



Analysis of Science Teaching Material Development Needs: Teachers' Perceptions of Ethnoscience Integration in Junior High and Senior High School Science Textbooks

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Abstract

Education today requires the implementation of contextual, responsive, and culturally sensitive approaches to create learning that is relevant to the daily lives of students and more inclusive. To date, research on ethnoscience in science education has primarily focused on the development of learning models, the implementation of ethnoscience in the classroom, or conceptual studies on the integration of culture in science learning. Studies that specifically analyze science textbooks as the primary learning resource are still limited and tend to be descriptive, without directly linking them to teachers' perceptions and the development of teaching materials in specific regional contexts. Therefore, this study is novel in filling this gap through an analysis of the need to develop ethnoscience-based science textbooks based on the perceptions of junior high and high school teachers in Riau Province, which provides an empirical basis for the development of teaching materials and the formulation of more contextually and locally based education policies. This study used a survey method involving 12 junior high school and high school science teachers from 12 different schools in various regions of Riau. The research instrument was a perception questionnaire from the perspective of teachers and students. Data analysis was conducted both descriptively and quantitatively, using simple statistics, and supplemented by qualitative interpretations of open-ended responses. The results showed that both teachers and students considered the integration of ethnoscience in science textbooks to be very limited, unsystematic, and lacking a strong connection between scientific concepts and local culture. The needs analysis indicated the need to develop culture-based textbooks that explicitly include the cultural context of Riau, are scientifically structured, and can strengthen the understanding of science concepts. This study has significant implications for teachers, textbook authors, and also curriculum developers, as it underscores the importance of enhancing the relevance of science learning through integration of local culture.

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INTRODUCTION

This culture-based approach to science is becoming increasingly important in a rapidly globalizing world, where recognition of cultural diversity must be an integral part of the educational process. Various studies have shown that contextualizing learning through the integration of local wisdom can enrich the science learning experience, strengthen the connection between science and culture, and foster an inclusive scientific identity. Science

education in the modern era does not only focus on mastering scientific concepts. Still, it must also be able to relate them to the social and cultural context of local students. The integration of ethnoscience can illustrate the uniqueness of teaching materials, classrooms, learning environments, learning methods, and culture-based learning approaches. The integration of ethnoscience in science education increased student interest in learning, enhanced understanding of concepts, and fostered critical thinking (Hidayati & Julianto, 2025). Scientific understanding combined with local wisdom not only increases student engagement but also builds bridges between modern science and the traditional knowledge that has developed within their communities. Indigenous epistemology and cultural perspectives are used to engage students in teaching and learning practices. To this end, stakeholders, curriculum experts, educators, teachers, and other relevant agencies working in the education system, particularly the Ministry of Education and regional education offices, must strive to maximize the integration of elements of indigenous knowledge and related pedagogical practices into the school curriculum (Gunjebo et al., 2025).

In Indonesia, cultural diversity and rich local wisdom offer significant potential for developing more contextually relevant science education. The implementation of the Merdeka Curriculum provides ample opportunity to integrate local values into science learning at the junior high school level and science subjects at the senior high school level, including chemistry, physics, and biology. However, so far, the integration of local wisdom in science teaching materials, especially in official textbooks, has not been optimally studied (Ardianto & Rubini, 2016). Until now, science learning resources have been limited to textbooks or reading texts, without direct learning (Haling et al., 2022). Textbooks play a strategic role as one of the primary learning resources in schools. Hence, the representation of local wisdom in textbooks significantly influences how science is perceived and accepted by students (Kim, 2007). However, the textbooks currently used in learning still do not adequately accommodate the local cultural context, so learning tends to be less engaging and less effective. Science literacy knowledge and application that relies solely on textbooks or texts does not fully touch the students' souls. As a result, lessons become boring, and students lack an understanding of the subject matter in the context of their lives (Suparya et al., 2024). The lack of integration of cultural values in textbooks has the potential to widen the gap between science and students' daily lives, which in turn affects the low relevance of learning.

In the context of education in Indonesia, the integration of culture, local potential, and local wisdom in learning is becoming increasingly relevant to maintaining national identity amid globalization. Local potential provides a concrete context for science learning. Meanwhile, local wisdom, which includes traditions, customs, and knowledge passed down from generation to generation, plays a role in instilling values of sustainability and care for the environment (Septina et al., 2025). This aligns with the principle of culturally responsive teaching, which seeks to create an inclusive learning environment where the cultural diversity of students is recognized as a source of strength (Saputri et al., 2025). A similar sentiment by (Harefa, 2017), who states that science education in schools balances Western science (normal science, science studied in class) with indigenous science (traditional science) using a cross-cultural approach. Science education that bridges the gap between students' cultures and the scientific culture in schools will make the learning process more effective for students. Students will learn formally to understand their environment and the various issues surrounding them.

