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Why Ethno Science is Important for Science Learning in South Papua ?

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ABSTRAK

Penelitian ini merupakan penelitian kualitatif dengan penekanan pada etnografi. Penelitian ini bertujuan untuk menunjukkan mengapa etnosains sangat penting dalam pembelajaran sains di Papua Selatan. Penelitian ini dilakukan di kampung-kampung Suku Malind, sekolah dasar di Kabupaten Merauke. Metode penelitian yang digunakan adalah survei deskriptif dengan alat pengumpulan data melalui observasi, wawancara, partisipasi, dokumentasi, dan literatur budaya Suku Malind. Dalam penelitian ini, peneliti berperan sebagai human instrument (instrumen utama) yang mengamati dan menggali secara langsung objek yang diamati. Hasil penelitian menunjukkan: pertama, etno-sains dalam budaya asli suku Malind dapat ditemukan dalam kegiatan budaya dan kehidupan sehari-hari seperti berburu, menangkap ikan, alat musik, upacara adat, pengolahan makanan, menentukan pasang surut air laut, dan makan sirih. Kedua, kurangnya inovasi guru dalam mengajarkan sains di Sekolah, konten pembelajaran sains belum mengaitkan pembelajaran sains secara kontekstual dengan aktivitas budaya suku Malind. Pentingnya etnosains dalam pembelajaran IPA yaitu sains tradisional suku Malind di Merauke dapat diintegrasikan ke dalam pembelajaran IPA guna menanamkan nilai nasionalisme melalui penguatan kearifan lokal. Dengan mengonversi sains tradisional menjadi sains ilmiah, siswa dapat merasakan pengalaman belajar yang kontekstual dan bermakna. Unsur budaya menjadi sumber pembelajaran yang dikembangkan menjadi perangkat dan kurikulum untuk meningkatkan literasi sains, hasil belajar, serta kemampuan berpikir kritis siswa.

ABSTRACT

This research is a qualitative study with an emphasis on ethnography. It aims to show why ethnoscience is so important in science learning in South Papua. This research was conducted in Malind villages, primary schools in Merauke Regency. The research method used was descriptive survey with data collection tools through observation, interviews, participation, documentation, and cultural literature of the Malind Tribe. In this research, the researcher acts as a human instrument (main instrument) who observes and explores directly the objects observed. The results showed: firstly, ethno-science in the indigenous culture of the Malind tribe can be found in cultural activities and daily life such as hunting, fishing, musical instruments, traditional ceremonies, food processing, determining tides, and eating betel nut. Secondly, the lack of teacher innovation in teaching science at school, science learning content has not contextually linked science learning with the cultural activities of the Malind tribe. The importance of ethnoscience in science learning is that the traditional science of the Malind tribe in Merauke can be integrated into science learning to instil the value of nationalism through strengthening local wisdom. By converting traditional science into scientific science, students can experience a contextualised and meaningful learning experience.

Cultural elements become learning resources that are developed into tools and curriculum to improve students' science literacy, learning outcomes, and critical thinking skills.

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1. INTRODUCTION

Regulation of the Minister of Education, Culture, Research and Technology No. 16 of 2022 on Process Standards in Early Childhood Education, Primary Education and Secondary Education stipulates that process standards serve as a guide for the implementation of effective and efficient learning to optimize the potential, initiative, ability and independence of learners. To achieve this, a strategy that focuses on quality learning experiences is required. The regulation also emphasizes that the learning process can be implemented by providing opportunities for learners to apply material in real contexts or situations, encouraging interaction and active participation, utilizing resources in the educational environment and society, and using information and communication technology (Pendidikan et al., 16 C.E.).

Decree of the Minister of Education and Research Number 56 / M / 2022 concerning Guidelines for Implementing the Curriculum for Learning Recovery emphasizes the development of the Merdeka Curriculum in educational units. The Merdeka Curriculum is a continuation of the 2013 Curriculum which focuses on a holistic, competency-based, contextualized, and personalized approach that is in accordance with local culture, school mission, and learner needs. This curriculum has the main characteristics of project-based learning to develop soft skills and character, with an emphasis on seven main themes, including the integration of local wisdom in learning [1].

