JPPIPA 10(2) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

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

Ethnoscience Knowledge of Science Teacher Candidates at UIN Mataram

Hadi Kusuma Ningrat[1*], Desi Ratnasari[2], Agus Muliadi[3]

[1]Department of Early Childhood Islamic Education, Universitas Islam Negeri Mataram, Mataram, Indonesia.
[2]Department of Biology Education, Universitas Kapuas, Sintang, Indonesia.
[3]Department of Biology Education, Universitas Pendidikan Mandalika, Mataram, Indonesia.

Received: December 21, 2023
Revised: January 30, 2024
Accepted: February 25, 2024
Published: February 28, 2024

Corresponding Author:
Hadi Kusuma Ningrat
hadiknt@uinmataram.ac.id

DOI: 10.29303/jppipa.v10i2.7128

Abstract: This study aims to explore the knowledge of prospective science teacher students about ethnoscience. This study is an exploratory research conducted by the Mataram State Islamic University with 17 biology education students as respondents obtained using a convenience sampling technique. The research instrument used is a closed questionnaire with answers using a Likert scale and has been validated by experts. This research data was analyzed using qualitative and quantitative descriptive statistics. The results of this research are (1) 82.35% of prospective science teacher students stated that they did not know enough about indigenous science, 70.59% stated that they did not know about ethnoscience, 70.59% stated that they did not know about the content of indigenous science in local traditions and culture, 58.82% said they didn't know enough about the relationship between indigenous science and scientific knowledge, 70.59% said they didn't know enough about the integration of indigenous science in science learning, 52.94% said they didn't know enough about ethnoscience-based learning; (2) 88.23% of prospective science teacher students showed ethnoscience knowledge in the Low category and another 11.17% showed ethnoscience knowledge in the Tall category.

Keywords: knowledge, ethnoscience, science teacher candidates.

Introduction

Indonesia is a country rich in ethnicities, cultures, regional languages, customs, and arts (Sarini & Selamet, 2019). Each region's unique local traditions and culture embody indigenous knowledge, representing local wisdom (Battiste, 2005). This indigenous science is an integral part of everyday social and cultural practices, passed down through generations (Arlinovita, Setiawan & Sudibyo, 2015). Mardianti, Kasmantoni, and Walid (2020) highlight that indigenous science originates from the esteemed values of tradition and culture, becoming local wisdom within communities. The *Sasak* people of Lombok exemplify this with their unique traditions and cultural practices. For instance, the motifs on songket cloth carry symbolic meanings reflecting the noble values of the *Sasak* tribe and incorporate scientific concepts through their reconstruction from diverse plants, animals, and traditional symbols (Sumadewa & Hasbullah, 2021; Misnawati, 2016). Another example is the traditional food, poteng jaje tujak, which involves scientific concepts through its fermentation process (Hikmawati, Suastra & Pujani, 2020; Anwar, Supardi & Sugiharto, 2012). Additionally, the *Sasak* people's tradition of smearing the floors of their traditional houses with buffalo dung has scientific merit due to the silica's pozzolanic properties, similar to cement (Widianti, 2017; Wir'aeni, 2017).

The indigenous knowledge embedded in the culture and traditions of the *Sasak* people represents a distinctive form of local wisdom that has evolved within the local environment over generations (Toharudin et al., 2017). Khoiri & Sunarno (2018) argue that this indigenous knowledge can be examined scientifically

How to Cite:
Ningrat, H.K., Ratnasari, D., & Muliadi, A. (2024). Ethnoscience Knowledge of Science Teacher Candidates at UIN Mataram. *Jurnal Penelitian Pendidikan IPA*, *10*(2), 870–878. https://doi.org/10.29303/jppipa.v10i2.7128

within the context of science education. Hadi et al. (2019) further emphasize that indigenous knowledge can be systematically explored through scientific learning. This integration of traditional knowledge with scientific principles is referred to as ethnoscience (Asmaningrum et al., 2021). According to Sarini & Selamet (2015), ethnoscience involves the scientific investigation of indigenous knowledge found in cultural traditions. Integrating indigenous knowledge into science education is feasible because science inherently involves the study of natural phenomena within societal contexts (Khoiri & Sunarno, 2018). Setyowati, Parmin, & Widyatmoko (2013) highlight the connection between scientific concepts and societal life, suggesting that cultural and traditional knowledge can be explored through science education (Puspasari et al., 2019). This approach allows students to apply scientific thinking to their local environment (Seroto, 2012; Listyawati, 2012). Consequently, science education can be enriched by incorporating the cultural heritage and traditions of the *Sasak* people (Kartono, Hairida & Bujang, 2010).

