Integration of Local Wisdom in the Development of Science Curriculum in Indonesia and Cambodia

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ABSTRACT

Cultivating science education through local wisdom provides a pathway to design a curriculum that is both contextually relevant and culturally responsive. This study explores the development and implementation of a local wisdom-based science curriculum in Indonesia and compares its relevance to educational practices in Cambodia. In Indonesia, the integration of cultural values and natural potential into science learning is realized through local traditions such as *Reog Ponorogo* for teaching biodiversity, *Dawet* traditional food for studying mixtures and their changes, and *Eco Brick* and *Eco Print* projects in the Pancasila Student Profile (P5) program to enhance environmental awareness. These practices enrich classroom instruction and connect students' cultural identities with scientific understanding. Likewise, Cambodia promotes culturally responsive teaching by embedding local culture, environmental contexts, and traditional knowledge into its science curriculum. Data from student surveys in both countries indicate that this integration increases students' engagement, interest, and conceptual comprehension. The findings suggest that a local wisdom-based curriculum not only advances science education but also preserves and promotes cultural heritage. Embedding indigenous values and community practices into education strengthens students' character, ecological awareness, and appreciation of cultural identity. Overall, integrating local wisdom contributes to sustainable, inclusive, and meaningful learning experiences, offering valuable insights for curriculum development in culturally rich regions such as Indonesia and Cambodia.

Keywords: Local wisdom, science education, curriculum development, cultural integration, contextual learning

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Introduction

Education plays a crucial role in shaping the character, identity, and cultural awareness of a nation. It functions not only as a means of transferring knowledge but also as a medium to build students' sense of identity. In this context, science education serves a dual purpose: to provide theoretical understanding and to develop critical thinking, analytical skills, and problem-solving abilities relevant to real-life situations (Arif & Muhanifah Izah Salsabila, 2022). One emerging approach in science learning is the integration of local wisdom into curriculum design. This approach aims to make learning more meaningful and contextually relevant by linking scientific concepts to students' cultural backgrounds, traditions, and local environments (Ramdani et al., 2023). Consequently, science learning can stimulate cognitive, affective, and psychomotor development simultaneously, enabling students to apply theory in practical, culturally familiar contexts.

However, the implementation of science learning in Indonesia still faces significant challenges. Data from the Ministry of Education, Culture, Research, and Technology (MoEC, 2023) show that around 68% of science teachers still rely on traditional lecture-based instruction, while only 25% integrate lessons with students' local contexts. This indicates that local potential remains underutilized as a learning resource. As a result, many students struggle to connect scientific concepts with real-world experiences, reducing their engagement and comprehension (I. K. D. A. S. Putra & Sulatri, 2023). Ilhami (2019) also found that only 35% of junior high school students demonstrated a good understanding of how local culture relates to environmental literacy. Local wisdom often appears only as supplementary material, rather than being fully integrated into learning activities (Rusli & Azmidar, 2023).

Indonesia's rich diversity reflected in its motto *Bhinneka Tunggal Ika* illustrates the importance of maintaining cultural identity through education. Integrating local wisdom into science learning is thus an essential strategy to foster cultural preservation and national character (Sakti et al., 2024). Similarly, in Cambodia, growing attention has been given to incorporating indigenous knowledge and community-based practices into science education. Scholars and policymakers advocate for culturally responsive pedagogy that enhances engagement, relevance, and environmental understanding (Papa, 2020). Local wisdom, with its intergenerational values, practices, and ecological insights, offers immense potential to contextualize learning and connect abstract science concepts to daily life.

Practical examples can be found in MTs Al Islam Joresan, Indonesia, where science lessons incorporate cultural elements such as *Reog Ponorogo* to teach biodiversity, traditional *Dawet* food to explain mixtures and their changes, and Eco Brick and Eco Print activities in the *Pancasila Student Profile (P5)* program to foster environmental awareness. In Cambodia, indigenous practices embedded in daily lif such as sustainable rice cultivation systems illustrate ecological principles while reinforcing cultural identity and environmental responsibility (Semali & Kincheloe, 1999). These examples show that integrating local wisdom can simultaneously promote conceptual understanding, cultural appreciation, and environmental ethics among students.