Integrating local wisdom in learning can provide a new and meaningful learning experience for students [2]. This approach is considered important to overcome the moral and spiritual crisis that can arise as a negative effect of globalization [3]. In addition, local wisdom-based learning can strengthen the relationship between students and the surrounding community and connect local knowledge with modern knowledge[4]. This concept has been implemented in the Merdeka Curriculum, especially through the subjects of Natural and Social Sciences (IPAS), which examines living things, inanimate objects, and human interactions with their environment [5]. Science learning that integrates materials with local cultural and environmental contexts is known as ethnoscience. [6]. This approach is expected to provide direct learning experiences that are relevant to the environment around students, thereby creating meaningful learning [7].

The application of ethnoscience learning is in accordance with the times and the education curriculum in Indonesia, and aims to instill a love for culture and nation, increase learners'

knowledge of local culture and potential, and help them understand abstract material by providing contextual learning experiences. It also plays a role in shaping the character of nationalism through strengthening the value of local wisdom. [8].Local wisdom-based learning models can improve students' understanding and character [9]. Local wisdom owned by the community needs to be studied scientifically so that it can be reconstructed into scientific science. Ethnoscience as an approach in integrating culture and science emphasizes that science and community culture do not need to be separated [10]. The integration of culture in science is important in the context of ethnoscience-based learning [11].

Ethnoscience learning is important to explore indigenous knowledge in a community, which can later become a bridge to formal science learning in schools. [8]. Ethnoscience is also recognized as cultural knowledge owned by a region and nation [12]. Cultural integration in learning in elementary schools can create a rich learning environment and improve student learning outcomes [13]. Ethnoscience-based learning needs to be integrated in science education, especially in schools, to make learning more meaningful by promoting local culture and wisdom [14].

The combination of culture and science can be used to solve problems in students' social life. The ethnoscience approach renews the original science that is cultured in the community to be converted into scientific science. [15]. Ethnoscience is knowledge owned by a nation (ethnic group) or certain social groups as a system of knowledge and cognition that is unique to a particular culture [16]. Meanwhile, according to [7] Ethnoscience is a scientific learning strategy used to unite cultures and create a learning environment, where direct learning experiences are a major part of the learning process in elementary schools. Furthermore, [17] stated that ethnoscience can present local wisdom and culture that can be used as objects in science learning so that learning becomes more meaningful. Through ethnoscience learning can be combined with the value of local wisdom. Overall, ethnoscience connects culture and science, and has a broad relevance to human life. [7].

The Malind tribe is one of the indigenous tribes living in Merauke Regency, South Papua Province. This tribe consists of several sub-tribes, such as Malind Anim, Kanume, and Marori Men Gey. In addition, the Malind are divided into several clans, including Ndiken, Gebze, Mahuze, Kaize, Balagaize, Basik-basik, and Samkakai. Clan names or totems are usually taken from the names of plants and animals that live in the area. [18]. Many cultural concepts of the Malind Tribe are found and can be integrated in natural science learning such as in traditional ceremonies, traditional rituals, social relations, hunting, agriculture, musical instruments, food, and their environment [19]. Researchers believe that many activities and cultures of the Malind Tribe are closely related to science, so they can be applied in learning to provide more real learning experiences and strengthen students' scientific thinking skills.

The integration of ethnoscience in science learning in schools has several benefits, such as helping students recognize indigenous science from their culture, distinguishing between indigenous science and scientific science, and developing the potential of indigenous science into scientific science. In addition, this integration facilitates learners' understanding of scientific science by using examples from the surrounding environment [20]. According to [21], ethnoscience-based learning in elementary schools can significantly improve science learning outcomes. Learners are directly involved in the discovery process related to facts, concepts and

scientific principles on science learning materials that are presented contextually with the daily activities of students.

