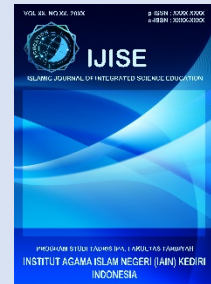




Islamic Journal of Integrated Science Education (IJISE)

Program Studi Tadris IPA
Universitas Islam Negeri (UIN) Syekh Wasil Kediri
e-ISSN : 2986-0865

<https://jurnalfaktarbiyah.iainkediri.ac.id/index.php/ijise>



THE INTEGRATION OF LOCAL WISDOM INTO SCIENCE LEARNING IN INDONESIA: A SYSTEMATIC REVIEW

Banu Kisworo^{1*}, Syarful Annam¹, Zul Hidayatullah², Muhammad Hanafi³

¹Department of Natural Science Education, Universitas Negeri Makassar, Makassar, Indonesia

²Study Program of Natural Science Education, Universitas Hamzanwadi, East Lombok, Indonesia

³Study Program of Physics Education, Institut Agama Islam Al-Manan NU Lombok Timur, East Lombok, Indonesia

*Correspondence E-mail: banu.kisworo@unm.ac.id

Abstract: This study aims to systematically analyze the patterns, forms, and impacts of integrating local wisdom into science learning in Indonesia. The study uses a systematic literature review method following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. Literature Searches were conducted using the Scopus and SINTA/Google Scholar databases for publications from 2013 to 2025. The literature search initially identified 245 articles, of which 40 duplicate records were removed. Following the screening of 205 articles and eligibility assessment of 65 full-text articles, 20 articles met the inclusion criteria and included in the final analysis. The findings show that the integration of local wisdom is generally carried out through an ethnoscience approach with themes of traditional food, environment and conservation, culture and tradition, architecture, and traditional games, and is most widely applied at the elementary and junior high levels. Integrating local wisdom has been shown to improve science literacy, learning motivation, creativity, and students' character.

Keywords: Local Wisdom, Ethnoscience, Science Learning, Science Literacy, Systematic Review

Article History:

Received: 07 May 2026; Revised: 28 July 2026; Accepted: 30 July 2026; Published: 31 July 2026

Citation (APA Style):

Kisworo, B., Annam, S., Hidayatullah, Z., & Hanafi, M. (2026). The Integration of Local Wisdom Into Science Learning In Indonesia: A Systematic Review. *Islamic Journal of Integrated Science Education (IJISE)*, 5(2), 182–199. <https://doi.org/10.30762/ijise.v5i2.9663>



Copyright : © 2026 by the authors. This is an open access publication under the terms and conditions of the Creative Commons Attribution-ShareAlike 4.0 International License (CC BYSA)

(<https://creativecommons.org/licenses/by-sa/4.0/>).

INTRODUCTION

Indonesia is a nation of extraordinarily rich ethnic, linguistic, and cultural diversity, and therefore holds great potential for local wisdom to be drawn upon as a learning resource, including in science education (Suprpto, Prahani, & Cheng, 2021). Local wisdom carries the empirical knowledge of communities passed down across generations, and it frequently contains scientific concepts relevant to school science content, ranging from traditional food-production processes to environmental conservation practices (Hadi & Ahied, 2017; Hadi et al., 2019). This is in accordance with a verse from the Quran Al-Hujurat (49):13, *"O mankind, indeed We have created you from male and female and made you peoples and tribes that you may know one another. Indeed, the most noble of you in the sight of Allah is the most righteous of you. Indeed, Allah is Knowing and Acquainted."* This verse frames Indonesia's ethnic and cultural plurality the very soil from which local wisdom grows not as an obstacle to unified national education, but as a divinely intended basis for mutual recognition and learning. It lends a normative, faith based rationale for treating the nation's many traditions as legitimate sources of knowledge rather than as content to be set aside in favor of a single, decontextualized science curriculum (Huda, et al., 2020a; Huda et al., 2026; Hardini et al., 2026).

Science learning in the 21st century is expected to develop learners' science literacy so that they are able to face global challenges. However, results from the Programme for International Student Assessment (PISA) have consistently shown that Indonesian students' science literacy achievement remains below the international average. One major cause is that science learning tends to remain abstract, textual, and insufficiently connected to concepts drawn from students' everyday lived experience (Irsan, 2021; Pertiwi & Firdausi, 2019). This gap has driven the development of the ethnoscience approach as a bridge between indigenous knowledge held by communities and the scientific knowledge taught in schools.

A range of studies show that integrating local wisdom into science learning can be carried out through processes of enculturation, assimilation, and acculturation, in which traditional knowledge is brought into the framework of modern scientific concepts (Nurulsari et al., 2020; Usman et al., 2025; Huda, et al., 2020b). This approach is considered effective because it is contextual, close to students' lived experience, and capable of strengthening cultural identity alongside scientific understanding (Yuliyanti et al., 2024). Ethnoscience studies have been applied across a variety of local cultural contexts for example, the salt and terasi production processes of Madura (Hadi & Ahied, 2017; Hadi et al., 2019), the Pranata Mangsa calendar of Javanese society (Pamungkas, Subali, & Linuwih, 2017), the Catur Pramana tradition in Bali (Wijayanti, Margunayasa, & Arnyana, 2022), and the ecological practices of the Ende

community in East Nusa Tenggara (Lidi, Mbia Wae, & Umbu Kaleka, 2022). This is in accordance with a verse from the Quran Ali 'Imran (3):190–191, *"Indeed, in the creation of the heavens and the earth and the alternation of the night and the day are signs for those of understanding who remember Allah while standing or sitting or lying on their sides and give thought to the creation of the heavens and the earth."* This pair of verses commends precisely the disposition that ethnosience based learning seeks to cultivate: sustained, reflective observation of the natural world the seas that yield salt, the seasons that shape a farming calendar, the day-night cycle behind traditional food processing as a path toward deeper understanding, rather than treating nature merely as an abstract subject in a textbook.

