

Figure 2. Science Literacy N-Gain Score for Each Indicator

Jurnal Kependidikan:
Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jurnalkependidikan/index
Vol. 11, No. 1 : March 2025
E-ISSN: 2442-7667
pp. 365-374
Email: jklppm@undikma.ac.id

From the average score results above, it can be seen that students obtained the highest score on the indicator "Explain phenomena scientifically," with an average of 41.71. This shows that students are more capable of theoretically understanding and explaining scientific concepts. According to Nugraha and Wahyuni (2021), understanding phenomena scientifically is a basic science literacy skill important for building strong conceptual knowledge. On the other hand, Herlina and Supriyadi (2022) stated that this skill tends to be easier to achieve because it relates to mastering material often obtained from conventional learning.

On the indicator "Designing scientific inquiry procedures based on observed phenomena and evaluating them," students get an average score of 36.00, which shows that the ability to design and evaluate scientific procedures is not fully optimal. According to Setiawan and Putri (2020), designing scientific inquiry procedures requires higher-order thinking skills and involvement in experimental activities, often requiring additional guidance. Research from Yuliani and Aditya (2023) also found that although ethnoscience material can help students understand the local context, inquiry skills require more intensive practice to achieve maximum results.

On the last indicator, "Concluding based on empirical data," students have an average score of 34.86. This score shows that students still struggle to draw conclusions from empirical data independently. Based on a study by Hartono and Rahayu (2021), this difficulty commonly occurs in science literacy, especially if students are not used to connecting observational data with theoretical concepts. In comparison, Santoso and Widjaja (2023) found that project-based learning and data analysis exercises can strengthen this skill, so integrating this strategy into teaching materials can be a solution to improve science literacy skills in this aspect.

The results of this study on the use of ethnoscience-based teaching materials toward students' scientific literacy have several conceptual and practical implications. Conceptually, the findings confirm that integrating local cultural knowledge through ethnoscience into learning materials can serve as an effective strategy to bridge students' everyday experiences with scientific concepts. However, the distribution of students' N-Gain categories—dominated by the Medium and Low levels—indicates that while ethnoscience-based resources have potential, their implementation still faces challenges in maximizing students' scientific literacy development. This suggests that merely embedding cultural elements is not sufficient; careful alignment between ethnoscientific content and core scientific literacy competencies (such as interpreting data, applying scientific concepts, and understanding scientific processes) is essential to fully realize the conceptual benefits of this approach.

Practically, these results emphasize the need for teachers to enhance how ethnoscience-based materials are delivered in classrooms. The significant number of students in the Low N-Gain category and the declining trend in average scores highlight the importance of improving instructional strategies. This may include providing structured guidance on how traditional knowledge connects with modern scientific principles, using more engaging and inquiry-based activities, and differentiating instruction to support students with lower levels of scientific literacy. Moreover, this study suggests that professional development for teachers in designing and applying ethnoscience resources effectively is necessary to ensure that such materials do not just preserve cultural values but also actively build scientific understanding. In summary, conceptually, this study supports the relevance of ethnoscience as a meaningful context for scientific literacy, while practically, it calls for strategic improvements in pedagogy and material design to maximize student outcomes.

Conclusion

The conclusion of this study indicates that the development of ethnoscience-based teaching materials significantly improves students' science literacy on physics material. Ethnoscience teaching materials allow students to explore science through their own culture, simplifying the learning process and enhancing deeper understanding. Implementing this approach can be an effective strategy to improve science literacy among students.The results of the pre-test and post-test, which show an increase in the average score from 70.48 to 83.33 with an N-gain of 37.56%, indicate that the integration of local culture in learning makes the subject matter not only more relevant and interesting but also improves students' understanding and critical thinking skills. Thus, implementing the ethnoscience approach in physics education can be an effective strategy to face the challenges of the 21st century, where students are expected not only to master scientific knowledge but also to connect science with the context of their culture and surrounding environment.