Based on these observations, the present study investigates how the integration of local wisdom within the science curriculum in Indonesia and

Cambodia can enhance students' conceptual understanding while cultivating awareness and appreciation of cultural heritage. Specifically, this research seeks to explore the extent to which cultural values derived from local environments can enrich learning processes and make them more meaningful and contextual for students. Using a descriptive qualitative approach (Waruwu, 2024), this study analyzes the implementation of local wisdom-based science curricula and their impacts on students' engagement and attitudes toward local culture.

At the end of this section, it is important to note the research gap and novelty of this study. Although previous research has highlighted the importance of contextual learning and cultural integration, few have compared the implementation of local wisdom-based science curricula across countries. This study therefore contributes to filling that gap by providing a comparative analysis between Indonesia and Cambodia, offering empirical evidence of how contextualized, culture-based approaches can effectively enhance science education. The main objectives of this research are to know how local wisdom is integrated into the science curriculum in two different countries. The contribution of this study lies in proposing a pedagogical model that integrates local wisdom as a core element of science learning to strengthen both academic competence and cultural identity.

Method

This study employed a qualitative research approach with an implementation case study design to explore the integration of local wisdom in science curriculum development in Indonesia and Cambodia. The research aimed to gain an in-depth understanding of how local culture and traditional practices are embedded into science learning and how such integration impacts students' engagement and comprehension. The study followed several systematic stages, including problem identification, instrument preparation, data collection, and data analysis.

Research Design

The research adopted a descriptive qualitative case study design focusing on real classroom practices that incorporate local wisdom elements. This design was chosen to allow a comprehensive exploration of the teaching and learning process within its natural context. The design followed the interpretive paradigm, emphasizing meaning-making from participants' perspectives and the cultural environment where the learning occurred (Creswell, 2018). The study sought to describe how local traditions, community practices, and environmental values were integrated into science instruction and curriculum structures.

Participants

The participants in this study were science teachers in junior high schools in Indonesia and Cambodia. The Indonesian participants were teachers from MTs Al Islam Joresan, Ponorogo, while the Cambodian participants were teachers from Phnom Penh Teacher Education College. Participants were selected using purposive sampling to ensure that they had direct experience in implementing local wisdom-based science learning. Ethical considerations, including voluntary

participation, informed consent, and confidentiality, were strictly observed throughout the research process.

The participants in this research included science teachers, students, and curriculum coordinators from selected schools in Indonesia (MTs Al Islam Joresan) and Cambodia (Phnom Penh Teacher Education College). The selection of participants used a purposive sampling technique, ensuring that each respondent had direct experience with the implementation of local wisdom-based science learning. In total, the study involved 10 teachers and 60 students across both countries, representing various cultural and educational settings. The participation of teachers and students was voluntary, and ethical considerations such as informed consent and confidentiality were strictly observed throughout the research process.

Data Collection Procedures

Data were collected through participatory observation, in-depth interviews, and document analysis. Participatory observation was conducted to directly observe teaching and learning processes that reflected the integration of local culture, such as Reog Ponorogo performances in biodiversity lessons and Eco Print activities in environmental education. In-depth interviews were carried out with teachers, students, and curriculum developers to explore their understanding, perceptions, and experiences in applying local wisdom to science learning. Meanwhile, document analysis involved reviewing lesson plans, curriculum documents, and school policy papers related to local wisdom-based learning implementation. All instruments used in the research were developed and validated through expert consultation to ensure their relevance and credibility.

Data Analysis

The collected data were analyzed using the narrative analysis method, which focuses on constructing descriptive narratives to interpret participants' experiences and contextualize the meaning behind local wisdom integration. The analysis involved three stages: data reduction, data display, and conclusion drawing (Miles, Huberman, & Saldaña, 2014). Patterns, themes, and relationships were identified to reveal how local values were embedded into science education and their impact on students' character development and learning engagement. The results of the analysis were then interpreted in light of the theoretical framework proposed by Sarumaha et al. (2024), which suggests that integrating cultural and contextual knowledge into the curriculum strengthens students' cultural identity and promotes more meaningful science learning experiences.