Previous studies have reported several positive contributions of local wisdom based science learning, including science literacy (Nabilah, Sudiby, & Aulia, 2022; Nugraha, 2022), creativity and learning outcomes (Pamungkas et al., 2017), critical-thinking skills (Suastra & Pujani, 2021; Fajeriadi et al., 2024), and the strengthening of character and Pancasila student profile values (Day, Riyana, & Harahap, 2023). Nevertheless, implementation in the field continues to face a range of challenges, including limited teacher competence and understanding in developing ethnosience based teaching materials (Alfiana & Fathoni, 2022), a scarcity of validated modules or learning tools (Pratiwi et al., 2024), and uneven application of this approach across educational levels and regions of Indonesia (Yuliana, Fathurohman, & Siahaan, 2023).

Research on global ethnosience trends shows that this topic continues to grow and receive attention in reputable databases such as Scopus, with a year on year increase in the number of publications (Supriyadi et al., 2023). This growth signals the importance of systematically synthesizing the literature to map integration patterns, the educational levels most in focus, the local wisdom themes employed, and their impact on science learning. Several similar literature reviews have been conducted, for example, within the scope of environmental conservation (Sihombing et al., 2025; Sarwi et al., 2025) and digital teaching-material development (Supriyadi et al., 2023), yet a review that specifically maps the integration of local wisdom into science learning across educational levels in Indonesia using the PRISMA protocol remains limited.

Based on this gap, this study conduct a systematic review of the literature on the integration of local wisdom into science learning in Indonesia. The review addresses three research questions: (1) what patterns and forms does the integration of local wisdom into science learning take; (2) which local wisdom themes are most frequently integrated, and at which educational levels; and (3) what impacts and challenges does this integration present for

science learning outcomes. The findings of this review are expected to serve as a reference for researchers, teachers, and education policymakers in developing science learning that is more contextual and more firmly rooted in the nation's culture.

METHOD

This study employed a systematic literature review (SLR) method, following the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) protocol. This method was chosen to ensure that the processes of identification, selection, and synthesis of the literature were carried out transparently, systematically, and in a replicable manner (Sarwi et al., 2025). This review was designed to answer three research questions (RQs): (RQ1) What patterns and forms does the integration of local wisdom into science learning in Indonesia take? (RQ2) Which local-wisdom themes are most frequently integrated, and at which educational level? (RQ3) What are the impacts and challenges of integrating local wisdom on science learning outcomes?

Article searches were conducted across two primary databases, Scopus and SINTA/Google Scholar, for the 2013 to 2025 publication range. The search was conducted on 27 July 2026. Keywords were developed in both Indonesian and English to capture variations in terminology related : "kearifan lokal," "etnosains," "local wisdom," "ethnoscience," "indigenous knowledge," combined with "pembelajaran IPA," "science learning," and "science education" using the Boolean operators AND/OR.

Inclusion criteria comprised: (1) national journal articles indexed in SINTA or international articles indexed in Scopus; (2) explicit discussion of the integration of local wisdom or ethnoscience into science/IPA learning; (3) conducted at the primary to secondary education level in Indonesia; (4) full text available; and (5) published between 2013 and 2025. Exclusion criteria comprised articles that did not focus on the science subject, did not explicitly address the dimension of local wisdom, were non-indexed proceedings or editorials, or lacked accessible full text.

The article selection process followed the four PRISMA stages: identification, screening, eligibility assessment, and determination of included articles. At the identification stage, the initial search yielded 245 articles (Scopus $n = 85$; SINTA/Google Scholar $n = 160$). After duplicate removal ($n = 40$), 205 articles remained and were screened by title and abstract, resulting in 140 articles being excluded as not relevant to the topic. The remaining 65 articles were then assessed for eligibility through full-text reading, and 45 articles were excluded for the following reasons: not focused on science ($n = 15$), not explicitly discussing local wisdom

(n = 12), unsuitable research design (n = 10), and full text unavailable (n = 8). The final selection process yielded 20 articles that met all criteria for further analysis.

The screening process was conducted sequentially by examining the title and abstract first, followed by full-text assessment. Two researches independently screened the records and resolved disagreements through discussion, disagreements that remained unresolved were referred to a third researcher. The reason for exclusion at the full-text stage were recorded to ensure transparency and consistency in the selection process. The complete selection procedure is presented in the PRISMA flow diagram in **Figure 1**.

Data analysis was carried out descriptively and qualitatively by extracting information from each article, including author name, year, local wisdom theme, educational level, research design, and key findings. The data were then categorized and thematically synthesized to answer the three research questions, and visualized in tables and charts to clarify the distribution patterns of the findings.

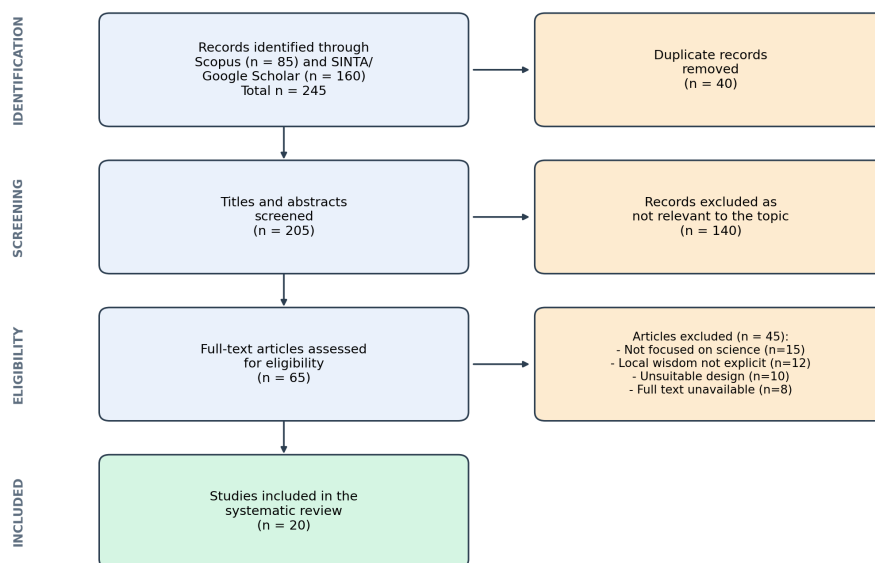


Figure 1. PRISMA Flow Diagram of Article Selection

FINDING AND DISCUSSION

General Characteristics of the Analyzed Articles

Based on the 20 articles meeting the inclusion criteria, the majority of studies were conducted at the elementary school level (SD/MI), amounting to 9 articles, followed by the junior high school (JHS) level (SMP/MTs) with 7 articles, and the senior high school (SHS) level (SMA/SMK) with 4 articles. A summary of the characteristics of the 20 articles is presented in **Table 1**, while the distribution across educational levels is visualized in Figure 2.