Recommendation

It is recommended that teachers use ethnoscience as the foundation for developing teaching materials, learning activities, and assessments that are closely connected to students' daily lives and local environments. To make learning more engaging, teachers should also utilize technology, such as videos, simulations, educational games, and mobile applications. For future researchers, further studies are suggested to develop and evaluate ethnoscience-based teaching innovations and explore their effectiveness in improving students' scientific literacy.

Acknowledgement

Thank you to Universitas Pendidikan Mandalika for funding this research through an Internal Grant, which LPPM carries out every year.

References

Afnan, M., Mubarak, Z. H., & Widodo, A. (2023). Pengembangan instrumen penilaian literasi sains berbasis keterampilan abad ke-21 untuk siswa sekolah menengah. *Jurnal Pendidikan IPA Indonesia*, *12*(1), 45–56.

Andini, D. R., Fitriani, A., & Yusuf, M. (2022). Pengembangan bahan ajar fisika berbasis etnosains untuk meningkatkan literasi sains siswa. *Jurnal Pendidikan Sains Indonesia*, *10*(1), 45–52.

Aza Nuralita. (2022). Budaya lokal dan pendidikan: Integrasi dalam pembelajaran sains. *Jurnal Pendidikan dan Kebudayaan*, *7*(1), 12–21.

Dewi, N., Prasetyo, Y., & Raharjo, T. (2022). Peran etnosains dalam pembelajaran abad 21. *Jurnal Pendidikan Sains dan Teknologi*, *10*(3), 45–56.

Fauzi, A., Asril, D., & Rizki, M. (2023). Dampak globalisasi terhadap kearifan lokal dalam pendidikan. *Jurnal Penelitian Pendidikan*, *14*(2), 78–86.

Fitria, R., Susanto, E., & Yulianto, R. (2024). Kreativitas siswa melalui pembelajaran etnosains. *Jurnal Pendidikan IPA Indonesia*, *11*(1), 30–37.

Feinstein, N. (2019). Education for a scientific mind: How to bridge the knowledge gap between scientists and the rest of society. *Nature Human Behaviour*, *3*(12), 1277–1280.

Habibi, H., Herayanti, L., & Sukroyanti, B. A. (2023). Development of ethnophysics-based teaching materials to improve the self-regulatory skills of prospective physics teachers. *Jurnal Penelitian Pendidikan IPA*, *9*(Special Issue), 724–731.

Hamzah, F., & Fitriani, R. (2021). Pembelajaran kolaboratif berbasis etnosains: Penguatan literasi sains dalam pendidikan tinggi. *Jurnal Pendidikan dan Kebudayaan*, *17*(5), 88–97.

Handayani, M., & Suharto, T. (2022). Peningkatan minat dan literasi sains melalui pembelajaran berbasis etnosains. *Jurnal Pendidikan Fisika Indonesia*, *18*(1), 25–33.

Hidayat, A., Wulandari, S., & Karim, M. (2022). Implementasi pendekatan konstruktivisme dalam pembelajaran sains berbasis budaya lokal. *Journal of Science Education and Technology*, *12*(4), 78–86.

Iriani, R., & Kurniasih, R. (2022). Etnosains dalam pembelajaran fisika: Membangun pemahaman konsep. *Journal of Educational Research and Practice*, *15*(1), 55–62.

Ismail, F., Nurjanah, L., & Fadilah, R. (2022). Budaya lokal sebagai konteks pembelajaran sains untuk meningkatkan motivasi dan pemahaman siswa. *Jurnal Ilmu Pendidikan dan Sains*, *14*(3), 210–217.

Kazempour, M. (2018). Science literacy and creativity: A review of literature. *Thinking Skills and Creativity*, *27*, 94–102.

Khoiriyah, U., & Usmeldi, A. (2022). Motivasi belajar siswa melalui integrasi etnosains. *Jurnal Inovasi Pendidikan Fisika*, *9*(3), 201–208.

Marlina, L., Arisandi, A., & Cahyono, B. (2023). Pendidikan lingkungan berbasis etnosains. *Jurnal Pendidikan Lingkungan dan Sains*, *4*(2), 99–107.

Novitasari, D., Rahmawati, S., & Darmawan, D. (2023). Etnosains: Menyatukan sains dan budaya lokal. *Jurnal Pendidikan dan Inovasi*, *6*(1), 89–96.