Ethnoscience studies emphasize the incorporation of indigenous knowledge into science education (Parmin et al., 2017). Wahyu (2017) defines ethnoscience as the unique cultural knowledge and traditions specific to a region or nation. It is an educational approach that aims to reconstruct and transform indigenous science, which has evolved in communities, into formal scientific knowledge (Khoiri & Sunarno, 2018). This approach is crucial as it fosters a contextual learning environment that integrates cultural values and traditions into science education, making learning more relevant and beneficial for students (Suastra, 2010; Mardianti, Kasmantoni & Walid, 2020). Ethnoscience-based education provides students with hands-on experiences in exploring and applying scientific concepts related to their daily lives (Puspasari et al., 2019). Koes (2003) highlights that effective science learning involves active student engagement with tangible objects from their local culture and traditions. Therefore, integrating scientific concepts with the local environment and its resources is essential (Arlianovita, Setiawan & Sudibyo, 2015). In higher education, science learning can be enriched by leveraging the unique cultural aspects and traditions of the *Sasak* ethnic community (Kartono, Hairida & Bujang, 2010).

As highlighted by Asmaningrum et al. (2021), the science embedded in cultural and traditional practices has long been integral to community life, yet it is infrequently studied within the realm of science education. This underscores the need to cultivate collective awareness for the development and implementation of ethnoscience-based learning in higher education, incorporating the valuable elements of the *Sasak* ethnic traditions and culture. Ethnoscience-based learning is vital as it represents a knowledge and cognitive system unique to each culture (Sudarmin, Sumarni, & Mursiti, 2018). This approach brings traditional and cultural values into the learning process (Puspasari et al., 2019), thereby fostering an effective and enjoyable educational environment (Wayu, 2017). Rooted in constructivist principles (Hikmawati, Suastra, & Pujani, 2020), ethnoscience-based learning emphasizes meaningful engagement (Akmal et al., 2020; Sudarmin et al., 2017), enabling students to learn through practical experience (Atmojo, Lukitoaji, & Muhtarom, 2021).

Developing ethnoscience-based learning in universities is crucial for preserving local cultural values and traditions (Sudarmin, 2014). This approach aligns with UNESCO primary objective for science education: fostering a generation that is both scientifically and culturally literate (Sudarmin & Asyhar, 2012). By incorporating ethnoscience into the curriculum, students can cultivate a deep appreciation for cultural heritage and local wisdom, recognizing the unique cultural potential of their regions (Parris & Linder-VanBerschot, 2010). Akmal et al. (2020) highlight the effectiveness of ethnoscience in teaching students' tolerance towards the diverse cultures and traditions across Indonesia. Additionally, ethnoscience education can shield students from the pervasive influence of foreign cultures disseminated through electronic media (Mardianti, Kasmantoni & Walid, 2020). Kasa (2011) underscores the importance of ethnoscience in fostering conservation attitudes and preventing the erosion of unique cultural traditions, such as those of the *Sasak* tribe. This is achieved by providing students with a comprehensive understanding of their own traditions and cultures (Wahyu, 2017; Listyawati, 2012). Research of Emdin (2011) supports the notion that ethnoscience-based learning offers meaningful educational experiences, thereby enhancing students' competencies.

Arlianovita, Setiawan, & Sudibyo (2015) highlight the benefits of ethnoscience-based learning in enhancing both scientific and cultural literacy among students. Aspiring science teachers should possess a solid understanding of ethnoscience to keep pace with the advancements in science, which should be integrated into everyday life contexts (Sarini & Selamet, 2019). Idrus, Andayani, & Rahmawati (2020) support this by stating that student comprehension of science can be enriched through learning processes that incorporate indigenous science. For biology education students who aim to become science teachers, it is crucial to develop skills and knowledge to create science learning resources that leverage local traditions and culture. Sudarmin & Asyhar (2012) stress the importance of equipping future science teachers with the ability to design and implement ethnoscience-based lessons. Consequently,

biology education at Mataram State Islamic University should incorporate local traditional and cultural values, ensuring that prospective science teachers are well-versed in ethnoscience. Dewi (2016) emphasizes that the learning process is a key factor in shaping students' knowledge, perceptions, and attitudes (Antoncic & Hisrich, 2003; Fiet, 2001). Therefore, it is necessary to conduct a study to assess the ethnoscience knowledge of prospective science teachers at Mataram State Islamic University.