The development of Indigenous Knowledge-based science education has become a focus in various countries. In Indonesia, Indigenous Knowledge is integrated into the science curriculum to enrich students' learning experiences while respecting local cultural heritage. The development of Indigenous Knowledge in science education is still in its early stages and requires a strong foundation based on empirical data, one of which is through studies of primary

learning resources such as textbooks (Rahmawati & Ridwan, 2017). Although the integration of local wisdom in science education has been widely studied globally and nationally, its implementation still shows significant variation at the regional level (Banks, 2015). One region that has great potential but has not been optimized in the development of ethnoscience-based teaching materials is Riau Province. This province has diverse local knowledge practices and a close connection between community life and the natural environment, particularly in the context of peatlands, rivers, and coastal ecosystems. It also has a rich Malay culture. (Badan Pusat Statistik Provinsi Riau, 2018). However, various preliminary findings and education reports indicate that science teaching materials at the junior high and high school levels are still dominated by generic and national content, with minimal integration of local cultural contexts and local (Hasnawati & Rahmawati, 2021). This condition has the potential to make science learning less contextual and less meaningful for students, and does not fully support the strengthening of local identity and science literacy based on the surrounding environment (Sasmi et al., 2025).

Although the potential of local wisdom is enormous in supporting contextual and meaningful science learning, its utilization in learning practices remains suboptimal. Teachers often face limitations in relating scientific concepts to the local cultural and environmental context because there is no clear picture of the extent to which the science textbooks currently in use support the integration of (Rahmawati et al., 2023). To date, empirical studies that specifically reveal teachers' perceptions of the need to develop ethnoscience-based science textbooks—especially in regional contexts such as Riau Province and at the junior high and high school levels—are still limited. This gap is the reason behind the need for this study to analyze the development of ethnoscience-based science teaching materials from the perspective of teachers, as a basis for improving teaching materials and formulating educational policies that are more contextual and responsive to local wisdom.

The development of Indigenous Knowledge-based science education has become a focus in various countries, including Canada, Australia, and several African nations. In these countries, Indigenous Knowledge is integrated into the science curriculum to enrich students' learning experiences and respect local cultural heritage. In Indonesia, the development of Indigenous Knowledge in science education is still in its early stages. It requires a strong foundation based on empirical data, one of which is through the analysis of the representation of local wisdom in the primary learning resources, namely, textbooks. By understanding how local wisdom is currently represented, steps to develop an Indigenous Knowledge-based learning model can be designed more effectively (Webb, 2016). Therefore, it is essential to examine the representation of local wisdom in science textbooks, while also assessing its development potential as a foundation for constructing Indigenous Knowledge-based science education. This research is essential as an initial effort to map the strengths and weaknesses of integrating local wisdom into junior high and high school science textbooks, as well as a foundation for developing innovative Indigenous Science Education-based curricula and teaching materials in the future. Before analyzing the representation of local wisdom in science textbooks as a preliminary step, we examined teachers' perceptions of the integration of ethnoscience in the science textbooks they currently use and their future needs regarding the form of integration they require in textbooks that can accommodate both scientific understanding and local cultural Knowledge.

METHODS

Research Design

This study employs a descriptive, quantitative approach using a survey method. An additional qualitative approach is used to analyze open-ended responses.

Research Location and Subjects

The research was conducted in Riau Province. The research subjects included 12 science teachers (5 junior high school teachers and 7 high school teachers) from 12 different schools.

Research Instruments

The instrument was a questionnaire with three main sections: Perceptions of ethnosience in science education; Assessment of the representation of ethnosience in science textbooks; and The need for the development of culture-based science textbooks.

The use of perception questionnaires to assess the integration of ethnosience and teaching material needs aligns with previous studies that emphasize the importance of teachers' perspectives in the development of science education based on culture and local context (Rahmawati & Ridwan, 2017). The content validity approach, through expert assessment, is commonly used in educational research, particularly in exploratory studies and the analysis of instructional material development needs (DeVellis & Thorpe, 2021). The perception questionnaire was developed based on a literature review and validated through expert judgment to ensure the suitability and clarity of the questions. Data from open-ended questions were analyzed descriptively and qualitatively through simple thematic grouping by summarizing respondents' answers based on similarities in meaning.

Data Analysis

According to (Sastroadmojo, 2018), to analyze the obtained questionnaires, the researcher converts the data into percentage using the percentage formula.

$$P = \frac{F}{N} \times 100 \%$$

Note:

P = Percentage

F = Frequency of Answer Scores

N = Number of Respondents

RESULTS AND DISCUSSION

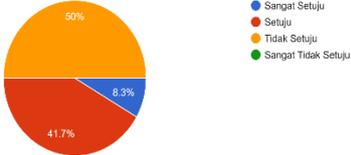
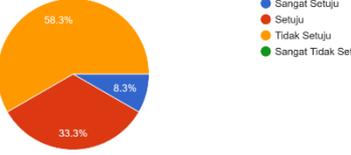
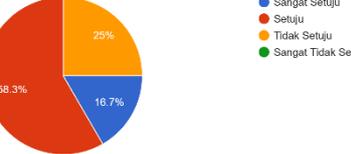
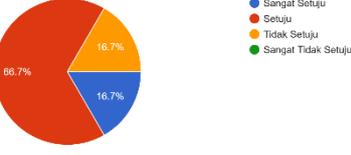
Teachers' Perceptions of the Existence and Completeness of Local Cultural Representation

The integration of ethnosience is a crucial aspect in facilitating contextual, meaningful learning that aligns with the cultural characteristics of students. Science Textbooks, as the primary source of knowledge, should not only present scientific concepts in an abstract manner but also through examples, phenomena, and also local cultural practices that are familiar to students. Teachers' perceptions of the extent to which textbooks contain elements of ethnosience greatly determine the quality of culture-based learning implementation, because teachers are the direct users who observe the relevance, depth, and usefulness of cultural content in textbooks. Therefore, the analysis of teachers' perceptions provides an initial picture of the suitability of science textbooks in accommodating local cultural values and serves as a basis for identifying areas for improvement in the development of ethnosience-based textbooks. The following section presents the results of a survey of teachers regarding their perceptions of the integration of local culture in the science textbooks used in schools.