Results

The results of this study are presented in accordance with its main objective, to know how local wisdom is integrated into the science curriculum in two different countries namely Indonesia and Cambodia. Based on data analysis from literature reviews and field surveys, there are several themes were found:

Forms of local wisdom integrated into the science curriculum in Indonesia

Based on the curriculum, there are several activities that involve the integration of local wisdom at MTs Al Islam Joresan Ponorogo, namely intracurricular and co-curricular activities. The integration of local wisdom in intracurricular activities is the utilization of local culture such as Reog Ponorogo which is associated with biodiversity in science subjects, while the integration of local wisdom in cocurricular activities is the existence of P5 or the Pancasila Student Profile Strengthening Project by making Ecobricks and Ecoprints. According to (Susanto, 2022). Intracurricular activities are learning activities carried out through face-to-face meetings in the classroom, or it can be said that teaching and learning activities are part of the curriculum at school, while cocurricular activities are activities that are part of school activities carried out outside of class hours with the aim of helping students to explore and appreciate various materials that will be learned later in intracurricular activities (Shilviana & Hamami, 2020).

In addition, there is another form of integration of local wisdom in the curriculum at MTs Al Islam Joresan Indonesia involving science subjects, namely through the application of eco print and eco brick activities in the Pancasila Student Profile Strengthening Project (P5) which is attended by students in grades VII and VIII. These two activities not only teach practical skills and understanding of science, but are also part of the implementation of local wisdom in eco-curricular activities. Eco print, for example, introduces students to the utilization of natural materials such as leaves and flowers from the surrounding environment to produce environmentally friendly works of art, while fostering a love for local nature. Meanwhile, eco brick teaches students to manage plastic waste into simple building materials, reflecting local wisdom values related to environmental awareness and creative waste management.

Figure 1. Eco-Friendly Printed Tote Bag Examples

After the material presentation, the activity continued with hands-on practice in the form of making natural designs on tote bags with eco print techniques. In this practice, the leaves that have been collected by students and parents are arranged on a cloth, then ground to produce natural prints. Students'

creativity is very visible in this process, because they are given the freedom to determine their own motifs or print patterns. The school provides tote bags as printing media, while the collection of various types of leaves is done independently by students and assisted by parents. This form of parental involvement is a reflection of the integration of local wisdom that not only involves students, but also strengthens the relationship between school, family and the environment.

In contrast to ecoprints that utilize natural resources in the form of leaf diversity, there are ecobricks that utilize plastic waste as a waste container. According to (Fatchurrahman, 2018) Eco Brick is a method of reducing plastic waste, in which used plastic bottles are filled with various plastic waste and then compacted until they become hard. After the bottle is full, the plastic bottles can be assembled and glued together using glue, which can later be used to make tables, chairs, towers, container fences, and so on. In the eco brick activity at MTs Al Islam Joresan, the plastic bottles are transformed into trash cans that are placed in front of each class. Before the practice begins, the science teacher will give an initial explanation related to environmental pollution and the utilization of plastic waste and eco brick making techniques. After the material is delivered, the activity continues by assigning students to find plastic bottles and plastic waste in the neighborhood around their homes. In collecting these materials, parents, friends, and the community around the student's neighborhood are involved, which is a reflection of the integration of local wisdom.

Figure 2. Eco Brick Product Examples

This activity can also help the environment around students become cleaner from plastic waste. After all the materials are collected, each class will work together to make eco bricks according to the theory that has been delivered by the science teacher before, in this manufacturing practice each class is accompanied by a teacher to supervise and guide. After the plastic bottles are arranged into a trash can, the results of each class will be placed in front of each class. So that in this eco brick and eco print activity, science teachers are directly

involved as companions and mentors, so that scientific values remain the basis of practice. The teacher not only plays a role in delivering the material, but also ensures that the manufacturing process runs well and safely, and encourages students to link their experiences with the science concepts they have learned. In addition, according to (Citrawan dkk., 2024). Learning that integrates local wisdom can increase student engagement and support character development according to the Pancasila student profile.

Forms of local wisdom integrated into the science curriculum in Cambodia

Meanwhile, based on the results of research on the integration of local wisdom in curriculum development in Cambodia, the Cambodian Ministry of Education, Youth and Sports (MoEC) has refined curriculum reform by integrating local culture, environment and traditional concepts into the syllabus of primary and secondary education. The current science curriculum enhances inquiry-based learning with advocacy for linking lessons to local contexts (Chhy & Kawai, 2025). These reforms are in line with UNESCO's Education for Sustainable Development (ESD) framework which justifies blending current science with local concepts for lifelong learning (Papa, 2020).