But in reality, science learning in schools has not touched on value education. Current science learning often ignores the ethical and cultural values of Indonesian society. Therefore, science learning is needed to integrate the values of local wisdom and Indonesian culture to shape the character of students who excel and have science literacy [22]. Susanti added that science learning in schools only teaches theory in the form of calculations and formulas so that students do not understand the concepts that should be taught in discovery activities. [23]. According to [8] problems that are often found in the science learning process can be caused by several factors, namely boring teaching methods because they are monotonous with lectures, notes, and memorization. In addition, the learning model used is not appropriate for material that aims to foster value awareness. The number of books related to value learning is also still small. Lesson plans that only focus on cognitive aspects, although affective goals have been included.

Researchers found, through observations and interviews with class teachers who teach science in four elementary schools in three districts of Merauke Regency, that science learning in the classroom only relies on learning resources from teacher and student books whose contents are general and national and the old curriculum, without connecting them with local conditions. This causes the low ability of students to understand and connect science material with phenomena in everyday life. The average science learning outcomes of students only reach 50% of the KKM 70 standard, so a culture-based learning approach and local wisdom is needed to improve student learning outcomes.

Incorporating ethnoscience in science learning at school also aims to strengthen students' understanding of science concepts and prepare them for more complex concepts at the next level of education. Ethnoscience, which integrates local wisdom values, helps students understand science concepts more contextually and relevant to everyday life. Previous research conducted by (Widyawati et al., 2021) revealed that ethnoscience is very relevant to teaching science in the era of the industrial revolution 4.0 because it encourages meaningful learning and helps students develop knowledge by considering scientific culture. This approach can also improve critical thinking skills needed for success in the 21st century. Other research shows that learning by combining ethnoscience with several learning models to teach science can, improve learning outcomes, critical thinking skills and develop students' character [24].

The results of previous research found that the traditional science concepts of the Malind tribe are related to the basic competencies of science, so this concept can be used as teaching material. Research by [19] [25] also suggested that science concepts from the Malind culture could be a reference for the science curriculum. Integrating Malind science concepts with science learning allows students to understand science through their surrounding environment. Research conducted by [30] found that the cultural traditions of Sar Malind Tribe can be used as science learning materials to preserve the environment. Even so, previous research has not linked Malind science concepts with specific science materials. In this study, researchers tried to reveal the importance of ethnoscience learning integrated in science learning at school. Therefore, the purpose of this research is to find out the importance of ethnoscience learning in science learning.

2. METHODS

This research is a qualitative research with an ethnographic approach, where the researcher acts as the main instrument. The method used to collect data is descriptive survey. The application of this method to the research population aims to reveal and describe the importance of ethnoscience-based learning to teach science learning in schools around Merauke Regency. Researchers also made direct observations of the research object using participatory observation techniques.

3. RESULT AND DISCUSSION

The research was conducted by taking samples of teachers and principals located in three districts in Merauke Regency. The results showed that science learning implemented in schools has not integrated cultural elements in science learning. In addition, the results of research on Malind community samples show that the daily activities of the Malind tribe are closely related to elements of science. The results of this study were obtained through observation and interview methods conducted by researchers as follows:

3.1 The results of interviews with elementary school teachers and principals related to ethnoscience content in the implementation of science learning at school.

Research through observations and interviews at SDN Cendrawasih Spadem (Merauke District), SD Inpres Wambi (Okaba District), SD YPPK Wamal and SD Inpres Dokib (Tubang District) aimed to identify whether elements of Malind culture are integrated in the curriculum, especially science lessons. Observations at SDN Cendrawasih Spadem, which is one of the oldest public schools in Merauke District with Accreditation B, showed that this school is still using the 2013 Curriculum, with science lessons taught from grades 4, 5 and 6. Meanwhile, the other three schools are still implementing the KTSP Curriculum. Based on interviews with the principal and four teachers, it was found that the science learning materials taught at the school were only sourced from textbooks that were general in nature and not contextualized with local culture. The lack of learning resources used by teachers in learning such as science books that are relatively old and have not been updated based on the applicable curriculum. Facilities and infrastructure such as electricity and internet networks are limited and inadequate in local villages resulting in teachers having minimal information on learning media innovations. As a result, the average understanding of science concepts and learning outcomes of students, especially from among Indigenous Papuans, is still low.