The finding that the integration of ethnosience in science textbooks is still rated low to moderate is in line with various studies showing that science textbooks tend to be generic and lack cultural context. This condition highlights a gap between the demands for contextual

science learning and the reality of available teaching materials, resulting in teachers often having to rely on personal initiative to connect science learning with local wisdom (Rahmawati & Ridwan, 2017)

Table 1. Teachers' Perceptions of the Existence and Completeness of Local Cultural Representation

Indicator	Survey Results	Description
Variations in local wisdom in science textbooks	<p>Buku menampilkan berbagai jenis kearifan lokal. 12 responses</p> 	<p>This graph shows that half of the teachers (50%) disagree that science textbooks have presented various types of local wisdom. This finding suggests that the diversity of local wisdom in science textbooks remains limited, and most teachers believe that the cultural variety is insufficient to support contextual science learning.</p>
Completeness of explanations of local culture in science textbook	<p>Penjelasan budaya lokal dalam buku cukup lengkap. 12 responses</p> 	<p>This graph shows that 58.3% of teachers disagree that the explanation of local culture presented in science textbooks is complete. This means that the local cultural content included in the textbooks remains superficial and descriptive, failing to provide an in-depth scientific explanation that connects culture with science concepts..</p>
Integration of local wisdom in science textbooks	<p>Buku IPA yang digunakan belum memuat contoh kearifan lokal 12 responses</p> 	<p>The findings show that 58.3% of teachers agreed and 16.7% strongly agreed that science textbooks do not include examples of local wisdom. This indicates that the absence of local culture in science textbooks is perceived as a real and significant issue by the majority of teachers. These findings directly indicate the need to develop science textbooks that explicitly feature local culture.</p>
The frequency of local cultural examples integrated into science textbooks	<p>Buku IPA yang digunakan hanya memasukkan sedikit contoh budaya lokal. 12 responses</p> 	<p>This graph shows a strong trend: 66.7% of teachers agree that science textbooks include few examples of local culture, with 16.7% strongly agreeing. This confirms that teachers feel the amount of local culture appearing in books is very limited, thus failing to meet the needs of context-based learning.</p>

Indicator	Survey Results	Description										
The relevance of local wisdom in science textbooks	<p>Buku IPA yang digunakan memuat contoh kearifan lokal yang relevan 12 responses</p> <table border="1"> <caption>Survey Results: Relevance of local wisdom in science textbooks</caption> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Sangat Setuju</td> <td>16.7%</td> </tr> <tr> <td>Setuju</td> <td>41.7%</td> </tr> <tr> <td>Tidak Setuju</td> <td>41.7%</td> </tr> <tr> <td>Sangat tidak setuju</td> <td>0%</td> </tr> </tbody> </table>	Response	Percentage	Sangat Setuju	16.7%	Setuju	41.7%	Tidak Setuju	41.7%	Sangat tidak setuju	0%	This graph shows the disagreement (41.7%) regarding the relevance of examples of local wisdom included in science textbooks. These findings suggest that some teachers view relevant examples, while others consider them inappropriate or ineffective in linking local culture with science concepts.
Response	Percentage											
Sangat Setuju	16.7%											
Setuju	41.7%											
Tidak Setuju	41.7%											
Sangat tidak setuju	0%											

Teachers' Experiences in Linking Science with Local Culture

Teachers' experience in linking science learning with local culture is a crucial aspect in achieving contextual, meaningful science education that is relevant to students' lives. Teachers play a central role in determining the extent to which local culture can be incorporated into the classroom, because their ability to modify and select cultural examples for science concepts significantly affects the quality of learning. However, teachers' experience in integrating this approach depends on the availability of learning resources, especially textbooks. Therefore, it is essential to understand how teachers' experiences and the frequency of linking local culture with science material can provide a realistic picture of the practice of ethnoscience in schools.

Teachers' limited and sporadic experience in linking science with local culture indicates that the integration of ethnoscience has not been systematically institutionalized. This is in line with previous findings stating that teachers often face limitations in curriculum guidelines and teaching materials when applying a culture-based approach (Gay, 2018). As a result, ethnoscience practices more often appear as a supplement to learning, rather than as an integral part of science learning design.

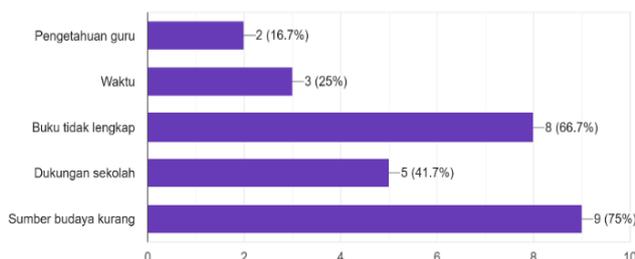
Table 2. Teachers' Experiences in Linking Science with Local Culture