The influence of local wisdom integration on students' understanding and involvement in learning in Indonesia

The integration of local wisdom into the science curriculum at MTs Al Islam Joresan shows that contextual learning can improve student motivation and understanding. In this case, the use of animals from reog Ponorogo as a depiction of biodiversity gives students the opportunity to learn about their environment directly. By getting to know the animals, students not only learn to recognize the species, but also understand the cultural values attached to each animal in the reog performance. Furthermore, learning about mixed substances through es dawet shows how traditional food can be an effective learning medium. Students learn about the process of mixing ingredients and the changes that occur, while enjoying a drink they are familiar with. This approach makes the learning material more vivid and relevant, making it easier for students to remember the concepts taught. The implementation of local wisdom-based learning has a positive effect on students' learning motivation. Learning that integrates values, culture, and the surrounding environment makes students more interested, active, and enthusiastic in participating in the learning process (Kurniawan et al., 2023).

Table 1. Frequency of Respondent Scores Student Questionnaire Statement on Learning Based on Local Wisdom

No	Revelation	Likert Scale				
		1 (strongly disagree)	2 (Disagree)	3 (Netral)	4 (Agreed)	5 (Strongly agree)
1	I often learn about local culture and traditions at school	0%	0%	60%	40%	0%
2	I feel that lessons related to daily life are easier to understand	0%	0%	0%	60%	40%

No	Revelation	Likert Scale				
		1 (strongly disagree)	**2 (Disagree)**	**3 (Netral)**	**4 (Agreed)**	**5 (Strongly agree)**
3	I became more concerned about the surrounding environment after learning local wisdom	0%	0%	20%	80%	0%
4	I feel proud of the local culture and traditions I learned	0%	0%	0%	20%	80%
5	Learning based on local wisdom makes me more active in school activities	0%	0%	100%	0%	0%
6	I was able to connect school lessons with the activities of the community around me	0%	0%	20%	80%	0%
7	I feel more aware of the importance of environmental sustainability	0%	0%	0%	20%	80%

Based on the data in the table above, it can be seen that the majority of students give positive responses to statements related to local wisdom-based learning. In the first statement, 60% of students stated neutral and 40% agreed that they often learn about local cultures and traditions at school. Meanwhile, on the second statement regarding the ease of understanding lessons related to daily life, 60% agreed and 40% strongly agreed, indicating that the contextual approach really helps their understanding. In the third statement, 80% of students strongly agreed and 20% agreed that learning local wisdom increases concern for the environment. This shows that the integration of local values in science also increases ecological awareness. Furthermore, the fourth statement shows that 80% of students feel very proud of the local culture they learn, while the remaining 20% agree. This reflects the success of learning in fostering a sense of belonging to one's own culture.

The fifth statement shows that all students (100%) feel more active in school activities when the material is delivered through a local wisdom-based approach. This is in line with previous findings that approaches that are relevant to students' lives encourage higher participation. In the sixth statement, 80% of students agreed and 20% were neutral that they were able to connect lessons at school with activities in the surrounding community, indicating an increased relevance between the subject matter and social reality. As for the seventh statement, 80% of students strongly agreed and 20% agreed that they became more aware of the importance of environmental sustainability. Overall, the questionnaire results show that students not only understand the science material better through local wisdom-based learning, but also show improvement in affective aspects such as environmental awareness, cultural pride, and involvement in school activities. Thus, this approach is proven to be able to create a more meaningful, enjoyable learning experience and build connections between science and students' daily lives.

The influence of local wisdom integration on students' understanding and involvement in learning in Cambodia

Table 2. Frequency of Respondent Scores of Cambodian Student Questionnaire Statements on Learning Based on Local Wisdom

No	Revelation	Likert Scale				
		1 (strongly disagree)	2 (Disagree)	3 (Netral)	4 (Agreed)	5 (Strongly agree)
1	I often learn about local culture and traditions at school	0%	0%	57%	43%	0%
2	I feel that lessons related to daily life are easier to understand	0%	0%	3%	87%	10%
3	I became more concerned about the surrounding environment after learning local wisdom	0%	0%	20%	80%	0%
4	I feel proud of the local culture and traditions I learned	0%	0%	4%	22%	74%
5	Learning based on local wisdom makes me more active in school activities	0%	0%	60%	30%	10%
6	I was able to connect school lessons with the activities of the community around me	0%	0%	13%	70%	17%
7	I feel more aware of the importance of environmental sustainability	0%	0%	3%	10%	87%