Figure 1. Teacher Interviews at Four Malind Local Village Schools

The results of interviews with four class teachers at SD Inpres Cendrawasih, SD YPPK Wamal, SD Inpres Dokib, and SD Inpres Wambi are as follows:

Table 1. Results of Teacher Interviews

No.	Question	Respondent's Answer
1	Are there any elements of Malind culture that are applied as guidelines in the school?	**a,b,c,d**: "None". It has never been implemented.
2	What is the role of teachers in integrating cultural values into science learning?	a : "currently not, the materials and assignments I teach use the textbooks available at school". **b** : "In my opinion, there are none, the learning resources used come from the 2013 Curriculum book, and according to the agreement of other teachers". **c.** : No, we teach only based on the books available, and even then it's old references. **d.** : "Very few, maybe none, teachers still have difficulty finding patterns and only use existing learning references at school".
3	Do you think there is a relationship between culture and the concept of science learning in schools?	**a** : "If it is related, I think it must be there" **b** : "There is definitely, maybe later we can apply it in learning if there are guidelines". **c**. : " There are so many if I look at local customs and culture. But we haven't implemented it yet. **d** : " "Definitely there, maybe more relevant for local content lessons".
4	What are the school's actions in supporting local government policies related to the preservation of Malind culture? Are there school subjects based on Malind culture?	**a,c,d**: "There are no written rules and appeals regarding this matter. Regarding Malind culture-based subjects, they are usually taught in local content subjects. **b** : "Currently there is no regulation from the education office regarding this matter. there is no regional regulation or policy such as the education office regarding this matter. Culture-related subjects in schools are taught in local content such as the introduction and processing of traditional food and the art of dance.
5	Do you have any suggestions for the local government, schools, regarding the implementation and integration of culture-based learning in science learning at school?	**a** : This should be applied in science learning at school. Because there are many cultural contents of the surrounding community that can be integrated in science learning so that learning is more contextual and easy to understand. **b** : Exactly. The Education Office should issue a policy for each school to implement learning development innovations by linking local culture in science learning so that students can conduct their own experiments and discover science concepts in everyday life. **c**: strongly agree, it should be included in the curriculum and become a guideline in teaching science at school. In addition, a culture-based science learning tool is needed that can be used as a learning resource that integrates culture and science so that it is easily understood by students who are mostly Indigenous Papuans (OAP) if this is included in the curriculum and culture-based science learning tools are provided, especially for OAP students.

No.	Question	Respondent's Answer
		d. : Very important. School principals and the Office need to sit together to provide space for teachers to innovate in culture-based science learning, therefore it is necessary to hold trainings for teachers so that they get new information and insights to continue to innovate by making learning media that motivate and attract students to learn science that is associated with real life in the surrounding environment.

Based on these interviews, there is a need for innovation in science learning by linking it to the culture of the Malind community at school. Therefore, ethnoscience-based learning is very important in science learning.

3.2 Identification of Science Learning Content in Malind Cultural Activities

Based on the results of research conducted through observations and interviews with community leaders in Wasur and Buti villages, it was found that some activities of the Malind community can be related to science concepts, especially in science learning in elementary schools. The discovery of traditional science concepts of the Malind community is summarized in the following table.

