JPPIPA 11(10) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Analysis of the Implementation of An Ethnoscience-Based Learning Approach in Elementary Science Education

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Received: August 07, 2025
Revised: September 04, 2025
Accepted: October 25, 2025
Published: October 31, 2025

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DOI: 10.29303/jppipa.v11i10.12450

Abstract: Ethnoscience highlights local culture and wisdom as learning resources, making science education more meaningful. This study aims to analyze the implementation of an ethnoscience-based learning approach to assist teachers in improving the quality of science education in elementary schools in accordance with students' needs. The sampling technique used was purposive sampling, involving 4 elementary schools in Golewa Subdistrict, Ngada Regency. Data collection methods included interviews, document analysis, literature review, and questionnaires. The data were analyzed using a descriptive qualitative approach. Based on data analysis and discussion, the following conclusions were drawn: The implementation of ethnoscience-based learning in science education has not been fully adopted by teachers in the 4 schools due to limited access to reading materials, teaching modules, instructional media, and a lack of teacher training in ethnoscience-based instruction. There is insufficient policy support from both the government and schools. There is a lack of specific training programs for teachers on ethnoscience-based learning. 4) There are limited resources and minimal support from school policies. This study shows that the implementation of ethnoscience-based learning requires adequate skills and resources from teachers. Better support in the form of teacher training, provision of sufficient teaching tools and materials, and effective time management is essential to improve the quality of science learning in elementary schools in Golewa Subdistrict.

Keywords: Elementary School Students; Ethnoscience; Learning Approach

Introduction

In today's era of globalization, students are more familiar with foreign cultures and less aware of the local culture and wisdom inherent in Indonesian society, leading to a gradual decline in students' sense of nationalism (Aza, 2020). Indonesia, as an archipelagic country with thousands of ethnic groups, languages, and traditions, possesses an extraordinary wealth of culture. However, amid rapid modernization—especially driven by technological advancement and globalization—many local cultures are beginning to fade. This phenomenon is not only occurring in urban areas but has also reached regions previously known as guardians of tradition. The fast and global flow of information makes foreign cultures, often seen as more appealing and relevant, increasingly dominant. This is also happening in Ngada Regency, Flores, East Nusa Tenggara (NTT), where the younger generation from elementary to high school levels are gradually forgetting local cultural traditions, traditional clothing, foods, folktales, traditional games, traditional houses, and cultural heritage. This raises a critical question: How can we embrace progress without losing the long-standing local cultures that define us?. (Sari, n.d.)

How to Cite:
Lawe, Y. U., Dolo, F. X., & Uta, A. (2025). Analysis of the Implementation of An Ethnoscience-Based Learning Approach in Elementary Science Education. *Jurnal Penelitian Pendidikan IPA*, *11*(10), 939–948. https://doi.org/10.29303/jppipa.v11i10.12450

Many traditional ceremonies that were once an integral part of the community's social life have now become mere formal events, losing their deeper meaning. This globalization process compels us to follow current trends, but without realizing it, we are beginning to forget the traditions that form the roots of our culture. This phenomenon has a significant impact on the survival of local cultures. Traditions that have been preserved for hundreds of years are at risk of disappearing if no efforts are made to safeguard them. Moreover, the tendency to adopt foreign cultures en masse threatens to erode the nation's identity. If local culture continues to fade, what will distinguish us from other countries? We risk becoming a nation without a clear identity, merely following the ever-moving tide of global influence without understanding its limits (Akmal, 2021).

In facing this change, we do not have to choose between progress and the loss of culture (Thaniah & Diliarosta, n.d., 2020). What is needed is an effort to maintain a balance between the two. The preservation of local culture must begin with education. Schools and other educational institutions need to more actively introduce local culture to children, both through formal lessons and extracurricular activities that involve local arts and traditions. In this way, the younger generation can understand and appreciate the importance of their cultural heritage (Mayasari, 2017). The novelty of this research lies in analyzing ethnoscience integrated into learning, specifically focusing on the ethnoscience of Ngada local culture, which consists of three ethnic groups: the Ngadhu–Bhaga ethnic group, the Soa ethnic group, and the Riung ethnic group. The aspects analyzed include reading materials, teaching modules, and learning media.