Table 1. Summary of Articles Analyzed in the Systematic Review

No	Author (Year)	Local Wisdom / Ethnoscience Focus	Level	Study Design
1	Hadi & Ahied (2017)	Ethnoscience of Madurese salt production	JHS	Descriptive qualitative
2	Hadi et al. (2019)	Ethnoscience of Madurese terasi (shrimp paste)	JHS	Ethnographic qualitative
3	Hadi et al. (2020)	Discovery learning with an ethnoscience approach	JHS	Quasi-experiment
4	Suastra & Yasmini (2013)	Physics model based on Balinese local wisdom	SHS	R&D
5	Subali, Sopyan & Ellianawati (2015)	Science learning design based on local wisdom	Elementary	R&D
6	Pamungkas, Subali & Linuwih (2017)	Javanese Pranata Mangsa calendar	JHS	Experiment
7	Wijayanti, Margunayasa & Arnyana (2022)	E-worksheet on Catur Pramana local wisdom	Elementary	R&D
8	Day, Riyana & Harahap (2023)	Local character worksheet for science literacy	Elementary	R&D
9	Lidi, Mbia Wae & Umbu Kaleka (2022)	Ethnoscience for Merdeka Belajar in Ende	Elementary	Descriptive qualitative
10	Nugraha (2022)	Science literacy and elementary science outcomes	Elementary	Correlational
11	Alfiana & Fathoni (2022)	Teachers' difficulties in applying ethnoscience	Elementary	Descriptive qualitative
12	Dhoka, Longa, Mude & Lawe (2024)	Ethnoscience based IPAS learning	Elementary	Descriptive qualitative
13	Pertiwi & Firdausi (2019)	Improving science literacy through ethnoscience	Elementary	Descriptive qualitative
14	Suprpto, Prahani & Cheng (2021)	Curriculum policy and local wisdom	National/ policy	Policy review
15	Agustina, Rachmadiarti & Kuntjoro (2023)	Flipbook on pollution/ethno-conservation	JHS	R&D
16	Nabilah, Sudibyo & Aulia (2022)	Science literacy on pollution/ethnoscience	JHS	Quasi-experiment
17	Pratiwi, Sunyono, Rohman & Firdaus (2024)	E-worksheet, ethnoscience, nature of science	Elementary	Needs analysis
18	Fajeriadi et al. (2024)	Popular-science book on coastal gastropod diversity	JHS	R&D
19	Suastra & Pujani (2021)	Ethnoscience model for critical thinking, Lombok	JHS	Experiment
20	Widayanti, Amaliah, Sholikhah & Kurniawan (2022)	Interactive e-module on non-renewable resources	SHS	R&D

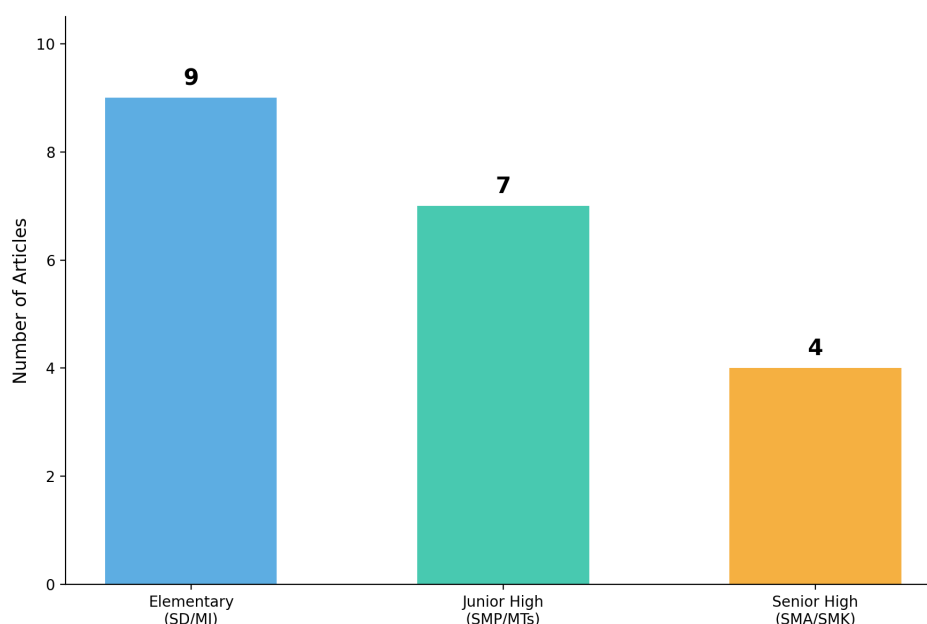


Figure 2. Distribution of Educational Levels among the 20 Analyzed Articles

The dominance of research at the elementary level is consistent with findings that local wisdom based learning is considered most effective when instilled from an early age, in order to build a foundation of character and love for local culture (Subali, Sopyan, & Ellianawati, 2015; Lidi et al., 2022). At the junior and senior high levels, the integration of local wisdom is directed more toward developing science literacy and higher order thinking skills (Suastra & Pujani, 2021; Fajeriadi et al., 2024). This is in accordance with a verse from the Quran An-Nahl (16):78, *"And Allah has extracted you from the wombs of your mothers not knowing a thing, and He made for you hearing and vision and hearts [i.e., intellect] that perhaps you would be grateful."* This verse describes learning as beginning from a state of not knowing, built up gradually through the senses and the intellect a trajectory that mirrors the review's finding that local wisdom based science education is most effective when introduced early, at the elementary level, so that observational and reasoning capacities are cultivated from the very foundation of a child's schooling (Munifah et al., 2019; Lestari et al., 2021; Saregar et al., 2025).