Tabel 2. Reconstruction of Original Science into Scientific Science

No	Community Activities	Original Science	Science Concepts (IPA)	Related Science Materials
1	Archery (*Tamain*)	Archery (*tamain*) using a bow (*mih*) by pulling the bowstring (*tup*) and arrows (*tangge*) adjusted to the distance of game animals	A force is a pull or push that can change the position or shape of an object. In archery, the force at work is spring force. When the bow (*mih*) and bowstring (*tup*) are pulled, spring force is created and releases the arrow (*tangge*). Since the bow and bowstring are elastic, once pulled, they will return to their original shape.	Styles around us
2	Makan Pinang (*Kahos/kahu*)	Eating betel nut is the activity of chewing a mixture of betel leaves or fruits, areca nut, gambier, lime and tobacco until smooth, usually lasting about an hour or more.	Betel leaves or fruits contain compounds that function as antimicrobials, which cause problems with teeth and gums and bad breath. Betel leaf and gambier serve as antioxidants, kill germs, and fight fungi, so teeth stay strong and are not easily damaged. Whiting if used excessively can be dangerous because it contains calcium hydroxide which can cause mouth ulcers to cancer of the mouth and tongue	Organizational System of Living Things Additives and Addictive Substances
3	Making *Sago Sep*	Making *sago sep* can be done by heating a stone by burning it first with wood, after which the hot	In the process of making *sago sep* there is a heat transfer event by conduction (flow). The heat from the	Heat transfer around us

No	Community Activities	Original Science	Science Concepts (IPA)	Related Science Materials
		stone is covered with leaves in which there is already sago, meat or tubers. Then on top of the leaves again coated with bus tree bark and let stand until cooked.	burning wood fire will flow to the stone so that the sago, meat and tubers that have been coated with leaves on the stone will be cooked.	
4	*Sal* (prohibition sign)	The implementation of the "sal" (sign of prohibition) to cultivate crops is carried out when a member of the indigenous community dies, with a duration of up to 2-3 years. Areas subject to the ban include swamps, forests and hamlets, which play a role in preserving flora and fauna.	The implementation of a "sal" (sign of prohibition) to not cultivate or take crops (animals and plants) in a sacred area for a certain time, to commemorate someone who has passed away, helps preserve natural resources and maintain environmental balance. With this prohibition, people are required to respect the rules and not utilize natural products within the specified period, so that the ecosystem in the area remains protected.	Environmental Conservation Efforts
5	Catching fish (*Awe Kalemeh*) with *Manenggop* (Tuba Root)	Catching fish with tuba roots (*Manenggop*) is done by pounding tuba roots and putting them into the water, making the fish drunk and float to the surface.	*Manenggop* (tuba root) fishing is a traditional method of the Malind people, where tuba roots containing *rotenone* are put into the water, causing the fish to faint or die from breathing failure.	People and Things in their Environment
6	Tidal (*Konda*) Seawater	Malind people who live on the coast understand the tides (*Konda*) by looking at the position of the moon. High tide occurs when the moon rises or enters, and low tide occurs when the moon is in the middle.	Tides are caused by the gravity of the Sun and Moon, with the Moon having the main influence as it is closer to Earth. When the Moon is full, the seas rise, and when there is no new or full Moon, the seas recede.	Earth, Sun and Moon
7	Tifa (*kandara*) a musical instrument that accompanies traditional ceremonies.	Malind musical instruments produce sound by striking a membrane made of kangaroo skin, similar to a drum.	Tifa is a musical instrument that produces sound energy through the vibration of the kangaroo skin membrane when struck. The tube shape of the tifa acts as a resonator that amplifies the sound.	Sound Source and Sound Properties

Data collection was conducted through observation and interviews with Malind people in Wasur and Buti villages. The Malind's indigenous science data was validated by comparing it with literature studies and interviews with academic and cultural figures. The social and cultural activities of the Malind tribe are seen in traditional events, rituals, hunting equipment, local food, musical instruments, and the environment. [19]. Hunting activities to fulfill food needs are carried out by archery (*tamain*) to catch animals such as deer, pigs, kangaroos, and cassowaries. This hunting activity reflects the concept of science, especially spring force which is relevant to science materials in elementary schools.