To ensure the continued existence of local culture and wisdom, students—as the future generation—must be instilled with a love for their cultural heritage by integrating cultural knowledge into the learning process (Muhammad Fajriansyah, 2020). Regional culture, local wisdom, and the surrounding environment can significantly contribute to students' learning experiences in the form of cognitive (thinking patterns), affective (attitudes), and psychomotor (behavioral) aspects. Therefore, there is a need for an educational breakthrough that combines culture with science, commonly referred to as ethnoscience (Lestari & Nabila, 2024).

This research is important to conduct because, in order to develop learning that aligns with students' contexts and needs, an in-depth analysis must first be carried out to enable appropriate actions to be taken. Integrating ethnoscience learning in Ngada Regency is particularly important in elementary schools, as it helps students understand that the things around them and those they frequently encounter are part of the learning process. The purpose of this study is to analyze the implementation of an ethnoscience-based learning approach in elementary science education

Method

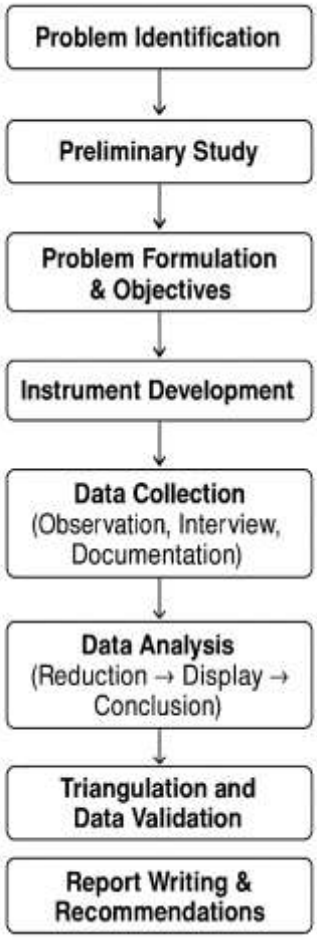

Figure 1. Research Flow

This type of research is qualitative descriptive research, aimed at analyzing ethnoscience-based learning tools used by elementary school teachers. The research procedure can be seen in Table 1

Table 1. Research Procedure

Stages	Activity Description	Results
Problem Identification	At this stage, the researcher identifies the main problems in elementary science learning, such as whether teachers have utilized local potentials (ethnoscience) in the learning process. The purpose is to determine the extent to which the ethnoscience-based approach is implemented in science learning.	Clear problem formulation and research objectives
Preliminary Study/ Literature Review	At this stage, the researcher examines theories related to ethnoscience, science learning, and contextual approaches. Initial observations are conducted in schools to understand the real conditions of science learning. Purpose: To obtain theoretical and empirical foundations for establishing the research focus.	Defined research focus and problem boundaries
Determination of Research Focus and Subjects	The researcher determines the aspects to be analyzed, such as: ethnoscience-based learning planning, implementation, and evaluation. The research subjects are elementary school teachers and students (Grades IV–VI).	Specific research focus and research subjects
Development of Research Instruments	Developing observation guides, interview guides, and documentation sheets based on ethnoscience indicators in learning.	Qualitatively valid and reliable research instruments.
Data Collection	Using three primary techniques: Interviews (exploring teachers' and students' perspectives on ethnoscience-based learning), Observations (observing the implementation of ethnoscience-based science learning in the classroom), and Documentation (collecting lesson plans, activity photos, and students' learning outcomes). Including questionnaires and literature study.	Valid research data
Data Analysis	The researcher analyzes the data in the following sequence: Data reduction: Filtering important data from observations, interviews, and documentation. Data presentation: Organizing data into narratives, tables, or charts for readability. Conclusion drawing: Identifying meanings and patterns of ethnoscience implementation in science learning.	
Data Triangulation and Validation	Data triangulation and validation are carried out through: Source triangulation: Teachers, students, documents. Technique triangulation: Observation, interviews, documentation, questionnaires, and literature review. Member check: Confirming findings with informants. Peer debriefing: Discussing with colleagues or experts	
Preparation of Research Report	Writing the research findings systematically, from field results and analysis to conclusions.	A research article or report describing the implementation of the ethnoscience approach in elementary science learning