Indicator	Survey Results	Description												
Frequency of teachers incorporating local culture into science learning	<p>Seberapa sering Anda menggunakan contoh kearifan lokal dalam pembelajaran? 12 responses</p> <table border="1"> <caption>Survey Results: Frequency of using local wisdom examples</caption> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Hampir setiap pertemuan</td> <td>8.3%</td> </tr> <tr> <td>1-2 kali setiap semester</td> <td>8.3%</td> </tr> <tr> <td>Hanya jika topik tertentu</td> <td>75%</td> </tr> <tr> <td>Hampir tidak pernah</td> <td>0%</td> </tr> <tr> <td>Belum pernah sama sekali</td> <td>0%</td> </tr> </tbody> </table>	Response	Percentage	Hampir setiap pertemuan	8.3%	1-2 kali setiap semester	8.3%	Hanya jika topik tertentu	75%	Hampir tidak pernah	0%	Belum pernah sama sekali	0%	The graph shows that most teachers, namely 75%, only use examples of local wisdom in teaching if the topic is considered appropriate. Meanwhile, 8.3% use examples of local culture routinely in every meeting, while another 8.3% use them only once or twice per semester. These findings that teachers have a positive inclination towards utilizing local wisdom; however, its application remains situational and unstructured within each topic or chapter of learning. This condition is most likely due to the lack of local cultural examples available in textbooks, so that teachers use local wisdom only as a supplement rather than as an integral part of explaining science concepts consistently.
Response	Percentage													
Hampir setiap pertemuan	8.3%													
1-2 kali setiap semester	8.3%													
Hanya jika topik tertentu	75%													
Hampir tidak pernah	0%													
Belum pernah sama sekali	0%													
Examples of local culture often found by teachers in science textbooks	<ol style="list-style-type: none"> 1. Examples of traditional foods on the topic of food and the digestive system 2. The process of cooperation in the discussion of blood circulation and bone health 													

Indicator	Survey Results
	<ol style="list-style-type: none"> 3. Traditional preservation methods, such as salted fish, fermented cassava, and tempeh, are discussed in the topic of microorganisms and fermentation 4. Spinning top games in the topic of circular motion 5. Mangrove forests, Subak in Bali, in the topic of ecosystems

The challenge for teachers in incorporating local culture into science education

Faktor penghambat implementasi budaya:
12 responses



Based on the graph regarding factors that hinder the implementation of culture in science learning, it appears that the biggest obstacle, according to teachers, is the lack of cultural

resources that can be integrated into learning materials, with 75% of respondents stating this as the main obstacle. In addition, 66.7% of teachers assessed that the textbooks they used did not provide complete examples of local culture, making it difficult for them to relate science concepts to the cultural context surrounding their students. School support was also considered lacking, as indicated by 41.7% of teachers who cited the lack of facilities or policies supporting the implementation of ethnoscience as an obstacle. Other obstacles include limited learning time (25%) and teachers' lack of knowledge about local culture or how to integrate it into science (16.7%). Overall, these data indicate that the implementation of ethnoscience is influenced not only by teacher competence but also by the availability of learning resources, institutional support, the quality of textbooks, and the current lack of optimal conditions

Student responses when teachers incorporate local culture into science lessons

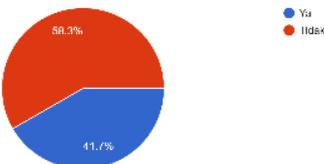
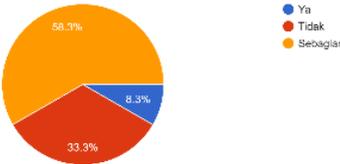
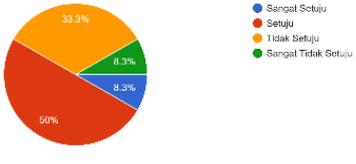
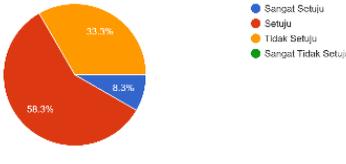
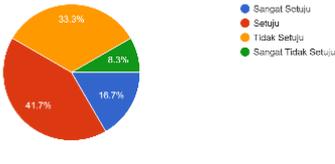
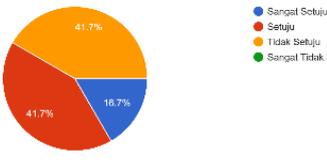
1. Very interested because it is very rare to find learning that integrates local culture, so this is like a first experience for students
2. Very positive and enthusiastic. They seem very eager to learn more about the local culture being discussed, as evidenced by their increased involvement in learning
3. Some students even shared their own experiences of the same local culture, creating an interactive and engaging discussion. They also asked questions about the origins, meaning, and function of the local culture.
1. 4. Students found it easier to understand concepts and gain a deeper understanding when they were linked to local culture because they felt they had gained new insights.

Teachers' Perceptions of Science Textbook Content Related to Culture

Analyzing teachers' perceptions of the presence, clarity, balance, and relevance of culture in science textbooks is a crucial step in identifying the strengths and weaknesses of current textbooks. The following section presents detailed teacher assessments of how local culture emerges and is utilized in science textbooks, which then serve as the basis for formulating the need for more comprehensive ethnoscience-based teaching materials.

Teachers' assessment that the cultural content in science textbooks is still general and does not adequately represent local culture supports criticism of the "one-size-fits-all" approach in the development of national textbooks (Banks, 2015). Other studies also show that the lack of representation of local culture can reduce the relevance of science learning for students and weaken the connection between scientific concepts and students' daily lives (Arma, 2024).