Method

This study employs an ex post facto research design with an exploratory descriptive approach to assess the ethnoscience knowledge of prospective science teacher students. According to Cohen, Manion & Morrison (2007) and Muliadi et al. (2022), ex post facto research involves analyzing and measuring existing data without manipulation or intervention, as described by Cooper & Schindler (2001) and Fraenkel, Wallen & Hyun (2012). The sample consists of 17 biology education students from Mataram State Islamic University, selected through convenience sampling based on accessibility and their willingness to participate by completing online questionnaires (Fink, 2011; Creeswell, 2012).

This study employs a closed-ended questionnaire as its instrument, utilizing a Likert scale for responses (Muliadi, et al., 2022). The scale includes the categories namely Very Know, Know, Know Less, Don't Know (Creswell, 2014; Singarimbun, 2007). Administered through an online platform via Google Forms (Adha, et al., 2020), the questionnaire is designed to gather data on students' understanding of indigenous science, ethnoscience, and the incorporation of ethnoscience in education (Rikizaputra et al., 2021). The questionnaire consists of eight statements and has been validated by experts, confirming its validity.

Research data was analyzed using qualitative and quantitative descriptive statistics. Qualitative descriptive analysis is used to describe students' answers to each question, while quantitative descriptive analysis is used to describe students' knowledge data about science. Average student knowledge data is interpreted in the form of categories using assessment criteria developed by Nugroho et al (2023) as presented in Table 1.

Table 1. Conversion criteria for average student knowledge scores

Average score ($\bar{p}$)	Category
3,25 < X ≤ 4,00	Very High
2,50 < X ≤ 3,25	Tall
1,75 < X ≤ 2,50	Low
1,00 < X ≤ 1,75	Very Low

Result and Discussion

Description of the data from measuring the knowledge of prospective science teacher students about ethnoscience is presented as follows:

1. Student knowledge about indigenous science

Based on the research results, information was obtained on the knowledge of prospective science teacher students about indigenous science, as presented in Figure 1 below.

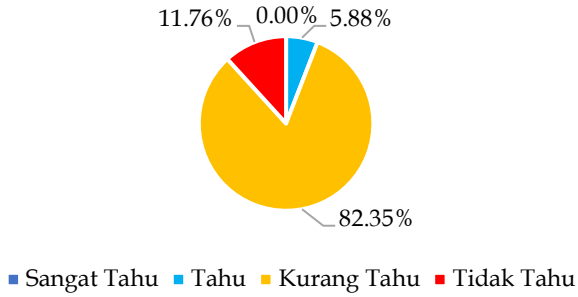

Figure 1. Level of student knowledge about indigenous science

In Figure 1 above, it can be seen that students who answered that they very know about indigenous science were 0.00%, those who know were 5.88%, those who know less were 82.35%, and those who don't know were 11.76%. This data shows that the majority of prospective science teacher students still have insufficient knowledge about indigenous science. Based on follow-up questions about sources of knowledge about indigenous science, information was obtained that most students got information from reading books, journals and online references.

2. Student knowledge about ethnoscience

Based on the research results, information was obtained on the knowledge of prospective science teacher students regarding ethnoscience, as presented in Figure 2 below.

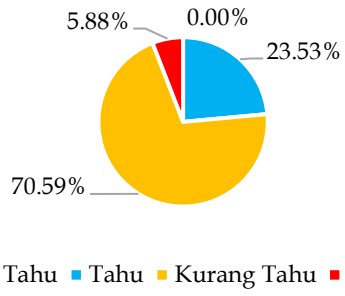

Figure 2. Level of student knowledge about ethnoscience

In Figure 2 above, it can be seen that the students who answered that they very know about ethnoscience were 0.00%, those who know were 23.53%, those who

know less were 70.59%, and those who don't know were 5.88%. This data shows that the majority of prospective science teacher students still have insufficient knowledge about ethnoscience. Based on follow-up questions about sources of knowledge about ethnoscience, information was obtained that most students got information from reading books, journals and online references.