Patterns and Forms of Local Wisdom Integration (Addressing RQ1)

Analysis of the 20 articles identified three main patterns of local wisdom integration: (1) development of contextual teaching materials, (2) implementation through learning models and strategies, and (3) exploration and documentation of local knowledge as a science-learning resource. The first pattern includes modules, e-modules, and student worksheets that embed local cultural contexts, such as the Catur Pramana e-worksheet (Wijayanti, Margunayasa, & Arnyana, 2022) and the interactive e-module on non-renewable resources (Widayanti et al.,

2022). The second pattern includes instructional approaches such as discovery learning with an ethnoscience orientation (Hadi et al., 2020) and an ethnoscience-based learning model designed to develop critical thinking (Suastra & Pujani, 2021). The third pattern involves identifying and documenting community knowledge as a contextual source for science learning, as illustrated by studies of Madurese salt and terasi production (Hadi & Ahied, 2017; Hadi et al., 2019) and the Javanese Pranata Mangsa calendar (Pamungkas, Subali, & Linuwih, 2017).

Although these patterns share the principle of connecting local knowledge with school science, they differ in their position within the learning process. Teaching-material studies primarily translate local wisdom into structured instructional resources, whereas learning-model studies position local wisdom within classroom activities and pedagogical processes. By contrast, exploratory and documentation studies primarily establish the scientific relevance of local practices before they are transformed into classroom resources. Thus, these three patterns can be viewed as complementary rather than competing approaches: exploration provides the knowledge base, instructional design translates it into pedagogical strategies, and teaching-material development operationalizes it for classroom use. A further similarity across the reviewed studies is the attempt to establish a relationship between community-based knowledge and scientific concepts (Huda et al., 2019; Yasin et al., 2020; Putra et al., 2024). However, the depth of this relationship varies. Some studies primarily identify scientific concepts embedded in local practices, while others proceed further by incorporating those concepts into learning models or validated learning materials. This distinction is important because identifying a scientific concept within local wisdom does not automatically constitute effective classroom integration. Meaningful integration requires a pedagogical process through which students compare, reconstruct, discuss, and apply local knowledge in relation to scientific explanations (Huda et al., 2019; Yasin et al., 2020; Putra et al., 2024).

The differences among study designs also help explain variations in the strength of the reported evidence. Development studies (R&D) generally emphasize the production and validation of instructional products, while experimental and quasi-experimental studies provide stronger evidence concerning changes in particular learning outcomes. Qualitative studies, in contrast, offer richer information about community knowledge, teacher experiences, and classroom implementation but do not provide the same type of evidence for causal effects. Therefore, the positive findings reported across the review should not be interpreted as evidence of a uniform causal effect of local wisdom integration.

The reviewed studies generally support an ethnoscience transformation process in which community knowledge is identified, interpreted in relation to scientific concepts, and subsequently incorporated into science learning. However, the process is not necessarily uniform across contexts. Local wisdom differs in its conceptual richness, cultural meaning, and degree of compatibility with formal science concepts. Consequently, the effectiveness of integration is likely to depend not only on the presence of local wisdom but also on how carefully teachers and instructional designers establish connections between local knowledge, scientific concepts, and learning objectives.

Local Wisdom Themes and Their Distribution (Addressing RQ2)

The local wisdom themes integrated into science learning across the 20 analyzed articles can be grouped into five main categories: traditional food/culinary practices (7 articles), environment and conservation (5 articles), culture, tradition, and art (4 articles), traditional architecture and technology (3 articles), and traditional games (1 article), as shown in Figure 3.