Result and Discussion

The data used in this study consisted of observational data, interview data, questionnaires distributed to teachers and students, document analysis, and literature review conducted at four elementary schools in Golewa Subdistrict. Based on the data collected from these four schools, it was found that the implementation of ethnoscience-based learning in science education has not been properly carried out in the elementary schools of Golewa Subdistrict. The following presents the research findings.

Interview Data

Interviews were conducted with four classroom teachers who were selected as research samples from four elementary schools in Golewa Subdistrict. The interview data are presented in Table 1.

Table 1. Interview Data with Classroom Teachers

Interview Questions	T1	T2	T3	T4	Average
Understanding of ethnoscience related to Ngada and Nagekeo cultures	4	3	4	3	3.50
Implementation of ethnoscience in science learning	4	3	3	3	3.25
Concrete examples of local cultural integration	3	3	4	2	3.00
Use of local learning resources	3	2	3	2	2.50
Challenges in implementing ethnoscience	2	3	2	3	2.50
Involvement of local community figures	3	2	3	1	2.25
Student responses to ethnoscience	4	3	4	4	3.75
Suggestions for improving ethnoscience implementation	3	3	3	2	2.75

Based on the interview data presented in Table 1 above, the findings can be described as follows: the average teacher understanding of the ethnoscience concept related to Ngada and Nagekeo culture falls into the "good" category (average score of 3.5). The implementation of the ethnoscience approach in science learning has been carried out by most teachers, particularly Teacher 1 and Teacher 3 (scores of 4 and 3, respectively).

However, the involvement of local community figures in learning activities remains low, with an average score of only 2.25. On the other hand, students' responses to ethnoscience-based learning were very positive, with an average score of 3.75. This indicates that the ethnoscience approach can enhance student engagement.

Nevertheless, challenges remain in the availability of local learning resources and the suboptimal use of culturally based teaching media. Teachers also expressed the need for specialized training and contextual ethnoscience modules to support more effective implementation.

Based on the interviews, it was found that the learning process had not yet integrated contextual elements or incorporated aspects of local culture into science instruction. Teachers conducted science lessons strictly according to the material provided in the textbooks, without combining local ethnoscience with classroom learning activities. Ideally, ethnoscience-based learning should involve the use of local knowledge and locally sourced materials that are characteristic of the students' surrounding environment. This concept aims to make learning more relevant and contextual, while also enhancing students' appreciation of their cultural heritage.

This finding is supported by research conducted by Widyaningrum (2018) in elementary schools in Surakarta, which emphasizes the importance of integrating local knowledge into science learning to improve students' understanding. According to Aji (2017), ethnoscience-based learning can develop students' scientific work skills and critical thinking abilities. Furthermore, Andayani et al. (2021) argue that the ethnoscience approach can also be integrated into the development of student character.

Observation Data

Observation data were collected from four schools by examining science learning activities in classrooms selected as research samples. The results of the classroom observations are presented in Table2.

Table 2. Observation Data

Observed Aspects	CB	RS	WW	OB
Teacher connects science material with local culture	4	3	2	4
Teacher uses local media or teaching aids	3	2	1	3
Teacher involves students in ethnoscience-based discussions	4	3	2	4
Students actively share local experiences related to science content	3	3	2	3
Teacher incorporates folktales or culturally scientific practices	4	2	1	3
Contextual and environment-based learning	4	3	2	4
Exploratory activities (observing, recording, interviewing)	3	3	1	3
Total Score	25	19	11	24
Average	3.57	2.71	1.57	3.43
Category	Very Good (VG)	Fair (F)	Poor (P)	Very Good (VG)

Explanation:
Score Scale:
1 = Not Observed
2 = Slightly Observed
3 = Observed
4 = Strongly Observed