Table 3. Teachers' Perceptions of Science Textbook Content Related to Culture

Indicator	Survey Results	Description
<p>Cultural balance from various regions</p>	<p>Budaya ditampilkan seimbang dari berbagai daerah. 12 responses</p> 	<p>The graph shows that 58.3% of teachers believe that culture is not presented evenly across different regions in Indonesia. This imbalance suggests that some regions hold more influence than others, indicating that science textbooks do not yet effectively incorporate the principle of cultural diversity.</p>
<p>Clarity of Local Culture in Science Textbooks</p>	<p>Terdapat unsur budaya lokal yang jelas di dalam Buku IPA 12 responses</p> 	<p>This graph shows that 58.3% of teachers assessed that only some elements of local culture were clearly visible in the books, 33.3% stated that there were no clear elements of local culture, and only 8.3% said that the books had clear aspects of local culture. These findings reinforce that the representation of local culture in science textbooks remains limited in terms of both form and quality of presentation..</p>
<p>Evaluation related to the local cultural context</p>	<p>Terdapat soal-soal evaluasi yang mengaitkan budaya lokal dan IPA. 12 responses</p> 	<p>The majority of teachers (50%) agreed that there were evaluation questions related to local culture and science, followed by 33.3% who disagreed, 8.3% who strongly agreed, and 8.3% who strongly disagreed. This data indicates that although some textbooks have attempted to link evaluation to local culture, its presence is not yet widespread or has not become a significant component of the assessment.</p>
<p>The existence of cultural phenomena that can be tested scientifically</p>	<p>Buku menampilkan fenomena budaya yang dapat diuji. 12 responses</p> 	<p>The graph shows that 58.3% of teachers disagree that the book presents cultural phenomena that can be tested scientifically, 33.3% of teachers agree, and only 8.3% strongly agree. This confirms that the majority of teachers believe science textbooks have not effectively integrated cultural phenomena as objects of scientific investigation, which can enrich students' inquiry skills.</p>
<p>Availability of Culture-Integrated Science Projects</p>	<p>Buku menyediakan proyek budaya-sains. 12 responses</p> 	<p>Most teachers (41.7%) agreed that the books provided culture-science projects, 33.3% disagreed, 16.7% strongly agreed, and 8.3% strongly disagreed. This distribution suggests that although efforts have been made to incorporate culture-based projects into the books, their number and quality are inconsistent across all books and publishers.</p>
<p>The book facilitates cultural diversity among students.</p>	<p>Buku memfasilitasi keberagaman budaya siswa. 12 responses</p> 	<p>A total of 41.7% of teachers agreed, and 16.7% strongly agreed, that science textbooks facilitate student cultural diversity, while the remaining 41.7% disagreed. This data shows that some teachers believe the textbooks have begun to accommodate cultural diversity. Still, others see shortcomings in their presentation, meaning they do not yet fully represent the</p>

Indicator	Survey Results	Description
Cultural relevance to the Riau region	<p>Budaya yang ditampilkan relevan dengan daerah Anda 12 responses</p> <p>Legend: Ya (blue), Tidak (red)</p>	<p>needs of students from different cultural backgrounds.</p> <p>This graph indicates that teachers' perceptions are evenly divided, with 50% of teachers stating that the culture presented in science textbooks is relevant to their region, while the other 50% state that it is not. This illustrates that although some local cultural content appears in the books, its relevance is uneven and does not fully reflect the cultural context in which teachers teach..</p>
The local context in science textbooks improves students' understanding of the material.	<p>Budaya lokal mempermudah pemahaman materi IPA 12 responses</p> <p>Legend: Sangat Setuju (blue), Setuju (red), Tidak Setuju (orange), Sangat Tidak Setuju (green)</p>	<p>The graph shows that 75% of teachers agree that local culture can facilitate understanding of science material, while 16.7% strongly agree. This illustrates that almost all teachers believe that integrating local culture into science textbooks has significant pedagogical value in helping students better understand abstract scientific concepts.</p>

Teacher Assessment of Science Book Quality

Teachers' assessments of the quality of science textbooks are crucial for understanding the extent to which textbooks meet the needs of students in terms of contextual, accurate, and relevant learning, given the characteristics of their students. Textbooks serve not only as sources of information but also as pedagogical guidelines that guide how scientific concepts are understood, applied, and implemented in everyday life. Therefore, the quality of material presentation, including the accuracy of content, clarity of illustrations, relevance of examples, and consistency of local cultural integration, is crucial for the effectiveness of science learning in the classroom. Teachers' perceptions of this quality offer a direct view of the strengths and weaknesses of the textbooks currently used in schools, while also revealing areas that need improvement to support the effective implementation of an ethnoscience approach. The following section presents the results of teachers' assessments of the quality of the science textbooks they use, followed by a further discussion to identify the most pressing areas for improvement.

Although the scientific quality of science textbooks is considered quite good, limitations in terms of cultural context show that the quality of textbooks cannot be assessed solely based on the accuracy of scientific concepts. Previous studies have confirmed that high-quality science textbooks should integrate the social and cultural contexts of students to make learning more meaningful (Chiappetta & Fillman, 2007). Thus, the cultural dimension is an important component in evaluating the quality of science textbooks.

Table 4. Teacher Assessment of Science Book Quality

Indicator	Survey Results
Errors in cultural integration in science textbooks	<ol style="list-style-type: none"> 2. The book presents cultural aspects superficially, focusing only on visible elements such as traditional clothing or food, without explaining deeper values, social systems, or beliefs. 3. The book only touches on culture briefly without encouraging students to study the science within that culture in depth. 4. Cultural integration only appears in specific materials and is not evenly distributed across all topics of study.