The results of a survey of 30 Grade 6 students showed that the integration of local wisdom in science learning had mixed impacts. A total of 43% of students agreed that they often learn about local culture and traditions at school, although another 57% were neutral, indicating a need for increased integration of local materials in the curriculum. The majority of students (87% agreed and 10% strongly agreed) felt that lessons related to daily life were easier to understand, signaling the effectiveness of the contextual approach. A total of 80% of students also stated that learning local wisdom increased their concern for the environment and the surrounding community. Pride in local culture was also high, with 74% strongly agreeing and 22% agreeing that they felt proud to learn about their own culture. However, only 40% of students felt more active in school activities because of local wisdom-based learning, while the other 60% were neutral, indicating that student engagement could still be improved with a more interactive approach. As many as 87% of students also stated that they are more aware of the importance of environmental sustainability, and another 87% linked school lessons to community activities, reflecting the success of integrating local values with formal education in shaping relevant and meaningful understanding.

Discussion

Based on the results of our research on the integration of local wisdom in curriculum development in Indonesia, more precisely at MTs Al Islam Joresan Ponorogo, which has three curricula, namely the modern pesantren curriculum, the salaf curriculum, and the Ministry of Religion (Kemenag) curriculum. The pesantren has three different curricula that aim to form learners or students who are balanced in general and religious knowledge, so that one day they are ready to face future challenges and what they learn can be useful in society. Madrasahs or schools organized in Islamic boarding schools use the same curriculum as those in other madrasahs or schools that have been standardized by the Ministry of Religious Affairs and the Ministry of Cultural Education. Other formal educational institutions organized by boarding schools, in addition to madrasah and schools, the curriculum is prepared by the organizers or boarding schools concerned (FARISI, 2024).

The curriculum in pesantren covers all aspects of life, both in carrying out relationships with fellow humans and with nature. However, due to the demands of progress, some pesantren have adopted and integrated the state curriculum into the pesantren curriculum which aims to produce students who not only have religious knowledge, but also have general knowledge, both of which can go hand in hand and are useful for students' lives in the future(W. Putra et al., 2025). Based on the curriculum, there are several activities that involve the integration of local wisdom at MTs Al Islam Joresan Ponorogo

According Table 1 Frequency of Respondent Scores Student Questionnaire Statement on Learning Based on Local Wisdom we found that the integration of local wisdom in the science curriculum at MTs Al Islam Joresan in the country of Indonesia has a positive impact on students' understanding. First, the use of animals in reog Ponorogo as examples in biodiversity material has successfully attracted students' interest. Students showed an increase in their understanding of the animal species around them and the relationship between biodiversity and local culture. Secondly, when the material about mixed substances and their changes was taught through es dawet, students found it easier to understand the scientific concepts taught. Students can see first-hand how natural ingredients mix and produce a familiar end product. This step not only encourages students' active participation in the learning process, but also makes it easier for them to connect theoretical concepts with experiences and activities they encounter in their daily lives. Based on this, it can be concluded that students' perceptions of local wisdom-based learning tend to be positive. This can be seen from the majority of students who agree and strongly agree. The results of student perceptions obtained also show that the integration of local wisdom in the science curriculum at MTs Al Islam Joresan Ponorogo has a significant impact on student perceptions of learning science materials at MTs Al Islam Joresan Ponorogo. Most students reported that they understood the lesson better when the material was taught by linking it to everyday life.

Learning that integrates local wisdom into learning materials at school is proven to strengthen students' connection with their own culture, making the learning process more meaningful. When learning materials are linked to everyday life, students not only understand concepts more easily, but also show increased concern for environmental and social issues around them. A sense of pride in the local culture studied encourages active engagement in school activities

and the ability to relate science to the reality of society, which ultimately contributes to the formation of strong character, social awareness and cultural identity. Local wisdom-based learning, such as the introduction of biodiversity through animals in Reog Ponorogo, helps students link science to their culture, making the learning process more relevant and memorable for students. Increased participation in school activities shows that this approach makes the learning atmosphere more interactive and fun. Relevant engagement with students' lives also builds motivation and a sense of appreciation, which are important for creating a positive learning environment.