The Malind tribe has a tradition of eating areca nut (*kahos*) which is an important part of daily life. All levels of society, from the young to the elderly, consider eating areca nut as an

obligation that makes the body more energized and vibrant. If they don't eat areca nut, they feel weak and lackluster. This tradition is related to natural science, as the ingredients in the betel nut concoction, such as betel leaves, gambier, and areca nut, have health benefits, such as acting as antioxidants and strengthening teeth. However, components such as tobacco and lime contain additives and addictive substances that are harmful and can cause addiction. This is relevant to science materials in elementary school, such as the structure of living organisms and additives. [26] .

The Malind have a local food called *sago sep*, which is made by burning sago using hot stones. This food is usually served as a staple food or in traditional ceremonies. The process involves heating a stone with wood, then the hot stone is used to burn sago that has been wrapped in banana leaves and meat. This tradition is related to the concept of heat transfer by conduction, which is relevant to the elementary science material on heat transfer. [27].

Sal culture in the Malind community is a tradition in the form of a prohibition sign that is applied when a community member dies. Sal prohibits the processing of natural products such as plants and animals in certain areas for 1 to 3 years. This tradition serves to preserve natural resources and maintain the balance of the ecosystem. The implementation of sal plays an important role in preserving the environment, preventing pollution, and reducing global warming [30]. This tradition is related to science lessons regarding environmental conservation efforts.

The Malind people in South Papua, especially in Merauke, use swamps and rivers as a source of food, especially for catching fish (*awe kalemeh*). One of the traditional methods they use is awe kalemeh, which is catching fish with the help of tuba roots (*manenggop*). This root is pounded and put into water, making the fish faint and float. This process is science-related, as tuba roots contain rotenone, which interferes with fish respiration. This technique is also applied in research to support fish transportation. Related science lessons are humans and objects in their environment [28].

The Malind coastal community has a special ability to predict the tides (*Konda*) by paying attention to the position of the moon and sun. The tide will rise when the moon rises, and recede when the moon is in the middle of the sky. This phenomenon is related to science, which explains that the gravity of the moon and sun affects the tides. On a full moon, the moon is closer to the sea so the water rises, while low tide occurs when the moon is far from the earth. [29]. This topic is related to science lessons about the Earth, Moon and Sun.

The Malind have a traditional musical instrument known as tifa (*kandara*), which is often used to accompany traditional ceremonies. This instrument is played by beating a membrane made of stock skin, as it produces a louder sound. The concept of using tifa can be explained through science lessons, specifically about sound. When a tifa is struck, the membrane vibrates, and the shape of the tube allows for resonance, which makes the sound stronger (Rapsanjani et al., 2023). This relates to the concept of sound in science learning.

4. CONCLUTION

The results of research on the reasons for the importance of ethnoscience in science learning in South Papua show that [1] The Malind tribe as one of the tribes that inhabit the Merauke region has traditional science that can be connected and integrated directly with science learning in schools so that it makes it easier for teachers to form the character value of

nationalism of students through strengthening the value of local wisdom. [2] Integrating culture by reconstructing traditional science into scientific science in science learning can create contextual learning experiences for students and meaningful learning [3] Incorporating elements of indigenous science culture into science learning materials can make it a guide for learning resources for students that can be developed into science learning tools and curriculum to improve science literacy, learning outcomes, and higher order thinking skills of students.

The suggestions in this study are that further research is needed to explore more deeply the culture of other tribes in South Papua so that it can be integrated into the curriculum and science learning tools in schools. Collaboration with the Education Office is needed to develop an ethnoscience-based science learning curriculum for local communities.

REFERENCES

[1] Mendikbudristek, R. I. (2022). Keputusan Menteri Pendidikan, Kebudayaan, Riset dan Teknologi Republik Indonesia Nomor 56/M/2022 Tentang Pedoman Penerapan Kurikulum Dalam Rangka Pemulihan Pembelajaran. *Kementerian Pendidikan, Kebudayaan, Riset Dan Teknologi RI*.

[2] Sumarni, W., Sudarmin, S., Sumarti, S. S., & Kadarwati, S. (2022). Indigenous knowledge of Indonesian traditional medicines in science teaching and learning using a science–technology–engineering–mathematics (STEM) approach. *Cultural Studies of Science Education*, 1–44.