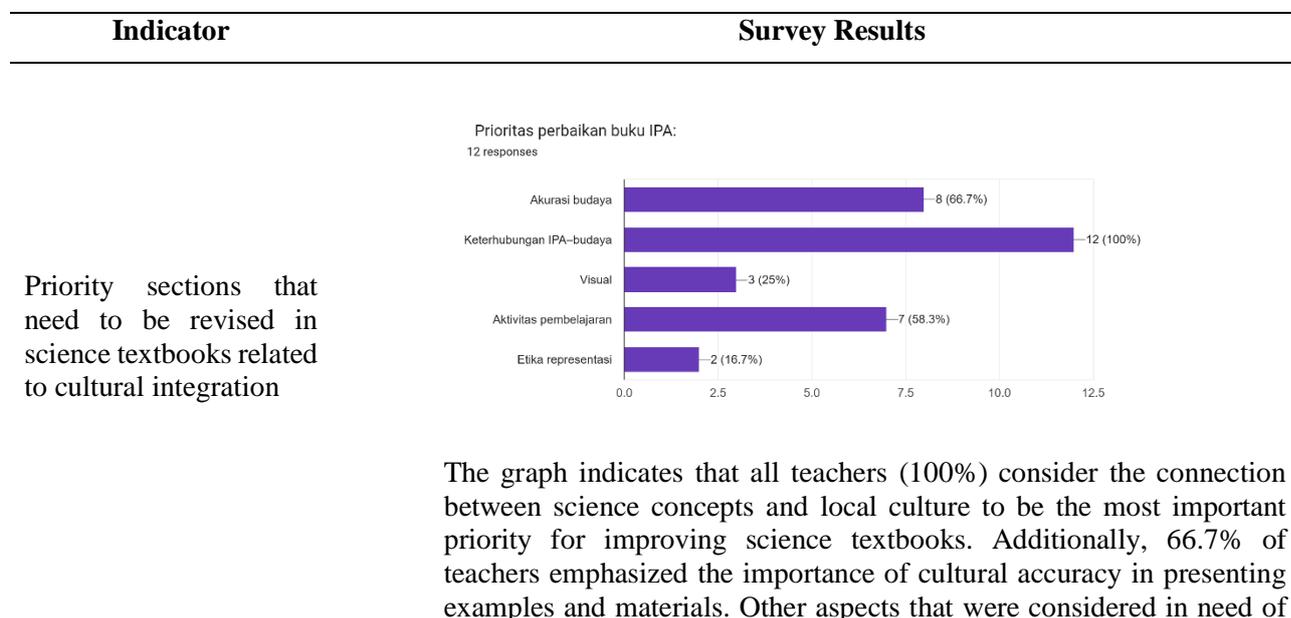
	<p>5. Common errors found in the inclusion of cultural elements in the book often relate to inaccurate representations, bias, and excessive generalization.</p>
<p>The quality of cultural accuracy in current science textbooks</p>	<p>1. The cultural accuracy of examples of local wisdom in current science textbooks is generally quite good in linking modern science to real-life contexts. However, the real contexts of local culture are still quite limited.</p> <p>2. Some examples are accurate and contextual. Still, others are general, lack detail, or do not fully reflect the cultural practices that actually occur in local communities, as seen in the example of the salt-making process, which uses inaccurate images and descriptions. The photos depict a salt-making process that does not accurately represent the actual process carried out in coastal areas of Indonesia.</p> <p>6. 3. Not all chapters in the chemistry textbook are based on local wisdom. There are some, but they are not very detailed, only discussing a few points or touching on them briefly.</p>

Teachers' Need for Culture-Based Science Books

Teachers demonstrate enthusiasm and awareness of the importance of ethnoscience in learning. Its implementation is often hindered by the limited learning resources that systematically integrate local culture into science materials. Current textbooks are considered to provide insufficient cultural examples, fail to present culture-based scientific phenomena, and offer insufficient inquiry activities that utilize the local context. Therefore, it is essential to identify specific teacher needs regarding the types of support, teaching tools, and forms of culture-based teaching materials that are expected to help them implement ethnoscience-oriented science learning more effectively.

The high demand for science textbooks based on culture is in line with the findings of a number of studies that confirm the role of ethnoscience in improving learning engagement, learning motivation, and strengthening students' science literacy (Snively, 2018). Within the framework of education policy, these results indicate the importance of the ongoing involvement and support of curriculum developers and government institutions in providing teaching materials that reflect and respect local cultural diversity.

Tabel 5. Teachers' Need for Culture-Based Science Books



Indicator	Survey Results
	improvement were learning activities (58.3%), visual presentation (25%), and cultural representation ethics (16.7%). These findings indicate that teachers not only need local culture to be present in the book, but also want it to be integrated in a scientifically appropriate and culturally accurate manner and presented through relevant learning activities. The emphasis on the connection between science and culture confirms that teachers need books that can explain scientific concepts through local cultural phenomena in a scientific and meaningful way.