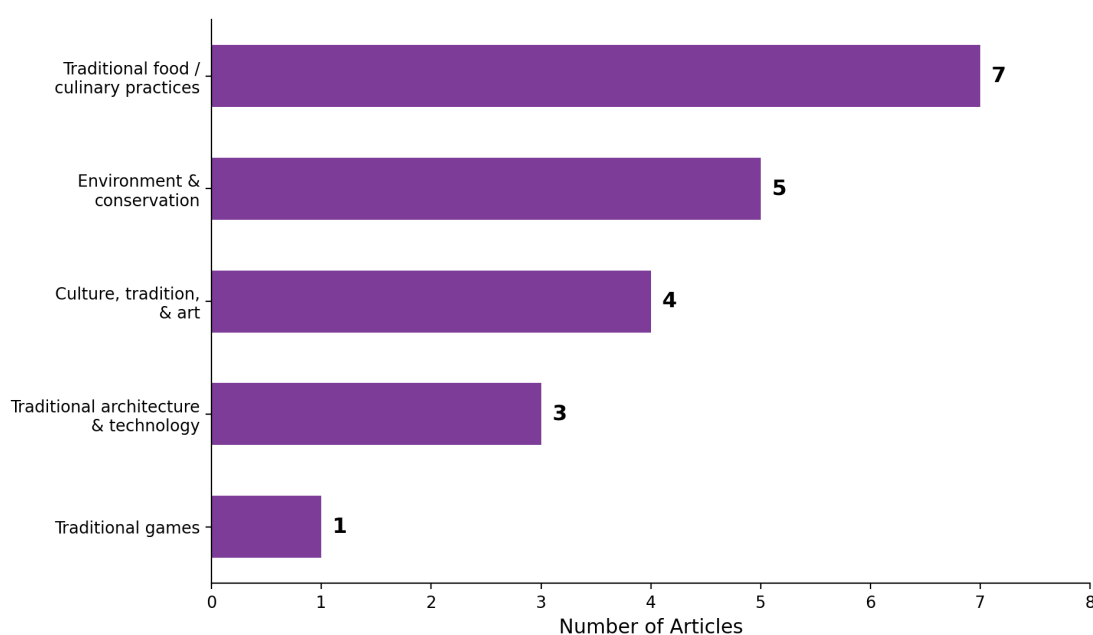


Figure 3. Distribution of Local-Wisdom Themes Integrated into Science Learning

The traditional food theme is the most dominant category, encompassing ethnoscience studies of Madurese salt and terasi production (Hadi & Ahied, 2017; Hadi et al., 2019) and the making of palm sugar, which is linked to concepts of the change in the physical state of matter and heat energy. The dominance of this theme shows that traditional food processing is rich in scientific concepts such as chemical reactions, phase changes of matter, and simple physics principles, making it an authentic learning context that is close to students' daily lives. This is in accordance with a verse from the Quran An-Nahl (16):14/ Fatir (35):12 (thematic reference

on the seas), *"It is He who subjected the sea for you to eat from it tender meat and extract from it ornaments... [An-Nahl 16:14, paraphrased]"*. The Qur'an repeatedly directs attention to the sea and its resources like salt, food, and materials extracted through human effort as blessings meant to be understood and put to beneficial use. This resonates with the article's dominant finding on traditional food themes such as salt and terasi making, framing these local industries as continuations of a long human relationship with natural resources that the Qur'an explicitly invites believers to observe and comprehend.

The environment and conservation theme was also frequently raised, for example through the environmental pollution flipbook based on Surabaya local wisdom (Agustina, Rachmadiarti, & Kuntjoro, 2023) and the e-book on agricultural land ethno-conservation (Pratama, Kuntjoro, & Asri, 2024), which affirm the relevance of local wisdom in fostering students' ecological awareness. Meanwhile, the culture, tradition, and art theme was found predominantly in the local wisdom contexts of Bali and Java, such as the Pranata Mangsa calendar (Pamungkas et al., 2017) and the Catur Pramana tradition (Wijayanti et al., 2022), which integrate aspects of astronomy and natural cycles into science learning. This is in accordance with a verse from the Quran Ar-Rum (30):41, *"Corruption has appeared throughout the land and sea by [reason of] what the hands of people have earned, so He may let them taste part of [the consequence of] what they have done, that perhaps they will return [to righteousness]"*. This verse links environmental degradation directly to human conduct, giving ethical weight to the review's findings on the environment/conservation theme. Local wisdom based ecological practices documented in the reviewed articles can be read as practical, community rooted expressions of the same principle: human hands can either despoil or safeguard land and sea, and science education grounded in local ecological wisdom helps cultivate the awareness needed to choose the latter.

Impact of Local Wisdom Integration on Science Learning (Addressing RQ3)

Overall, the 20 analyzed articles report positive impacts of local wisdom integration on various aspects of science learning. First, improved science literacy, as found in the application of an ethnoscience approach to the topic of environmental pollution (Nabilah, Sudibyo, & Aulia, 2022) and in ethnoscience based learning more generally (Pertiwi & Firdausi, 2019). Second, improved creativity and learning outcomes, as in the application of the Pranata Mangsa calendar in physics learning (Pamungkas et al., 2017). Third, the strengthening of critical-thinking skills, found in an ethnoscience model for junior-high students in Lombok (Suastra &

Pujani, 2021) and in the use of a popular science book on coastal gastropod diversity (Fajeriadi et al., 2024).

Beyond cognitive impacts, the integration of local wisdom also contributes to strengthening students' character and cultural identity. A worksheet embedding local character content was shown to improve science literacy while also instilling local wisdom values (Day, Riyana, & Harahap, 2023), while a local wisdom based science learning model at the elementary level also helped develop students' positive character (Subali, Sopyan, & Ellianawati, 2015). This is in accordance with a verse from the Quran **Al-Hujurat (49):13 (revisited)**, "...Indeed, the most noble of you in the sight of Allah is the most righteous of you..." The review's finding that local-wisdom integration strengthens character and cultural identity, not merely cognitive science literacy, echoes the Qur'anic emphasis that human worth is ultimately measured by righteous conduct rather than by lineage or origin alone. Learning that roots scientific understanding in one's own cultural heritage, while remaining open to knowing and respecting others, models exactly the kind of character formation this verse commends.

Nevertheless, a number of implementation challenges were also identified. Teachers were reported to face difficulties in developing and applying ethnoscience based science learning, mainly due to limited understanding of the ethnoscience concept itself and a lack of training (Alfiana & Fathoni, 2022). In addition, the need for scientifically validated teaching materials, such as ethnoscience based e-worksheets, remains high and has not yet been fully met (Pratiwi et al., 2024), while the development of local wisdom modules in several regions, such as South Sumatra, still requires further strengthening for wider application (Yuliana, Fathurohman, & Siahaan, 2023). This is in accordance with one of the authentic hadiths Sunan Ibn Majah 224 (narrated by Anas ibn Malik), "*Seeking knowledge is an obligation upon every Muslim.*" This hadith casts the challenge of limited teacher competence and scarce validated teaching materials, identified throughout the reviewed studies, as more than a technical shortfall: it is a call to sustained collective effort in seeking and producing sound knowledge. It supports the article's recommendation for continued teacher training and the development of scientifically validated, local wisdom based teaching materials, framing that recommendation as consistent with the broader obligation to pursue beneficial knowledge.

These findings are consistent with bibliometric studies of global ethnoscience trends, which show growing research interest in this topic while also highlighting the need for methodological standardization and validation of teaching materials so that research findings can be widely replicated across Indonesia's diverse cultural contexts (Supriyadi et al., 2023; Sihombing et al., 2025).