3. Student knowledge about indigenous science in local culture

Based on the research results, information was obtained on the knowledge of prospective science teacher students regarding the content of indigenous science in local traditions and culture in society, as presented in Figure 3 below.

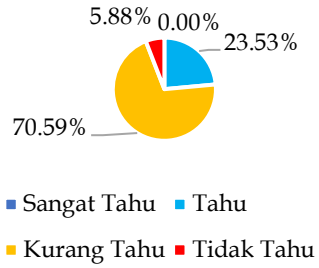

Figure 3. Level of student knowledge about indigenous science in local culture

In Figure 3 above, it can be seen that students who answered that they very know about the content of indigenous science (native science) in local culture were 0.00%, those who know were 23.53%, those who know less were 70.59%, and those who don't know of 5.88%. This data shows that the majority of prospective science teacher students still have insufficient knowledge about the content of indigenous science in local traditions and culture in society.

4. Student knowledge about the relationship between indigenous science and scientific science

Based on the research results, information was obtained on the knowledge of prospective science teacher students regarding the relationship between indigenous science and scientific science, as presented in Figure 4 below.

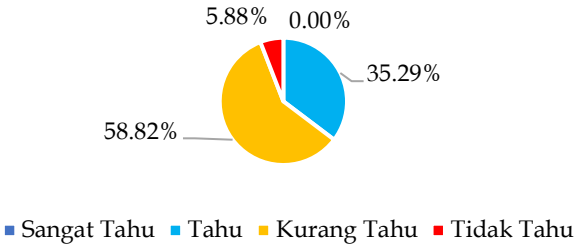

Figure 4. Level of student knowledge about the relationship between indigenous science and scientific science

In Figure 4 above, it can be seen that students who answered that they very know about the relationship between indigenous science and scientific science were 0.00%, those who know were 35.29%, those who know less were 58.82%, and those who don't know of 5.88%. This data shows that the majority of science teacher candidates still have insufficient knowledge about the relationship between indigenous science and scientific science.

5. Students' knowledge about the integration of indigenous science in science learning

Based on the research results, it was obtained that information on prospective science teacher students' knowledge about indigenous science contained in local traditions and culture can be integrated into science learning, as presented in Figure 5 below.

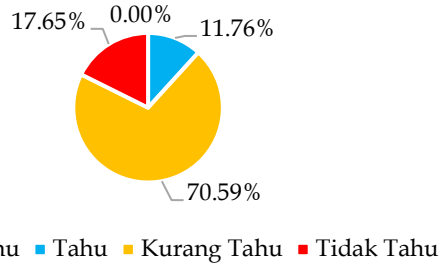

Figure 5. Level of student knowledge regarding the integration of indigenous science in science learning

In Figure 5 above, it can be seen that the students who answered that they very know about the integration of indigenous science in science learning were 0.00%, those who know were 11.76%, those who know less were 70.59%, and those who don't know were 17.65%. This data shows that the majority of prospective science teacher students still have insufficient knowledge about integrating indigenous science contained in local traditions and culture in science learning.

6. Student knowledge about ethnoscience-based learning

Based on the research results, information was obtained on the knowledge of prospective science teacher students regarding the implementation of ethnoscience-based science learning, as presented in Figure 6 below.

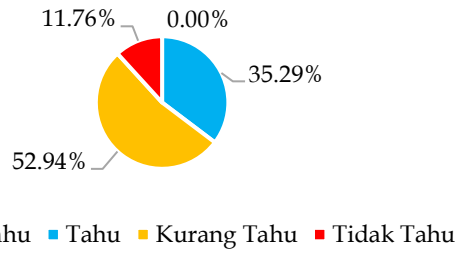

Figure 6. Level of student knowledge about ethnoscience-based learning

In Figure 6 above, it can be seen that the students who answered that they very know about ethnoscience-based learning were 0.00%, those who know were 35.29%, those who know less were 52.94%, and those who don't know were 11.76%. This data shows that the majority of prospective science teacher students still have insufficient knowledge about ethnoscience-based learning.