Nugraha, R., Sari, M., & Aulia, N. (2023). Etnosains sebagai jembatan dalam pembelajaran sains. *Jurnal Pendidikan Sains Indonesia*, *8*(3), 120–129.

Nugroho, H., & Rahmawati, S. (2023). Etnosains dalam pendidikan sains: Relevansi dan penerapan pada kurikulum fisika. *Jurnal Penelitian dan Pembelajaran Sains*, *11*(2), 103–110.

Nurhayati, F., & Gunawan, G. (2023). Efektivitas pembelajaran kontekstual berbasis etnosains dalam meningkatkan keterampilan berpikir kritis. *International Journal of Science Education*, *15*(4), 200–208.

Parmin, H. (2023). Implementasi etnosains dalam pembelajaran IPA. *Jurnal Pendidikan Sains dan Teknologi*, *5*(4), 34–42.

Prasetyo, R., & Lestari, M. (2023). Pembelajaran fisika berbasis budaya lokal sebagai sarana peningkatan literasi sains dan keterampilan berpikir kritis. *Jurnal Inovasi Pendidikan Fisika*, *15*(3), 231–238.

Puspasari, D., Prabowo, R., & Rahardjo, P. (2022). Dampak globalisasi terhadap kearifan lokal. *Jurnal Pendidikan dan Kebudayaan*, *11*(2), 65–74.

Putri, A., & Usmeldi, A. (2023). Kreativitas siswa dalam pembelajaran etnosains. *Jurnal Penelitian Pendidikan*, *10*(1), 51–59.

Rozi, R., Sari, D. M., & Nasution, M. R. (2025). Development of ethnoscience-based science teaching materials for PGSD students at FIP UNIMED. In *Proceedings of the 4th International Conference on Educational Sciences (ICES 2024)*. EAI. https://doi.org/10.4108/eai.17-9-2024.2352852

Sari, A. D., & Widodo, W. (2023). Efektivitas pembelajaran sains berbasis etnosains dalam meningkatkan pemahaman konsep dan literasi sains siswa. *Journal of Educational Research*, *13*(1), 41–49.

Sawitri, Y., Asrizal, Kamus, Z., & Afrizon, M. (2023). Rekonstruksi pengetahuan lokal dalam pembelajaran sains. *Journal of Science Education Research*, *12*(2), 14–23.

Susanto, E., Purnama, D., & Azmi, F. (2022). Penerapan pendekatan etnosains dalam pembelajaran untuk meningkatkan kemampuan berpikir kritis siswa. *Jurnal Pendidikan IPA Indonesia*, *8*(2), 120–128.

Sunyoto, D., & Setiawan, A. (2013). *Buku ajar: Statistik kesehatan parametrik, non parametrik, validitas, dan reliabilitas*. Penerbit Andi.

Suryanti, S., Karyanto, P., & Sudarmin, S. (2020). The development of local wisdom-based teaching materials to improve elementary school students' scientific literacy skills. *Jurnal Pendidikan Dasar Indonesia*, *5*(2), 98–110. https://doi.org/10.21831/jpe.v5i2.32898

Sutopo, A., & Waluyo, S. (2020). Penggunaan etnosains dalam pendidikan sains: Pendekatan kontekstual untuk pemahaman konsep. *Journal of Science Education*, *14*(2), 50–58.

Wati, E., & Rizal, M. (2022). Penggunaan pendekatan kombinatif etnosains dan inkuiri untuk penguatan literasi sains mahasiswa. *Journal of Physics Education Research*, *9*(2), 75–84.

Yacoubian, H. A. (2018). Developing students' scientific literacy and creativity through inquiry-based STEM activities. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(3), 829–840.

Yuliana, R. (2023). Pendidikan etnosains: Upaya pelestarian budaya. *Jurnal Pendidikan dan Kebudayaan*, *9*(1), 78–86.

Zulfikar, A., & Prasetyo, D. (2021). Integrasi etnosains dalam pengajaran fisika untuk meningkatkan literasi sains mahasiswa. *Journal of Educational Science*, *22*(3), 110–118.