CONCLUSION

This systematic review of 20 articles indexed in SINTA and Scopus identified three main patterns of integrating local wisdom into science learning in Indonesia: the development of contextual teaching materials, the application of ethnoscience based learning models and strategies, and the exploration and documentation of local knowledge as a learning resource. The most frequently integrated local wisdom themes were traditional food and culinary practices, followed by environment and conservation, culture and tradition, traditional architecture and technology, and traditional games. The reviewed studies were most frequently conducted at the elementary school level, followed by junior and senior high school levels.

Integrating local wisdom has been shown to have a positive impact on improving science literacy, creativity, learning outcomes, critical thinking skills, and the strengthening of students' character and cultural identity. Nevertheless, implementation continues to face challenges in the form of limited teacher competence and a scarcity of scientifically validated teaching materials. Systematic efforts are therefore needed in the form of ongoing teacher training, the development of well tested local wisdom based teaching materials, and the expansion of studies to educational levels and cultural regions that remain understudied, so that the integration of local wisdom into science learning can be applied more evenly and sustainably across all of Indonesia.

Read together, the Qur'anic and hadith perspectives cited throughout this review reinforce, rather than compete with, the article's empirical findings: they affirm cultural plurality as a basis for mutual understanding (QS 49:13), commend reflective observation of the natural world as a path to knowledge (QS 3:190–191), trace human development from ignorance toward understanding through the senses and intellect (QS 16:78), link environmental well being to human conduct (QS 30:41), and frame the pursuit and teaching of sound knowledge as a shared obligation (Ibn Majah 224). None of these sources were part of the original systematic review's evidence base; they are offered here as a complementary, values oriented lens through which Indonesian educators, particularly in Islamic and general schools alike, may further contextualize the reviewed findings not as a substitute for the empirical literature itself.

REFERENCES

- Adawiah, R., Nakjah, S. N. S., & Muslihatun, F. (2026). Science learning based on ethnoscience: Exploring local wisdom as a learning resource in elementary school. *Indonesian Journal of Elementary and Childhood Education*, 7(1).
- Afni, N., & Rokhimawan, M. A. (2018). Literasi sains peserta didik kelas V di MIN Tanuraksan Kebumen. *Al-Bidayah: Jurnal Pendidikan Dasar Islam*, 10(1), 47–68. <https://doi.org/10.14421/al-bidayah.v10i1.129>
- Agustin, I., & Wiratama, N. A. (2021). Implementasi gerakan literasi bagi anak berkebutuhan khusus di sekolah dasar penyelenggara pendidikan inklusi. *ELSE (Elementary School Education Journal)*, 5(2), 254–260. <https://doi.org/10.30651/else.v5i2.8927>
- Agustina, D. W., Rachmadiarti, F., & Kuntjoro, S. (2023). Development of environmental pollution handling flipbook based on Surabaya local wisdom to train students' ethno-conservation. *IJORE: International Journal of Recent Educational Research*, 4(1), 16–30. <https://doi.org/10.46245/ijorer.v4i1.268>
- Alfiana, A., & Fathoni, A. (2022). Kesulitan guru dalam menerapkan pembelajaran IPA berbasis etnosains di sekolah dasar. *Jurnal Basicedu*, 6(4), 5721–5727. <https://doi.org/10.31004/basicedu.v6i4.3123>
- Dal, M., Lidi, M. W., & Priska, M. (2024). Pengembangan lembar kerja peserta didik berbasis etnosains untuk melatih keterampilan literasi sains peserta didik SMP. *PSEJ (Pancasakti Science Education Journal)*, 9(1), 39–57. <https://doi.org/10.24905/psej.v9i1.204>
- Day, W. O. S. H., Riyana, M., & Harahap, D. G. S. (2023). Pengembangan LKPD bermuatan karakter lokal untuk meningkatkan literasi sains siswa. *Edukatif: Jurnal Ilmu Pendidikan*, 5(5), 2127–2137. <https://doi.org/10.31004/edukatif.v5i5.5651>
- Dharma, I. M. A., Dantes, N., Lasmawan, I. W., & Suastika, I. N. (2025). Effectiveness of digital storybooks based on Balinese culture for enhancing cultural-civic literacy and Pancasila education outcomes. *Journal of Education and E-Learning Research*, 12(2), 165–178. <https://doi.org/10.20448/jeelr.v12i2.6749>
- Dhoka, F. A., Longa, V. M., Mude, A., & Lawe, Y. U. (2024). Pembelajaran IPAS berbasis etnosains untuk pemahaman konsep sains bagi siswa kelas IV UPTD SDI Waruwaja. *Jurnal Pendidikan Guru Sekolah Dasar*, 1(4), 7. <https://doi.org/10.47134/pgsd.v1i4.835>