Schools:
CB = SD Citra Bakti
RS = SDI Rutosoro
WW = SDN Watuwula
OB = SDK Olabolo
Category:
VG = Very Good (Strongly Observed)
G = Good (Observed)
F = Fair (Slightly Observed)

Based on the Table 2, the observation findings can be described as follows: SD Citra Bakti and SDK Olabolo demonstrated a strong integration between science learning and local culture. Teachers actively used cultural examples such as local planting patterns, medicinal plants, and bamboo measurement units, and involved students in discussions. SDI Rutosoro fell into the moderate category; teachers had started to connect science content with the local context but had not yet optimized the use of local media or folklore. SDN Watuwula received the lowest score. Teachers had not actively incorporated local culture into science instruction. Limited media and lack of training were identified as the main challenges. From these data, it can be concluded that none of the schools have fully utilized exploratory activities, such as field visits or interviews with traditional leaders, as part of their science learning process.

Based on the findings from four elementary schools in Golewa District, it was discovered that the implementation of ethnoscience-based learning has not yet been applied contextually. Although teachers have demonstrated good preparation prior to teaching, there is still no integration of local culture within science learning activities. This study aligns with the research conducted by Yulistina Nur DS et al. (2022), which found that the planning of ethnoscience-based science learning at SDIT Al-Jihad Pedes Karawang was still not well-prepared. Even though the teachers at SDIT Al-Jihad Pedes Karawang were able to connect science material with local culture and the surrounding environment, they had not yet incorporated it into the lesson plans. This indicates the need for greater attention in designing and integrating ethnoscience-based practical activities in elementary schools.

These findings are supported by McCarthy (2018), who emphasizes that integrating local or traditional knowledge into science teaching can enhance student engagement and understanding, as such knowledge is highly relevant to students' lived experiences.

Document Analysis Data

Document analysis was conducted to examine how science learning is planned across several documents, including: Lesson Plans (RPP), Syllabus or Learning Objectives Flow (ATP), Student Worksheets (LKS), photos or documentation of learning activities, and thematic/local content books (if available). The results of the document analysis are presented in Table 3.

Table 3. Document Analysis Data

Aspects Analyzed	Findings in Schools
Explicit mention of local cultural elements in learning objectives	Found only in the lesson plans (RPP) of SD Citra Bakti and SDK Olabolo
Use of local cultural examples/illustrations (tools, processes, plants)	Present in SD Citra Bakti's student worksheet (e.g., sembung leaves, kapok, etc.)
Integration of local culture in core learning activities	Partially observed, particularly in observation or discussion sessions
Culture-based assignments (e.g., interviews with traditional leaders)	Not found in formal documents
Learning resources based on local wisdom	Found in only one school, in the form of photocopied supplemental materials
Photographic documentation of ethnoscience activities (local experiments, visits)	Available in SDI Rutosoro and SDK Olabolo

Based on the document analysis conducted in four elementary schools within Cluster V of Golewa Subdistrict, it was found that the integration of ethnoscience elements in written learning documents remains limited. SD Citra Bakti and SDK Olabolo demonstrated signs of incorporating local cultural elements in their Lesson Plans (RPP) and Student Worksheets (LKS), such as the use of local plant examples (e.g., sembung leaves and kapok trees) and discussion activities related to traditional healing practices.

Meanwhile, SDN Watuwula and SDI Rutosoro did not explicitly include ethnoscience elements in their teaching materials, although classroom practices sometimes reflected the use of local knowledge. Almost all schools have yet to include exploratory assignments—such as interviews with traditional leaders or field visits to cultural sites—as part of their formal instructional documents.

Photographic documentation showed that culture-based learning activities do take place, but these are typically informal and not structurally embedded in the learning plans. Based on these findings, it can be concluded that: 1) Learning documents do not yet fully support the explicit implementation of the ethnoscience approach. 2) Revisions of lesson plans (RPP/ATP) and the development of student worksheets (LKS) that incorporate local cultural contexts are necessary. 3) Administrative support and teacher training in developing ethnoscience-based teaching materials are urgently needed to support contextual science literacy among elementary school students.