P5 is a co-curricular activity or one that is carried out outside the core learning in the classroom, but is still related to the learning objectives, which aim to prepare students to become Indonesian students who are skilled, have strong character, and behave in accordance with the values of Pancasila (Melati et al., 2024). Eco print and eco brick activities are one of the efforts to utilize natural resources and waste effectively and sustainably. According to (Hikmah & Retnasari, 2021). The eco print technique is a method of coloring white cloth by utilizing plants that contain natural pigments to produce motifs and colors directly on the surface of the fabric, or it can be called batik with leaves on white cloth. So that eco print is an effective learning media in understanding the concept of biodiversity, especially in leafy plants. The white cloth used is a tote bag so that students can make a bag to carry books. Before the practice, the science teacher explains about biodiversity by focusing on various types of leaves as the basic material for eco print, so that students understand the shape, color, and unique structure of each leaf (Sari & Muthmainnah, 2023)

Based on the research results, it also shows that P5 activity also have a positive impact on learning Although ecoprint activities have a positive impact on learning, their implementation faces challenges, especially in managing large numbers of students during practice. This difficulty makes the learning process less optimal if done all at once. To overcome this, the activity is divided into two days so that student management is more orderly and each participant gets maximum learning opportunities. This time division also allows teachers to pay more attention to each student. Thus, learning runs more effectively and the classroom atmosphere becomes more enjoyable. Positive responses and high student interest in this activity are indicators of the success of the contextual approach based on local wisdom (Kamswara, 2023)

Overall, the eco print activity not only provides an understanding of biodiversity through a fun and creative approach, but also creates a collaborative space between school and family. Through this activity, students learn to recognize and utilize the natural resources around them wisely, while fostering concern for the environment. By integrating local elements and community involvement, science learning becomes more meaningful and contextualized in accordance with the objectives of the Merdeka curriculum (Busro, Al-kindi Nur Fuadi, Inka Alamanda Al-Kautsar, 2023).

Meanwhile in a different country, the Cambodian Ministry of Education, Youth and Sports (MoEC) has refined curriculum reform by integrating local culture, environment and traditional concepts into the syllabus of primary and secondary education. The current science curriculum enhances inquiry-based learning with advocacy for linking lessons to local contexts (Chhy & Kawai, 2025). And Based on the survey results, we can know that almost the majority of students

feel helped and in understanding lessons and making students not forget local wisdom or culture contained in their area. So that students not only get new lessons but can also recognize and remember the local wisdom found in the surrounding environment. According to (Imaduddin dkk., 2020) integrating local wisdom into school science learning not only makes the curriculum more relevant but also significantly improves student understanding because the material becomes more contextual, meaningful, and interesting to them.

Based on the results of the integration of local wisdom in the science education curriculum in Indonesia and Cambodia, we can compare the integration of local wisdom in the curriculum in Cambodia with its application in MTs Al-Islam Joresan Indonesia. This comparison is made based on aspects of implementation, the results of student perceptions, and the impact on student understanding, attitudes, and involvement. Cambodia is a developing country that has a national policy that supports the integration of local wisdom into education. Meanwhile, MTs Al-Islam Joresan Indonesia applies local wisdom through a direct learning approach that is linked to tradition and the surrounding environment. In terms of integration models, Cambodia carries an approach through the national curriculum and contextual inquiry, while MTs Joresan integrates local wisdom in science learning as well as P5 activities (Pancasila Student Profile Strengthening Project) such as Reog, Dawet, eco brick, and eco print.

The research survey in Cambodia involved 30 6th grade students using a 7-item survey on a Likert scale. Meanwhile, at MTs Joresan, a similar survey was conducted on 30 students accompanied by observations and interviews. The results showed that in terms of contextual understanding, 87% of students in Cambodia felt that lessons were easier to understand when linked to everyday life. In Joresan, 60% of students agreed and 40% strongly agreed that contextualized lessons were easier to understand. In terms of cultural pride, Cambodian students indicated 74% strongly agreed and 22% agreed, while in Joresan, 80% strongly agreed and 20% agreed. Regarding environmental issues, 80% of students in Cambodia said they agreed, while in Joresan, 80% strongly agreed and 20% agreed, indicating higher environmental awareness. In terms of student involvement in school activities, 60% of Cambodian students answered neutral and 30% agreed, while in Joresan, all students (100%) felt more actively participated. For social relevance, 70% of Cambodian students agreed that they could relate lessons to community activities, while in Joresan, 80% agreed and 20% were neutral. In terms of the application of ecopedagogy, Cambodian students showed increased environmental awareness with 87% strongly agreeing, while MTs Joresan directly practiced environmentally friendly activities such as eco bricks and eco prints that also involved families and surrounding communities. Where ecopedagogy is a type of learning based on love, participation, and creativity. The application of ecopedagogy aims to instill environmental character values for generations. This can be done by integrating ecological understanding into the curriculum and subjects, as well as through the use of relevant learning methods or media (Isna Aulia Adzani dkk., 2024). In conclusion, both studies show that the integration of local wisdom in science learning is able to improve students' understanding and positive attitudes towards culture and the environment. However, MTs Al-Islam Joresan stands out in terms of practical application, community involvement, and affective influence on