The findings of this study indicate that students' limited understanding of indigenous science, ethnoscience, and ethnoscience-based learning is attributed to the lack of integration of local traditions and cultural knowledge into the science curriculum. As Muliadi, Sarjan & Rokhmat (2022) highlight, certain biological topics are relevant to indigenous scientific values found in local traditions and cultures, presenting opportunities for the development of science learning resources. Ernawati, Azrai & Wibowo (2016) suggest that indigenous science can be incorporated into natural resources and ecosystem studies. Additionally, Rosyidah, Sudarmin & Siadi (2013) note that topics related to food processing can be effectively included in ethnoscience-based learning. Efendi & Muliadi (2023) point out that various traditions and cultural practices of the *Sasak* tribe, such as the fermentation process in making poteng jaje tujak, can be connected to biotechnology lessons (Hikmawati, Suastra & Pujani, 2020; Anwar, Supardi & Sugiharto, 2012). Consequently, students' knowledge of ethnoscience can be enriched by integrating science education with indigenous knowledge and cultural practices (Kelana, Wardani & Wulandari, 2021; Rikizaputra et al., 2021).

The research findings indicate that classroom learning has yet to integrate indigenous science with scientific concepts. Students reported acquiring their knowledge of indigenous science and ethnoscience primarily from books, journals, and other online sources, highlighting a gap in classroom instruction. This observation aligns with Rikizaputra et al. (2021), who noted that many educators have not incorporated ethnoscience into their teaching and have not planned for it in their curricula. According to Kartono, Hairida & Bujang (2010), science education can be enriched by incorporating the unique aspects and cultural traditions of a region. Nurkhalisa and Ummayah (2015) support this by stating that integrating indigenous science with local traditions and culture into learning materials can enhance science education. Wahyu (2017) emphasizes the importance of ethnoscience-based learning, as it helps develop students' competencies in various dimensions, including process, product, and attitude. Emdin (2011) research supports this by demonstrating that ethnoscience-based learning provides students with meaningful learning experiences, which in turn boosts their motivation and competence (Damayanti, Rusilowati & Linuwih, 2017).

A description of the results of data analysis on students' level of knowledge about science is presented in Table 2 below.

Table 2. Results of student knowledge data analysis

Respondent	ΣScore	Rata-rata	Category
1	17	2.83	Tall
2	12	2.00	Low
3	14	2.33	Low
4	13	2.17	Low
5	13	2.17	Low
6	14	2.33	Low
7	18	3.00	Tall
8	14	2.33	Low
9	7	1.17	Low
10	15	2.50	Low
11	11	1.83	Low
12	10	1.67	Low
13	12	2.00	Low
14	12	2.00	Low
15	12	2.00	Low
16	12	2.00	Low
17	11	1.83	Low

Based on Table 2, it is known that 88.23% of prospective science teacher students who were respondents to this research had ethnoscience knowledge in the Low category and another 11.17% had ethnoscience knowledge in the Tall category. The data description is emphasized in the following Figure 7.

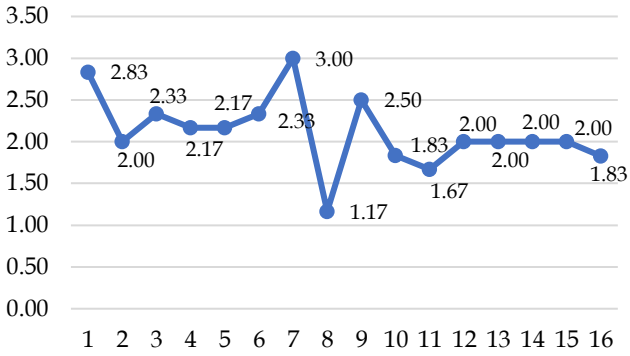

Figure 7. Level of student knowledge about ethnoscience

The research results elaborate on the insufficient knowledge about ethnoscience among prospective science teacher students. The study indicates that these students have not been adequately informed about ethnoscience through classroom learning or other educational sources. Instead, students reported that their knowledge of ethnoscience primarily came from books, journals, and online references, rather than

classroom instruction. This suggests that the educational process has not integrated indigenous science concepts with local traditions and culture into the science curriculum. One contributing factor is the educators' limited understanding of ethnoscience-based learning. This aligns with the findings of Rikizaputra et al. (2021), which highlight educators' lack of understanding of ethnoscience as a barrier to its implementation in teaching. Sudjana (2011) also emphasizes that educators' comprehension of ethnoscience is crucial for the successful integration of ethnoscience-based learning.