- Fajeriadi, H., Zaini, M., Dharmono, D., Nugroho, B. A., Fahmi, F., & Fitriani, A. (2024). The popular scientific book-based coastal gastropod's diversity as local potential: Practicality and effectiveness on student's critical thinking ability. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 10(2), 580–590. <https://doi.org/10.22219/jpbi.v10i2.32255>
- Falah, H. S., & Jufrida, J. (2024). Case method in the problem-based learning model to increase student participation in the basic physics course. *Jurnal Penelitian Pendidikan IPA*, 10(1), 311–316. <https://doi.org/10.29303/jppipa.v10i1.6392>
- Gudesma, A., Ismet, & Kistono. (2024). Pengembangan e-modul IPA berbasis etnosains untuk meningkatkan kemampuan literasi sains siswa. *Jurnal Intelektualita: Keislaman, Sosial dan Sains*, 13(2). <https://doi.org/10.19109/intelektualita.v13i2.25169>
- Hadi, W. P., & Ahied, M. (2017). Kajian etnosains Madura dalam proses produksi garam sebagai media pembelajaran IPA terpadu. *Rekayasa*, 10(2), 79. <https://doi.org/10.21107/rys.v10i2.3608>
- Hadi, W. P., Munawaroh, F., Rosidi, I., & Wardani, W. K. (2020). Penerapan model pembelajaran discovery learning berpendekatan etnosains untuk mengetahui profil literasi sains siswa SMP. *Jurnal IPA & Pembelajaran IPA*, 4(2), 178–192. <https://doi.org/10.24815/jipi.v4i2.15771>
- Hadi, W. P., Sari, F. P., Sugiarto, A., Mawaddah, W., & Arifin, S. (2019). Terasi Madura: Kajian etnosains dalam pembelajaran IPA untuk menumbuhkan nilai kearifan lokal dan karakter siswa. *Quantum: Jurnal Inovasi Pendidikan Sains*, 10(1), 45. <https://doi.org/10.20527/quantum.v10i1.5877>
- Hardini, I. P., Saregar, A., Subandi, Anugrah, A., Fitri, M. R., Panse, V. R., Umam, R., & Huda, S. (2026). Development of electronic student worksheet on disaster-based waves for eleventh-grade senior high school students. *AIP Conference Proceedings*, 3226(1), 020023. <https://doi.org/10.1063/5.0329108>
- Huda, S., Anggraini, L., Saputri, R. D., Syazali, M., & Umam, R. (2019). Learning model to improve the ability to understand mathematical concepts. *PRISMA*, 8(2), 173–181.
- Huda, S., Munifah, M., & Umam, R. (2020a). Think Talk Write (TTW) learning model on thinking skills, creativity, and problem solving. *Journal of Gifted Education and Creativity*, 7(1), 25–32.
- Huda, S., Munifah, M., Syazali, M., Rahayu, S. S., & Umam, R. (2020b). The effectiveness of Two Stay Two Stray, Somatic, Auditory, Visualization, Intellectually, and Auditory learning to improving numerical ability. *Humanities & Social Sciences Reviews*, 8(4), 431–441. <https://doi.org/10.18510/hssr.2020.8442>

- Huda, S., Ridwanulloh, M. U., Karomah, U., Febrian, R. E., Kurniasari, E., Laili, U. F., & Umam, R. (2026). Effectiveness of physics exams using smartphone based test system in senior high school of MAN 1 Kediri city, Indonesia. *AIP Conference Proceedings*, 3226(1), 020059. <https://doi.org/10.1063/5.0333689>
- Irsan, I. (2021). Implementasi literasi sains dalam pembelajaran IPA di sekolah dasar. *Jurnal Basicedu*, 5(6), 5631–5639. <https://doi.org/10.31004/basicedu.v5i6.1682>
- Lestari, F., Dalman, Noprisa, Efendi, D., Ariyanti, I., Anggara, B., & Umam, R. (2021). The effectiveness of math learning based on multiple intelligence: Implications at MTs Darul Ma'wa. *AIP Conference Proceedings*, 2438(1), 020001. <https://doi.org/10.1063/5.0071296>
- Lidi, M. W., Mbia Wae, V. P. S., & Umbu Kaleka, M. B. (2022). Implementasi etnosains dalam pembelajaran IPA untuk mewujudkan Merdeka Belajar di Kabupaten Ende. *OPTIKA: Jurnal Pendidikan Fisika*, 6(2), 206–216. <https://doi.org/10.37478/optika.v6i2.2218>
- Munifah, M., Tsani, I., Yasin, M., Tortop, H. S., Palupi, E. K., & Umam, R. (2019). Management system of education: Conceptual similarity (integration) between Japanese learning system and Islamic learning system in Indonesia. *Tadris: Jurnal Keguruan dan Ilmu Tarbiyah*, 4(2), 159–170. <https://doi.org/10.24042/tadris.v4i2.4893>
- Nabilah, W., Sudibyo, E., & Aulia, V. (2022). Foster student's science literacy skills on environmental pollution topics through the ethnoscience approach. *Jurnal Pijar MIPA*, 17(3), 387–393. <https://doi.org/10.29303/jpm.v17i3.3506>
- Nugraha, D. P. D. M. (2022). Hubungan kemampuan literasi sains dengan hasil belajar IPA siswa sekolah dasar. *Jurnal Elementary*, 5(2), 153. <https://doi.org/10.31764/elementary.v5i2.8874>
- Nur Fauziah, Nafiah, Hartatik, S., & Sunanto. (2022). Penerapan media augmented reality pada materi ilmu pengetahuan alam siswa sekolah dasar. *Jurnal Sekolah Dasar*, 7(2), 103–117. <https://doi.org/10.36805/jurnalsekolahdasar.v7i2.2116>
- Nurulsari, N., Abdurrahman, Maulina, H., Sukamto, I., & Umam, R. (2020). Exploring the prospective of pre-service physics teacher's pedagogical content knowledge: A case study. *Journal of Physics: Conference Series*, 1467(1), 012023. <https://doi.org/10.1088/1742-6596/1467/1/012023>
- Pamungkas, A., Subali, B., & Linuwih, S. (2017). Implementasi model pembelajaran IPA berbasis kearifan lokal untuk meningkatkan kreativitas dan hasil belajar siswa. *Jurnal Inovasi Pendidikan IPA*, 3(2), 118–127. <https://doi.org/10.21831/jipi.v3i2.14562>
- Pertiwi, U. D., & Firdausi, U. Y. R. (2019). Upaya meningkatkan literasi sains melalui