Teacher support for implementing cultural and science connections in science education



The graph indicates that the greatest need among teachers is for culturally based teaching modules (81.8%), followed by local science textbooks (72.7%) and local cultural videos (63.6%). Other forms of support include culturally-based worksheets (54.5%), culturally-based learning models (54.5%), and teacher training (36.4%). Access to local resource persons is the lowest priority (27.3%). This data shows that teachers are in dire need of ready-to-use teaching tools and other easily accessible resources. The lack of culture-based teaching materials is a significant obstacle, so teachers hope for concrete support in the form of modules, books, and worksheets that directly incorporate local culture for application in learning. The demand for teacher training also indicates that pedagogical competence in ethnoscience needs to be further strengthened in the future.

The best form of local cultural integration in science education



This graph suggests that teachers have a strong preference for incorporating active learning methods into science education, particularly when integrating local culture. A total of 66.7% of teachers stated that videos, practical work, and field projects are the best ways to teach culture-based science. Meanwhile, storytelling and discussion methods were chosen by 50% of teachers, respectively. These findings illustrate that teachers prefer exploratory, visual approaches that directly involve students in a cultural context, rather than lecture-style or abstract

Indicator	Survey Results
	learning methods. Practical work and also field projects are considered essential for providing students with opportunities to observe cultural phenomena firsthand, so strengthening their understanding of scientific concepts through real-world experiences.
The culture that needs to be added to the book in accordance with the subject matter	<ol style="list-style-type: none"> 1. A study of the relationship between humans and everyday cultural objects, including their manufacturing processes, history, and interpretation. This may include objects that appear ordinary but hold social significance, such as studies of household waste that can provide insight into a community's social behavior. 2. Local cultures that are rarely known to students, such as traditional foods or traditional houses, which can be linked to science subjects. 3. Culture in the use of natural materials and traditional medicine. 4. Traditional Musical Instruments (Angklung, Gamelan, Sasando). Analyzing how the materials (bamboo, metal, wood) and the shape of musical instruments affect the frequency and amplitude of the sounds they produce. 5. Customary forest restrictions in Riau in ecosystem learning.
The role of teachers in developing better cultural representation	<ol style="list-style-type: none"> 1. Teachers should act as facilitators and inspirers to foster a deep understanding of cultural diversity among students, so that students can explore and understand their own culture or the culture of others. 2. Teachers must know and understand their students' cultures, including their values, traditions, and experiences. 3. Teachers should create an inclusive classroom environment where all students feel valued and respected, regardless of their culture. 4. Teachers can use technology to enhance cultural representation, such as using videos, images, and diverse online resources. 5. Involve students' local cultures in learning activities by asking them to explain their regional cultures. 6. Use regional contexts as case studies. This creates authentic learning that is close to students' lives and fosters cultural pride.
The most effective part of the book in presenting local wisdom	<ol style="list-style-type: none"> 1. The most effective part of the book in presenting local wisdom is the primary material or chapter content, followed by examples and case studies that connect theory with practice and develop critical thinking skills. 2. The Introduction section. This section can contain an introduction to the importance of local wisdom and how this book can help students understand and appreciate local cultural values. It can also provide an initial bridge between students' real-life experiences and the science concepts to be learned, making students feel that the material is relevant to their own lives and encouraging curiosity before delving into theory. 3. At the end of each topic discussion, teachers can then invite students to understand examples in line with the debate that has been studied.
The importance of local wisdom is selected based on the school area	<ol style="list-style-type: none"> 1. Local wisdom needs to be selected based on the school's location because this makes education more relevant, contextual, and meaningful for students since the local wisdom taught comes from their own surroundings. 2. It is necessary, considering that there are many different ethnic groups and cultures in Indonesia, that the ethnic group or culture closest to the school's location should be taught to students so that they can immediately apply it to their surroundings. 3. It is necessary so that schools can learn about the many things we do not yet know about our surroundings. Ease of Access: By choosing

Indicator	Survey Results
Teachers' Suggestions for Future Development of Science Textbooks	<p>local wisdom that exists in the school's region, students can easily access information and resources related to that local wisdom.</p> <ol style="list-style-type: none"> 1. Focus on creating textbooks that are more relevant, contextual, and capable of critical thinking skills in students 2. Provision of relevant, inspiring, and applicable learning resources to prepare a generation capable of facing global challenges and making a real contribution 3. Greater emphasis should be placed on adding material or explanations about local culture, linked to science learning material 4. Future science textbooks should include many examples of local wisdom in each region of Indonesia. 5. Future science textbooks must transform from mere repositories of information into dynamic learning tools that stimulate curiosity and prepare students to face real-world challenges. 6. Future Indonesian science textbooks will serve as a solid bridge between scientific knowledge and Indonesia's rich culture and nature, producing a generation that is scientifically intelligent and firmly rooted in its local identity. 7. All topics will include material that links science with local wisdom.

The survey results indicate that teachers' perceptions of the integration of local culture in science textbooks fall short of expectations. Most teachers believe that the variety of local wisdom appearing in science textbooks is still very limited and incomplete, thus not supporting contextual and meaningful science learning. This can be seen from the high percentage of teachers who disagree that the books contain local culture in a varied, comprehensive, and relevant manner to the science material. The lack of clarity of local cultural elements in the books and the imbalance in cultural representation between regions further emphasize the cultural literacy gap in the science textbooks used. The representation of local wisdom in science textbooks remains limited and has not been systematically integrated into various science topics (Arma, 2024). This suggests that the problem is not only local but also structural within the context of national textbook development. The presentation of local culture, which appears sporadically and descriptively, without scientific explanations linking cultural phenomena to scientific concepts, causes learning to become abstract and far from students' daily experiences. This finding aligns with (Savera et al., 2025) indicates that science textbooks often present local culture solely through illustrations or brief narratives, providing insufficient scientific elaboration for students.