According to the data analysis results, students demonstrate an average knowledge score of 3.52, classified as very high, on questions regarding the integration of ethnoscience into science education. These results indicate that prospective science teachers possess a strong understanding of how to implement ethnoscience-based learning. This signifies their awareness of the importance of incorporating indigenous knowledge and local cultural traditions into science instruction. The development of science education can benefit from leveraging regional uniqueness and cultural heritage (Kartono, Hairida & Bujang, 2010). Ethnoscience-based learning incorporates traditional and cultural values (Puspasari et al., 2019), creating an effective and enjoyable learning environment (Wayu, 2017). It is grounded in constructivist principles (Hikmawati, Suastra & Pujani, 2020) and emphasizes meaningful learning experiences (Akmal et al., 2020; Sudarmin et al., 2019), facilitating hands-on learning for students (Atmojo, Lukitoaji & Muhtarom, 2021; Alvonco, 2014).

Implementing ethnoscience-based learning is crucial for helping students develop an appreciation for their local traditions and culture. According to Parris & Linder-VanBerschot (2010), this approach nurtures a sense of love for regional heritage. Akmal et al. (2020) highlight that ethnoscience, which encompasses local wisdom, effectively teaches students tolerance towards the diverse cultures and traditions across different regions in Indonesia. This method also safeguards students from being overly influenced by foreign cultures propagated through extensive electronic media exposure (Mardianti, Kasmantoni & Walid, 2020). Kasa (2011) points out the importance of ethnoscience-based learning in fostering conservation attitudes and preserving the unique culture and traditions of the *Sasak* tribe. It provides a comprehensive understanding of one's own traditions and culture (Wahyu, 2017; Listyawati, 2012). Consequently, this form of learning enhances the knowledge and skills of future science teachers in utilizing local traditions and indigenous science in their educational resources. Ultimately, biology education students who are training to become science teachers will be equipped to design and implement ethnoscience-based learning effectively (Sudarmin & Asyhar, 2012).

Conclusion

Based on the results of the research above, it can be concluded that (1) 82.35% of prospective science teacher students stated that they did not know enough about indigenous science, 70.59% stated that they did not know about ethnoscience, 70.59% stated that they did not know enough about the content of indigenous science in local traditions and culture, 58.82% said they did not know enough about the relationship between indigenous science and scientific knowledge, 70.59% said they did not know about the integration of indigenous science in science learning, 52.94% said they did not know enough about ethnoscience-based learning; (2) 88.23% of prospective science teacher students showed ethnoscience knowledge in the Low category and another 11.17% showed ethnoscience knowledge in the Tall category.

Acknowledgements
We would like to thank to all the parties that help to complete the research entitled "Ethnoscience Knowledge of Science Teacher Candidates at UIN Mataram".

Author Contributions
Hadi Wira Kusuma: developing literature study topics and defining literature analysis methodology.
Desi Ratnasari: browsing and mapping literature related to the topic of literature study.
Agus Muliadi: analyzing literature related to literature study topics, writing draft articles, revising, and editing final articles.

Funding
This research received no external funding.

Conflicts of Interest
The authors declare no conflict of interest.

References

Adha, M.A., Arifin, I., Maisyaroh, Sultoni & Sunarni. (2020). Perbedaan Minat Berwirausaha Berdasarkan Jenis Kelamin Mahasiswa. *JAMP: Jurnal Adminitrasi dan Manajemen Pendidikan*, 3(3), 208-215. http://dx.doi.org/10.17977/um027v3i32020p208

Akmal, A.U., Lia, Lestari, T., Asra, A., Effendy, Festiyed, Skunda. (2020). Analisis Etnosains dalam Pembelajaran IPA di Sekolah Dasar Kota Padang dan Bukittinggi. *Jurnal Inovasi Pendidikan dan Pembelajaran Sekolah Dasar*, 4(2), 68-77. https://doi.org/10.24036/jippsd.v4i2.111385