Questionnaire Data

The questionnaire data was collected to understand the opinions and responses of teachers and students regarding ethnoscience-based learning in elementary science education. The results of the teacher and student questionnaires are presented in Tables 4 and 5.

Table 4. Teacher Questionnaire Results

Indicator	Teacher 1	Teacher 2	Teacher 3	Teacher 4
Understanding of ethnoscience	4	3	3	4
Integration of science concepts and local culture	3	3	4	3
Use of local learning media	3	2	3	2
Exploration of local culture activities with students	4	3	3	4
Ethnoscience-based assessment	2	3	3	3
Student response to ethnoscience	4	4	3	4
School support for ethnoscience implementation	2	2	3	3

Based on the table above, the following description can be provided: Teachers demonstrated a good understanding of ethnoscience (average score of 3.5). The practice of linking science with local culture—such as medicinal plants, traditional measuring tools, and agricultural patterns—has been carried out, particularly in SD Citra Bakti and SDK Olabolo. The use of local teaching media remains limited due to a lack of materials and resources. Student responses were considered positive, but institutional support—such as from school principals and the provision of facilities—is still relatively low (average score of 2.5). Training and development of ethnoscience-based teaching materials are needed to ensure more widespread implementation.

Table 5. Student Questionnaire Results

Indicator	Total Score (max 160)	Average	Category
Enjoyment of learning science when connected to local culture	136	3.4	High
Ability to mention local cultural examples relevant to science lessons	128	3.2	Medium
Increased learning motivation through the ethnoscience approach	120	3.0	Medium
Involvement in local cultural practices and exploration	112	2.8	Medium
Introduction of local tools and plants in science learning	124	3.1	Medium

Based on the table above, the following description can be made: Students expressed a strong liking for science learning that is connected to local culture, such as the use of *daun sembung* (Blumea balsamifera), bamboo measuring tools, and scientific folklore (average score 3.4). Their ability to mention relevant local cultural examples was relatively good, indicating that contextual relevance is beginning to be understood. However, student involvement still needs to be improved through more exploration activities and hands-on practice. Overall, the student response was positive, suggesting that the ethnoscience approach can increase interest in learning science.

Literature Review Data

The literature review was conducted to gather information from various sources in order to obtain a comprehensive overview of ethnoscience in education. The findings from the literature review are as follows:

1) The Concept of Ethnoscience in Science Education

Ethnoscience is knowledge developed from the traditional knowledge systems of local communities regarding nature and their environment. In the context of education, ethnoscience aims to link modern scientific knowledge with local practices derived from the cultural wisdom of the community (Sutiarso, 2021; Sumarni et al., 2022). Ethnoscience-based science education provides a context that is closer to students' lives. The integration of local culture into science learning can enhance students' understanding, as the material becomes more relevant, concrete, and contextual. The key principles of ethnoscience-based learning are: Contextualizing science content with local culture,

Integrating the values of local wisdom, Building scientific understanding from cultural experiences.

2) Contextual Science Learning and Local Content

The Merdeka Curriculum provides significant opportunities for implementing learning based on local culture. Local content is not merely a complement but can be integrated into core subjects such as science to develop scientific literacy based on local wisdom. Examples of contextual approaches in science include: Linking the respiratory system with traditional healing practices, Observing the structure and function of local plants, Using traditional measuring tools to introduce measurement concepts.

3) Relevant Previous Studies

This research also examines previous studies on ethnoscience-based learning to support the current study. The data from the review of prior research can be seen in Table 6.