students. On the other hand, Cambodia has the advantage of national policy support and a more structured theoretical framework.

Thus, the integration of local wisdom into the science curriculum provides extensive benefits, not only contributing to the improvement of students' science literacy, but also playing an important role in strengthening their cultural identity. By linking learning materials to the context of everyday life, students are encouraged to better understand and appreciate their cultural heritage and the surrounding environment. Beside that, many students find this learning interesting, because it is integrated with the culture and environment around the school, thus strengthening the impression of learning (Susanti & Nurhayati, 2025). This not only forms a deeper understanding of science concepts, but also fosters social and ecological awareness. ntegrating local wisdom into the curriculum significantly enriches students' understanding of the lessons. By learning scientific concepts through the lens of local wisdom, students develop a deeper and more holistic understanding. In addition, the use of problem-based learning (PBL) models integrated with local wisdom is also effective in improving students' critical thinking skills, encouraging them to analyze problems and seek solutions relevant to their environment. On the other hand, this integration also sensitizes students to the local wisdom of their environment. It encourages students to value their own cultural heritage, realizing that scientific knowledge is not only sourced from global theories but also from the practices and wisdom of their ancestors. Learning that integrates local wisdom with environmental issues, can equip them to understand environmental problems, identify their causes, and develop solutions. Ultimately, it encourages students to take social and environmental responsibility, making them active agents of change in environmental preservation and sustainability efforts (Pangsuma dkk., 2024).

Therefore, the role of educators is very important in designing a curriculum that harmonizes aspects of science and local wisdom. Teachers are one of the main components of education along with students and curriculum, which must interact in the school environment so that the teaching and learning process runs according to goals. Teachers are required to be professional in educating and behaving, not only in teaching tasks but also in the community. The role of teachers is indispensable because they are the main figure who is a source of inspiration and motivation for students, and has a great responsibility to create a young generation with character, culture and morals. Teachers are expected to be able to adapt and manage learning to be in line with the curriculum, and are required to be innovative in creating optimal learning outcomes by translating valuable experiences and policies into a more modern and acceptable language for students. The lack of a teacher's role in the learning process at school can cause children's understanding to decrease, especially in elementary school children who still lack the ability to capture what they see and hear. Teachers are the determinants of success in achieving quality education goals (Yestiani & Zahwa, 2020).

The contextual curriculum allows the learning process to be more relevant, interesting and meaningful, while shaping the character of students who are not only academically intelligent, but also rooted in the cultural values of their nation. Because the curriculum holds a strategic position as the main guideline in education, which directly determines the quality of student understanding and the achievement of national education goals. Although curriculum changes have

positive aims to adapt education to the times and address previous shortcomings, as well as enable students to learn to keep up with progress, too rapid a transition can lead to problems such as a decline in student achievement due to difficulties adapting to the new learning system. This is also exacerbated by the challenges for educators in understanding and implementing the new curriculum effectively, as well as the long socialization time (Setyorini dkk., 2023). So as educators must be good at adapting and making learning as interesting and creative as possible in an effort to increase student understanding in learning. Learning approaches that link science with local values encourage the formation of a generation that is more concerned about culture and the surrounding environment. This shows the importance of the role of educators in designing a curriculum that integrates local aspects and science to create a more contextual and meaningful learning process.