Anwar, M., Supardi & Sugiharto, DYP. (2012.) Pengembangan Perangkat Pembelajaran Biologi dengan Pendekatan Bioentrepreneurship Untuk Meningkatkan Keterampilan Proses Ilmiah dan Minat Berwirausaha Siswa. *Innovative Journal of curriculum an educational Technology*, 1(1). https://doi.org/10.15294/ijcet.v1i1.129

Antonic, B. & Hisrich, R. (2003). Clarifying the Intrapreneurship Concept. *Journal of Small Bussiness and Enterprise Development*, 10(1), 7-24. http://dx.doi.org/10.1108/14626000310461187

Arlianovita, D., Setiawan, B. & Sudibyo, E. (2015). Pendekatan Etnosains dalam Proses Pembuatan Tempe terhadap Kemampuan Literasi Sains. *Seminar Nasional Fisika dan Pembelajaran 2015*. 101-107.

Asmaningrum, H. P., Betaubun, M., Nasrawati & Witdarko, Y. (2021). Persepsi Mahasiswa dalam Pembelajaran Kimia dengan Pendekatan Etnosains terhadap Kemampuan Literasi Sains. *Prosiding Seminar Nasional Kimia (SNK) 2021*, 322-328.

Atmojo, S.E., Lukitoaji, B.D. & Muhtarom, T. (2020). Improving Science Literation and Citizen Literation Through Thematic Learning Based on Ethnoscience. *Journal of Physics: Conference Series*, 1-6. https://doi:10.1088/1742-6596/1823/1/012001

Battiste, M. (2005). Indigenous Knowledge: Foundations for First Nations. *WINHEC: International Journal of Indigenous Education Scholarship*, 1, 1-17.

Creswell, J.W. (2014). *Qualitative Research & Research Design*. Yogyakarta: Student Libraries

Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education*. New York: Routledge.

Cooper, D.R. & Schindler, P.S. (2001). *Business Research Methods*. USA: McGraw-Hill College.

Damayanti, C., A. Rusilowati, & S. Linuwih. (2017). Pengembangan Model Pembelajaran IPA Terintegrasi Etnosains untuk Meningkatkan Hasil Belajar dan Kemampuan Berpikir Kreatif. *Journal of Innovative Science Education*. 6(1), 117-128. https://doi.org/10.15294/jise.v6i1.17071

Dewi, N.L.A. (2016). Pengaruh Sikap Kewirausahaan Terhadap Kemampuan Mengelola Usaha Pada Peserta Program Mahasiswa Wirausaha (PMW) UNDIKSHA Tahun 2015, *Jurnal Program Studi Pendidikan Ekonomi (JPPE)*, 7(2), 1-11. http://dx.doi.org/10.23887/jjpe.v7i2.7741

Efendi, M.H. & Muliadi, A. (2023). Ethnoscience-Based Science Learning in *Sasak* Ethnic Culture: Literature Review. *Jurnal Penelitian Pendidikan IPA*, 9(5), 22–33. https://doi.org/10.29303/jppipa.v9i5.3769

Emdin, C. (2011). Droppin' science and dropping science: African American Males and Urban Science Education. *JAAME*, 2 (1), 1-15.

Ernawati, Azrai, E. P., & Wibowo, S. S. (2016). Hubungan Persepsi Kearifan Lokal Dengan Sikap Konservasi Masyarakat Desa Lencoh Kecamatan Selo di Taman Nasional Gunung Merapi. Biosfer: *Jurnal Pendidikan Biologi*, 9(1), 65– 69. https://doi.org/10.21009/biosferjpb.9-1.10

Fiet, J. (2001). The Theoretical Side of Teaching Entrepreneurship. *Journal of Business Venturing* 16(1), 1-24. https://doi.org/10.1016/S0883-9026(99)00041-5

Fink, A. (2011). *How to sample in surveys. In how to sample in surveys (2nd edition)*. Thousand Oaks, CA: SAGE Publication. https://us.sagepub.com/en-us/nam/how-to-sample-in-surveys/book225416

Fraenkel, J.C., Wallen, N.E., Hyun, H.H. (2012). *How to Design and Evaluate Research in Education*. New York: Mc Graw Hill.