[3] Fadli, A. (2020). The Effect of Local Wisdom-Based Elsii Learning Model on the Problem Solving and Communication Skills of Pre-Service Islamic Teachers. *International Journal of Instruction*, *13*(1), 731–746.

[4] Ramdiah, S., Abidinsyah, A., Royani, M., Husamah, H., & Fauzi, A. (2020). South Kalimantan Local Wisdom-Based Biology Learning Model. *European Journal of Educational Research*, *9*(2), 639–653.

[5] Setyowati, D., Afryaningsih, Y., & Nurcahyo, M. A. (2023). Kajian etnosains pada pembelajaran di sekolah dasar. *Jurnal Pendidikan Informatika Dan Sains*, *12*(1), 225–235.

[6] Rahmawati, F., & Atmojo, I. R. W. (2021). Etnosains pasar terapung kalimantan selatan dalam materi ilmu pengetahuan alam (ipa) sekolah dasar. *Jurnal Basicedu*, *5*(6), 6280–6287.

[7] Fahrozy, F. P. N., Irianto, D. M., & Kurniawan, D. T. (2022). Etnosains sebagai upaya belajar secara kontekstual dan lingkungan pada peserta didik di sekolah dasar. *Edukatif: Jurnal Ilmu Pendidikan*, *4*(3), 4337–4345.

[8] Puspasari, A., Susilowati, I., Kurniawati, L., Utami, R. R., Gunawan, I., & Sayekti, I. C. (2019). Implementasi Etnosains dalam Pembelajaran IPA di SD Muhammadiyah Alam Surya Mentari Surakarta. *SEJ (Science Education Journal)*, *3*(1), 25–31.

[9] Anggraini, P., & Kusniarti, T. (2017). Character and Local Wisdom-Based Instructional Model of Bahasa Indonesia in Vocational High Schools. *Journal of Education and Practice*, *8*(5), 23–29

[10] Sudarmin, S., Diliarosta, S., Pujiastuti, R. S. E., Jumini, S., & Prasetya, A. T. (2020). The instructional design of ethnoscience-based inquiry learning for scientific explanation about Taxus sumatrana as cancer medication. *Journal for the Education of Gifted Young Scientists*, *8*(4), 1493–1507.

[11] Sumarni, W. (2018). The influence of ethnoscience-based learning on chemistry to the chemistryâ€TM s literacy rate of the prospective teachers. *Unnes Science Education Journal*, *7*(2).

[12] Wahyu, Y. (2017). Pembelajaran berbasis etnosains di sekolah dasar. *JIPD (Jurnal Inovasi Pendidikan Dasar)*, *1*(2), 140–147