Table 6. ***Data from Previous Research Reviews***

Author& Year	Research Focus	Key Findings
Saputri, Dessitya (2023)	Implementation of Science Learning Based on Local Wisdom in Elementary Schools in Sragen Regency	The implementation of science learning models based on local wisdom can improve students' creativity and learning outcomes.
Mayasari (2017)	Integration of Indonesian Culture with Science Education	The cultural diversity in Indonesia can be used as study material linked to topics relevant to scientific knowledge.
Husnul Mukti et al. (2022)	Integration of Ethnoscience in Science Learning	Ethnoscience can be integrated into science learning even though traditional science and modern scientific (school science) have differences.
Lestari, Nabila (2024)	Application of Ethnoscience in Natural and Social Science Learning in Grade IV at MI As-Sunni Pamekasan	Students are more actively involved and able to give examples from their own culture and traditions related to the material being studied.
Fahrozi et al. (2022)	Ethnoscience as a Contextual and Environmental Learning Effort in Elementary School Students	Ethnoscience is considered an effective learning approach for science content, allowing students to experience learning through daily life contexts.
Dewi et al. (2019)	An Ethnoscience Study in Chemistry Learning to Develop Scientific Literacy	The development of scientific literacy should focus on preparing the future generation through curriculum content grounded in scientific literacy.

4) Ngada and Nagekeo Cultures as a Source of Ethnoscience

Ngada and Nagekeo are rich in cultural practices that contain scientific elements, such as: 1) Medicinal plants: sembung leaves, basil, *tianu* roots, 2) Traditional food processing: *arak moke*, fermented cassava, smoking techniques, 3) Traditional measurement and time tools: bamboo measuring units, sky observation, 4) Local agriculture: intercropping (*tumpang sari*), seasonal planting patterns, customary planting prohibitions (*ula waja*). These cultural practices involve scientific concepts such as fermentation, photosynthesis, metabolism, and even energy concepts, which can be integrated into science learning.

Based on this description, the following conclusions can be drawn: Ethnoscience-based science learning is relevant to be implemented in elementary schools, especially in regions rich in local culture such as Ngada and Nagekeo. Student engagement increases when learning connects to their everyday lives. The main challenges lie in the availability of written teaching materials, teacher training, and school policy support. Literature studies support that integrating local culture into science education is not only feasible but essential for meaningful scientific literacy.

Obstacles in Implementing Ethnoscience-Based Learning in Elementary Science Education in Golewa District

The research conducted in four elementary schools in Golewa District shows that the main obstacles hindering the implementation of ethnoscience-based learning are the limited availability of tools and materials, lack of teacher training, and insufficient resources.

1) Limited Tools and Materials

The lack of teaching tools and materials is one of the main obstacles in implementing ethnoscience-based learning. Based on the research findings from the four elementary schools, teachers do not fully understand the instructional media to be used for implementing ethnoscience-based learning. According to Saputri & Desstya (2023), providing relevant local resources is essential to support the success of ethnoscience-based learning. Jadallah (n.d., 2024) also emphasizes that the availability and accessibility of local materials are crucial

for the success of ethnoscience education programs. Similarly, Dorji et al. (2021) underline that education based on local wisdom requires specific tools and materials to support contextual learning.

2) Lack of Special Training for Teachers on Ethnoscience-Based Learning

The absence of specific training for teachers is another significant obstacle. Generally, teachers in the four elementary schools in Golewa District have not received adequate specialized training on how to implement ethnoscience-based learning in the classroom. This lack of training causes teachers to feel less confident about incorporating ethnoscience into science education. This finding aligns with Di & Ibtidaiyah (2022), who found that in Madrasah Ibtidaiyah, teachers unintentionally applied ethnoscience approaches in thematic learning, although without detailed planning. Therefore, teachers need more support and training to effectively implement ethnoscience-based learning.

Dewi et al. (2019) revealed that adequate training for teachers is essential to successfully integrate ethnoscience into the curriculum. Trained teachers are better able to combine scientific concepts with local culture effectively. George (2020) emphasized the importance of continuous training and professional support to help teachers integrate local knowledge into science learning. Likewise, Nicol & Taplin (2017) stated that ongoing support and training are critical to the successful implementation of ethnoscience-based learning approaches. They suggested that teachers need access to resources and training to develop the necessary skills.