- pembelajaran berbasis etnosains. *Indonesian Journal of Natural Science Education (IJNSE)*, 2(1), 120–124. <https://doi.org/10.31002/nse.v2i1.476>
- Pratama, M. Y., Kuntjoro, S., & Asri, M. T. (2024). E-book on ethno-conservation of agricultural land for teaching students' critical thinking skills in Sidoarjo-Indonesia. *IJORER: International Journal of Recent Educational Research*, 5(4), 935–944. <https://doi.org/10.46245/ijorer.v5i4.626>
- Pratiwi, W. O., Sunyono, S., Rohman, F., & Firdaus, R. (2024). Unveiling the needs for ethnoscience-based e-worksheets to enhance nature of science and environmental awareness of elementary school students. *Indonesian Journal of Science and Mathematics Education*, 7(1), 118. <https://doi.org/10.24042/ijisme.v7i1.21099>
- Putra, F. G., Lengkana, D., Sutiarso, S., Nurhanurawati, N., Saregar, A., Diani, R., Widyawati, S., Suparman, S., Imama, K., & Umam, R. (2024). Mathematical representation: A bibliometric mapping of the research literature (2013–2022). *Infinity Journal*, 13(1), 1–26. <https://doi.org/10.22460/infinity.v13i1.p1-26>
- Saregar, A., Putra, F. G., Diani, R., Anugrah, A., Misbah, M., & Umam, R. (2025). Innovative integrated disaster education in physics learning: An effort to enhance students' disaster literacy skills. *Jurnal Pendidikan IPA Indonesia*, 14(2), Article 23959. <https://doi.org/10.15294/jpii.v14i2.23959>
- Sarwi, S., Fathonah, S., Winarto, W., Fatimah, S., Fariha Sari, E., & Fadilah, A. M. (2025). Ethnoscience and local wisdom in science education for conservation: A systematic review with bibliometric mapping. *Multidisciplinary Reviews*. <https://doi.org/10.29303/jppipa.v10i7.7456>
- Sihombing, R. A., Anwar, S., Liu, S.-Y., Muslim, M., Winarno, N., & Sihombing, P. J. (2025). Integrating local wisdom into environmental education: A systematic review of ethnoscience research in Indonesia. *Journal of Natural Science and Integration*.
- Suastra, I. W., & Pujani, N. M. (2021). Ethnoscience-based science learning model to develop critical thinking ability and local cultural concern for junior high school students in Lombok. *Jurnal Penelitian Pendidikan IPA*, 7(1). <https://doi.org/10.29303/jppipa.v7i1.530>
- Suastra, I. W., & Yasmini, L. P. B. (2013). Model pembelajaran fisika untuk mengembangkan kreativitas berpikir dan karakter bangsa berbasis kearifan lokal Bali. *JPI (Jurnal Pendidikan Indonesia)*, 2(2), 221–235. <https://doi.org/10.23887/jpi-undiksha.v2i2.2166>

- Subali, B., Sopyan, A., & Ellianawati, E. (2015). Developing local wisdom based science learning design to establish positive character in elementary school. *Jurnal Pendidikan Fisika Indonesia*, 11(1), 1–7. <https://doi.org/10.15294/jpfi.v11i1.3998>
- Suprpto, N., Prahani, B. K., & Cheng, T. H. (2021). Indonesian curriculum reform in policy and local wisdom: Perspectives from science education. *Jurnal Pendidikan IPA Indonesia*, 10(1), 69–80. <https://doi.org/10.15294/jpii.v10i1.28438>
- Supriyadi, E., Turmudi, T., Dahlan, J. A., Juandi, D., Istikomah, E., Febriandi, R., & Sholikhah, R. A. (2023). Global trend of ethnoscience research: A bibliometric analysis using Scopus database. *Journal of Engineering Science and Technology*, 18(3), 1–8.
- Usman, M., Pramudawardani, H., Umam, R., & Takahashi, H. (2025). Synthesizing a framework and establishing content validity of an energy literacy instrument for Indonesian students. *Islamic Journal of Integrated Science Education (IJISE)*, 4(3), 175–185. <https://doi.org/10.30762/ijise.v4i3.6993>
- Widayanti, Amaliah, K., Sholikhah, A. U., & Kurniawan, A. (2022). Ethnoscience-based interactive e-module: E-module development on nonrenewable resources topic. *Indonesian Journal of Science and Mathematics Education*, 5(2), 261–270. <https://doi.org/10.24042/ij sme.v5i2.13806>
- Wijayanti, D. A. I., Margunayasa, I. G., & Arnyana, I. B. P. (2022). Pengembangan e-LKPD berkearifan lokal Catur Pramana tema 7 muatan IPA kelas V SD. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, 6(1), 141–152. https://doi.org/10.23887/jurnal_pendas.v6i1.572
- Wijayanti, Y., Warto, Wasino, W., Djono, & Esa, M. S. (2025). History learning based on local wisdom Sanghyang Sikskandang Karesian. *Paramita: Historical Studies Journal*, 35(1). <https://doi.org/10.15294/paramita.v35i1.9033>
- Winangun, I. M. A. (2024). Interactive e-modules with cases of local wisdom in learning animal diversity to improve student learning outcomes. *Jurnal Ilmiah Pendidikan dan Pembelajaran*, 8(1), 118–124. <https://doi.org/10.23887/jipp.v8i1.69028>
- Yasin, M., Huda, S., Putra, F. G., Syazali, M., Umam, R., & Widyawati, S. (2020). IMPROVE learning model and learning independence: Influence and interaction on mathematics problem-solving abilities in Islamic boarding school. *Journal of Physics: Conference Series*, 1467(1), 012003. <https://doi.org/10.1088/1742-6596/1467/1/012003>
- Yuliana, Y., Fathurohman, A., & Siahaan, S. M. (2023). Analysis of needs for the development of local wisdom-based junior high school science e-modules related to ethnoscience in

South Sumatra. *Jurnal Penelitian Pendidikan IPA*, 9(10), 7865–7870.
<https://doi.org/10.29303/jppipa.v9i10.5292>

Yuliyanti, N., Pertiwi, R. P., Sarwi, S., Wardani, S., & Doyin, M. (2024). Pendekatan etnosains dalam pembelajaran IPAS untuk literasi sains inklusif di sekolah dasar: Tinjauan literatur. *Didaktika: Jurnal Kependidikan*, 13(3), 3539–3552.
<https://doi.org/10.58230/27454312.780>

Zuyina, A. V., & Widodo, W. (2020). Validity of ethnoscience booklet media in the region of Ponorogo on sound wave sub material. *Pensa E-Jurnal Pendidikan Sains*, 8(2), 178–182.
<https://doi.org/10.26740/pensa.v8i2.38360>