[13] Ahmadi, Y., Astuti, B., & Linuwih, S. (2019). Bahan ajar IPA berbasis etnosains tema pemanasan global untuk peserta didik SMP Kelas VII. *UPEJ Unnes Physics Education Journal*, *8*(1), 53–59.
[14] Kelana, J. B., Wardani, D. S., & Wulandari, M. A. (2021). *Etnosains sebagai Sumber Belajar di Sekolah Dasar. JIKAP PGSD: Jurnal Ilmiah Ilmu Kependidikan, 5 (1), 74–79*.
[15] Khoiri, A., & Sunarno, W. (2018). *Pendekatan Etnosains Dalam Tinjauan Fisafat. SPEKTRA: Jurnal Kajian Pendidikan Sains, 4 (2), 145*.
[16] Parmin, P., & Fibriana, F. (2019). Prospective teachers' scientific literacy through ethnoscience learning integrated with the indigenous knowledge of people in the frontier, outermost, and least developed regions. *Jurnal Penelitian Dan Pembelajaran IPA*, *5*(2), 142–154.
[17] Widyaningrum, R. (2018). Analisis kebutuhan pengembangan model pembelajaran berbasis etnosains untuk meningkatkan kualitas pembelajaran ipa dan menanamkan nilai kearifan lokal siswa sekolah dasar. *Widya Wacana: Jurnal Ilmiah*, *13*(2).
[18] Palittin, I. D., Supriyadi, S., & Kaikatui, H. A. (2019). Kajian Fisika Lingkungan Berbasis Etnosains pada Budaya Sar Suku Kanum di Merauke. *JPFT (Jurnal Pendidikan Fisika Tadulako Online)*, *7*(3).
[19] Rapsanjani, H., Yohanes, R. A., Fredy, F., & Mahuze, F. N. (2023). Eksplorasi Etno Sains Masyarakat Malind Untuk Penguatan Pemahaman Konsep IPA di Sekolah Dasar. *Lensa: Jurnal Kependidikan Fisika*, *11*(2), 63–74
[20] Mukti, H., Suastra, I. W., & Aryana, I. B. P. (2022). Integrasi Etnosains dalam pembelajaran IPA. *JPGI (Jurnal Penelit. Guru Indones., Vol. 7, No. 2, Pp. 356–362*.
[21] DS, Y. N., Hufad, A., & Leksono, S. M. (2022). Analisis Pembelajaran IPA Berbasis Etnosains di SDIT Al-Jihad Karawang. *Jurnal Sekolah Dasar*, *7*(2), 155–159.
[22] Mayasari, T. (2017). Integrasi budaya Indonesia dengan pendidikan sains. *Prosiding SNPF (Seminar Nasional Pendidikan Fisika)*, 12–17.
[23] Susanti, N. K. E., Asrin, A., & Khair, B. N. (2021). Analisis Tingkat Pemahaman Konsep IPA Siswa Kelas V SDN Gugus V Kecamatan Cakranegara. *Jurnal Ilmiah Profesi Pendidikan*, *6*(4), 686–690.
[24] Widyawati, A., Dwiningrum, S. I. A., & Rukiyati, R. (2021). Pembelajaran ethnosciences di era revolusi industri 4.0 sebagai pemacu Higher Order Thinking Skills (HOTS). *Jurnal Pembangunan Pendidikan: Fondasi Dan Aplikasi*, *9*(1), 66–74.
[25] Supriyadi, S., Palittin, I. D., & Martini, C. (2020a). Kajian etnosains pada indigenous science suku malind dalam upaya pengembangan pembelajaran ipa kontekstual papua. *JPFT (Jurnal Pendidikan Fisika Tadulako Online)*, *8*(1).
[26] Novianti, A. N., & Khusniati, M. (2022). Rekonstruksi Sains Asli pada Tradisi Menginang untuk Memperkuat Gigi di Desa Kadilanggon. *Proceeding Seminar Nasional IPA*, 40–48
[27] Supriyadi, S., & Nurvitasari, E. (2019). Inventarisasi Sains Asli Suku Malind: Upaya Dalam Pengembangan Kurikulum Ipa Kontekstual Papua Berbasis Etnosains. *Edu Sains: Jurnal Pendidikan Sains Dan Matematika*, *7*(1), 10–20
[28] Ihsan, M., Lukum, A., & Jusuf, M. I. (2024). Desain Kearifan Lokal Gorontalo sebagai Bahan Kajian dalam Pembelajaran Sains. *Jambura Journal of Educational Chemistry*, *6*(1), 61–70.
[29] Aulia, I. A., Ilhami, A., Yusrianto, E., & Putri, M. D. (2023). Analisis Etnosains dalam Tradisi Bakaroh Desa Sungai Intan Kabupaten Indragiri Hilir Sebagai Media Pembelajaran IPA. *Journal of Natural Sciences Learning*, *2*(1), 8–14.
[30] Supriyadi, S., Palittin, I. D., & Martini, C. (2020b). Kajian etnosains pada indigenous science suku malind dalam upaya pengembangan pembelajaran ipa kontekstual papua. *JPFT (Jurnal Pendidikan Fisika Tadulako Online)*, *8*(1).