In the learning process, teachers integrate local culture only when the topic is deemed appropriate, not as a consistently planned approach. When teachers incorporate local culture into science concepts, students respond very positively: they appear more enthusiastic, understand the material more easily, and are more active in discussions. This finding is supported by (Rapsanjani et al., 2023), who stated that local culture improves understanding of science concepts because students feel connected to the examples given and have relevant, firsthand experiences. However, teachers face several significant obstacles, including a lack of available cultural resources, incomplete textbooks as reference sources, and inadequate school support and training. The lack of culture-based teaching materials and limited supporting infrastructure often hampers the implementation of ethnosience in schools (Lestari, 2025).

Other findings suggest that teachers require more robust support to integrate local culture into science learning effectively. Most teachers are in dire need of culture-based teacher modules, local science companion books, local culture videos, culture-based worksheets, and

ethnoscience-based learning models. They also emphasized the need for teacher training in incorporating local culture into the learning process. Teachers need ready-to-use teaching tools to implement science learning based on local wisdom consistently and sustainably (Chusnur Rahmi et al., 2025). Teachers also viewed the best way to teach culture-based science through hands-on activities such as videos, labs, and field projects, each of which was chosen by 66.7% of respondents. These activities are considered to present cultural phenomena realistically and help students connect cultural experiences with scientific concepts through direct observation and engagement. (Chem, 2025) confirmed the effectiveness of these methods by stating that "practical work and field exploration enable students to construct scientific meaning through interaction with authentic cultural phenomena.

Furthermore, teachers assessed that the main priority in improving science textbooks is the connection between science concepts and local culture. All teachers (100%) agreed that science textbooks should emphasize the scientific relationship between culture and science, rather than simply presenting culture as additional illustrations. They also stressed the importance of cultural accuracy, enhancing the quality of learning activities, and enhancing the visual and ethical representation of culture. This finding is consistent with (Septina et al., 2025) analysis, which states that "the essence of ethnoscience is bridging science concepts with community cultural practices through appropriate and accurate scientific interpretation."

Thus, culture-based science learning not only requires the presence of local culture in textbooks but also necessitates cultural processing through scientific activities, testable phenomena, and assessment questions that integrate culture with science competencies. This confirms that future improvements to science textbooks should focus on strengthening the integration of scientific, pedagogical, and representational aspects, making learning more relevant, inclusive, and contextual for all students.

CONCLUSION

This study has a significant impact on the development of science education by providing an empirical basis for integrating ethnoscience into science textbooks, based on the perceptions of teachers as the primary users of teaching materials. The findings of this study utilized by policymakers, curriculum developers, and textbook publishers to design science teaching materials that are more contextual, relevant to local culture, and responsive to regional diversity, particularly in supporting meaningful science learning at the junior high and high school levels. The novelty of this research lies in revealing the gap between the potential of local wisdom and the support of science textbooks as perceived by teachers, without first analyzing the content of the books directly. By placing teachers' perceptions as the starting point for needs analysis, this study offers an alternative approach to ethnoscience studies, which emphasizes the importance of the perspective of education practitioners in the development of teaching materials and education policies based on local culture.

As a policy implication, policymakers and curriculum developers should encourage the development of more contextual science textbooks by providing flexibility for integrating local culture without neglecting national standards. Textbook procurement and assessment policies also need to include indicators of ethnoscience integration as one of the criteria for teaching material quality. For textbook developers and publishers, these findings suggest the need to integrate local culture not only as illustrations or additional examples, but also as the primary context in presenting scientific concepts, learning activities, and evaluation. The development of ethnoscience-based textbooks should involve collaboration with educators, local cultural experts, and local communities so that the content produced is authentic and applicable.

Meanwhile, for science teachers, the results of this study emphasize the importance of the teacher's role as a bridge between the national curriculum and the local context. Teachers are encouraged to utilize the potential of local culture as an alternative learning resource, either by adapting existing textbook material or developing contextual teaching materials, while waiting for the availability of more representative culture-based science textbooks. Overall, these recommendations are expected to form the basis for systematic efforts to strengthen the integration of ethnoscience in science education, so that science learning is not only oriented towards mastery of concepts, but also relevant to the social and cultural realities of students.

RECOMMENDATIONS

Based on research findings, the development of science textbooks should be carried out with greater emphasis on the explicit, in-depth, and sustainable integration of local culture in each learning topic. It is necessary to develop textbooks or accompanying teaching materials that not only present local culture as illustrations, but also process it into scientific phenomena that can be tested, analyzed, and used as a context for meaningful learning. Teachers also need support in the form of teaching modules, culture-based worksheets, videos, and ethnoscience learning model guides so that the implementation of local culture is not situational. In addition, continuous training is necessary for teachers to enable them to identify scientific values in local culture and link them to science competencies. Educational institutions and local governments are advised to provide policy support and cultural resources as part of efforts to strengthen learning based on local wisdom and traditions. Further research can expand to include the student perspective, analyzing representative content of science textbooks directly and developing prototypes of ethnoscience-based science teaching materials for future testing to assess their effectiveness in improving students' scientific and cultural literacy.

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