The results showed that the integration of local wisdom in the curriculum in two different countries, namely Indonesia and Cambodia, had a significant effect on the quality of learning. Where according to (Punaji Setyosari, 2014). Quality learning can be achieved when learning is easily understood, remembered, and applied by students, supported by teachers who are adept at managing time, presenting teaching materials as needed, monitoring progress, and providing practice opportunities. It also relies heavily on the appropriate application of the QAIT (Quality, Appropriateness, Incentives, Time) effective learning model, where quality learning refers to information that is easy to learn, an appropriate level of learning that ensures student readiness, motivates students, and sufficient time allocated for learning. Cooperation between learning components such as standards, objectives, content, strategies, media, learning resources, and assessment, as well as an adequate and student-centered learning environment, are also determinants in creating high-quality learning. In addition, quality learning requires teachers to effectively design, implement, and assess the learning process, increase student engagement, use assessment for learning, and implement positive behavior management strategies. Quality learning also includes students who are healthy and ready to learn, a safe and supportive environment, a relevant curriculum, and a child-centered learning process with appropriate assessment to achieve comprehensive learning outcomes, which include knowledge, skills, and attitudes of learners. Based on the explanation put forward by Setyosari above, a curriculum that is creative and in accordance with the needs of students is also one of the determining factors for quality learning. One example of its application is by integrating local wisdom in the curriculum.

This approach provides a more meaningful learning experience because students can connect the subject matter with the culture and environment they know directly. When science concepts are linked to local practices or traditions, such as community customs or the utilization of natural resources around them, students not only understand the theory cognitively but also gain a deep contextual understanding. This makes learning not abstract and far from reality, but part of students' daily lives. This process encourages students' active involvement in learning as they find the lessons more relevant, interesting and close to their personal experiences. Thus, the integration of local wisdom not only improves academic understanding, but also strengthens students' emotional attachment to their culture, and fosters higher curiosity about science. According to (Lestari dkk., 2024), the integration of local wisdom in the context of education can strengthen students' understanding.

This approach also shows that science education should not be separated from the social and cultural context, but can be developed harmoniously to create a complete and empowering learning process. According to (Andriani & Effendy, 2024), local wisdom-based education not only helps create a friendly and inclusive learning atmosphere, but also strengthens students' cultural identity, thus showing that the integration of local wisdom in education is important for the development of various aspects of students' understanding, learning, and culture.

Conclusion

This research proves that the integration of local wisdom in the science curriculum in Indonesia and Cambodia has a significant positive impact on students' understanding and motivation to learn. In Indonesia, contextual learning that links science with local culture, such as the use of animals in Reog Ponorogo and the practice of making dawet, has successfully increased students' interest and engagement. In addition, eco print and eco brick activities not only strengthen the understanding of natural resources and waste management, but also involve parents and the neighborhood, thus creating a collaborative and meaningful learning environment. Despite challenges in implementation, this approach has proven to be effective and relevant to students' daily lives. Meanwhile, education in Cambodia has undergone significant curriculum reforms, with the Ministry of Education, Youth and Sports (MoEYS) integrating local culture, environment and traditional concepts into the syllabus of primary and secondary education. The current science curriculum in Cambodia also enhances inquiry-based learning, encouraging the linking of lessons to local contexts. These reforms are in line with UNESCO's Education for Sustainable Development (ESD) framework, which supports the integration of science with local concepts for learning. Where Cambodia has reformed its curriculum by integrating local culture, environment, and traditional concepts into primary and secondary education syllabi, as well as enhancing inquiry-based learning that links lessons to local contexts, in line with UNESCO's Education for Sustainable Development framework. Meanwhile, MTs Al-Islam Joresan in Indonesia integrates local wisdom through hands-on science learning and Pancasila Student Profile Strengthening Project (P5) activities, utilizing cultural elements such as Reog Ponorogo and traditional dawet food, as well as "eco brick" and "eco print" projects. Although both countries have differences in integrating local wisdom in the curriculum, the integration of local wisdom in the science curriculum in both countries, namely Indonesia and Cambodia, has a positive impact on students' understanding of learning and strengthens the cultural identity of each country. Therefore, it is very important for educators to continue to develop curricula that effectively integrate elements of local wisdom to form a generation that respects culture and the environment and has a strong character and social awareness. Further research is recommended to explore more innovative and sustainable methods in implementing local wisdom integration, as well as examining its long-term impact on students' academic achievement and character development. In addition, wider involvement from various stakeholders, such as the community and local government, is expected to strengthen the implementation of local wisdom in education.

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