3) Lack of Resources

Insufficient resources are also a major barrier to the implementation of ethnoscience-based learning. The research findings show that the four elementary schools in Golewa District lack specific teaching modules and learning materials on ethnoscience. This makes it difficult for teachers to design and carry out appropriate lessons, and results in teachers not having enough knowledge and skills to integrate local culture into classroom science learning. This is supported by Aza (2020), who found that in three elementary schools in East Semarang, the use of learning resources was suboptimal. Ideally, in ethnoscience learning, teachers should also utilize other learning resources such as the surrounding environment, videos, and the internet. According to Fahrozy et al. (2022), the availability of adequate learning materials, such as modules and guidebooks focused on ethnoscience, is essential to support teachers in planning and conducting ethnoscience-based practicals. Kawagley & Barnhardt (1998) also stressed that developing resources and education that integrate local knowledge is vital to support the success of ethnoscience-based learning.

Based on these research findings, it can be concluded that the implementation of ethnoscience-based learning in science education has not been fully realized in the four elementary schools in Golewa District. The main challenges faced include the lack of teaching modules and media, inadequate teacher training, and insufficient resources to support ethnoscience-based learning in science classes. These challenges need to be addressed in order to improve the quality of science education in Golewa's elementary schools.

This research demonstrates that implementing ethnoscience-based learning requires adequate teacher skills and resources. Nolan & Paatsch (2018) emphasize that the implementation of innovative teaching methods, including those based on culture and local context, requires sufficient teacher training to ensure classroom effectiveness. Better support is needed in terms of teacher training. Vogt et al. (2018) state that practice-based learning aligned with local culture can improve student outcomes in science and mathematics at the primary education level. They also highlight the importance of providing sufficient tools and materials to support this process.

4) Minimal Support from School Policies

Support from schools, whether in the form of policy or facilities, remains suboptimal in promoting the implementation of ethnoscience-based practicals. In the four elementary schools in Golewa District, ethnoscience-based learning has not yet been incorporated into the official curriculum. Therefore, the implementation of ethnoscience-based learning still depends heavily on individual teachers' creativity and initiative. Raymond et al. (2023) suggest that school policies that support educational innovation, including the integration of ethnoscience, are essential to ensure sustainability and consistency in applying this teaching method.

Conclusion

Based on research conducted in four elementary schools in Golewa District—Citra Bakti Elementary School, Rutosoro Islamic Elementary School, Watuwula Public Elementary School, and Olabolo Catholic Elementary School—it was found that the implementation of ethnoscience-based learning in science education has not been fully carried out by teachers. This is due to the limited availability of reading materials, teaching modules, learning media, lack of

teacher training on ethnoscience-based learning, and insufficient policy support from both the government and schools. The lack of specific training for teachers, limited resources, and minimal school policy support are key obstacles.

This study shows that the implementation of ethnoscience-based learning requires adequate teacher skills and resources. Better support in terms of teacher training, the provision of sufficient tools and materials for practical activities, and effective time management is essential to improve the quality of science learning in elementary schools in Golewa District.

Acknowledgments

The researcher would like to express sincere gratitude to all parties who have provided support and contributions during the implementation of this research:

1. The Head of STKIP Citra Bakti and the Head of the Study Program, for granting permission and providing the opportunity to conduct a study on ethnoscience in science learning at the elementary school level.
2. The Principals of the four elementary schools involved in this research SD Citra Bakti, SDI Rutosoro, SDN Watuwula, and SDK Olabolo for their generous support and for allowing the researcher full access to collect data.
3. The teachers and students who served as respondents, for their willingness to participate and provide valuable data that contributed significantly to the completion of this study.

Author Contributions

This article is a collaborative work contributed by several authors who were responsible for the research and writing process. Yosefina Uge Lawe, as the lead researcher, was responsible for developing the research methodology and instruments, conducting the research, and writing the final research report. Fransiskus Xaverius Dolo (Research Member 1) contributed by assisting in the preparation for the dissemination of research results, supporting the implementation of the research, and providing guidance and training for teachers (in preparation for model trials). Alexander Uta (Research Member 2) assisted in the development of research instruments, supported the implementation of the research, contributed to writing the research report, and conducted data analysis.

Funding

This research did not receive any external funding and was conducted with self-funding by the researchers.

Conflicts of Interest

The authors declare that there is no conflict of interest. The research, article writing, and publication were entirely conducted by the researchers and funded independently by the three researchers and authors.

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