Hadi, W.P., Muharrami, L.K., Hidayati, Y., Rosidi, I. & Maryamah, S. (2019). Development of Magazine on Madura Salt Theme with Ethnoscience Approach to Improve Student's Characterunnes. *Unnes Science Education Journal*, 8(2), 118-129. https://doi.org/10.15294/usej.v8i2.31524

Hikmawati, Suastra, I.W. & Pujani, N.M. (2020) Local wisdom in Lombok island with the potential of ethnoscience for the development of learning models in junior high school. *Journal of Physics: Conference Series*, 1-12. https://doi:10.1088/1742-6596/1816/1/012105

Idrus, Y., Andayani, Y., & Rahmawati, R. (2020). Persepsi Siswa Kelas XI MIPA SMA/MA Se-Kota Praya Terhadap Lembar Kerja Peserta Didik Bermuatan Etnosains Pada Materi Pokok Koloid. *Chemistry Education Practice*, 3(2), 63. https://doi.org/10.29303/cep.v3i2.1981

Kasa, I.W. (2011). Local Wisdom in Relation to Climate Change. *Journal of International Society for Southeast Asian Agricultural Sciences* (*JISSAAS*), 17(1), 22-27.

Kartono, Hairida, & G. Bujang. (2010). *Penelusuran Budaya Teknologi Lokal dalam Rangka Rekonstruksi dan Pengembangan Sains di Sekolah Dasar.* Pontianak: FKIP, Universitas Tanjungpura.

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. https://doi.org/10.26858/jkp.v5i1.16822

Khoiri, A. & Sunarno, W. (2018). Pendekatan Etnosains Dalam Tinjauan Fisafat (Implementasi Model Pembelajaran STEM: *Science, Technology, Enginering, and Mathematic*). *SPKETRA: Jurnal Kajian Pendidikan Sains*, 4(2), 145-153. http://dx.doi.org/10.32699/spektra.v4i2.55

Koes, S. H. (2003). *Strategi pembelajaran Fisika*. Malang: Universitas Negeri Malang.

Listyawati, M. (2012). Pengembangan Perangkat Pembelajaran IPA Terpadu di SMP. *Jurnal Pendidikan IPA*, 1(1), 61-69. https://journal.unnes.ac.id/sju/index.php/jise/article/view/46

Mardianti, I., Kasmantoni & Walid, A. (2020). Pengembangan Modul Pembelajaran IPA Berbasis Etnosains Materi Pencemaran Lingkungan Untuk Melatih Literasi Sains Siswa Kelas VII di SMP. *BIO-EDU: Jurnal Pendidikan Biologi*, 5(2), 97-106. https://doi.org/10.32938/jbe.v5i2.545

Misnawati, Y. (2016). *Makna Simbolik Kain Songket Sukarara Lombok Tengah Nusa Tenggara Barat (NTB)*. S1 Thesis, Pendidikan Seni Rupa FBS.

Muliadi, A., Suhirman, S., Wazni, MK, Yamin, M., & Khery, Y. (2022). Ethnoscience Studies in Songket *Sasak* Cloth Motifs: Prospective Science Teacher Perceptions. *Journal of Science Education Research*, 8(6), 2613-2620. https://doi.org/10.29303/jppipa.v8i6.2414

Muliadi, A., Sarjan, M. & Rokhmat, J. (2022). Pendidikan Ipa Multidimesional Pada Etnosains Bale Adat *Sasak*: Perspektif Filsafat**.** *Jurnal Ilmiah Mandala Education*, 8(4), 2799-2811. http://dx.doi.org/10.58258/jime.v8i4.3987

Nugroho, P.S., Nasir, M., Syafi'i, M., & Erviyenni, E. (2023). The Profile Perception of Student's Collaboration and Creative Thinking Skills in Physics. *Jurnal Penelitian Pendidikan IPA*, 9(2), 775-779. https://doi.org/10.29303/jppipa.v9i2.3055

Nurkhalisa & Ummayah (2015). Etse-Module "The Benefits of Acidic Bases in Life" Ethnoscience Based Demak Society in the Utilisation of Lime. *International Journal of Science and Research (IJSR)*, 6, 1396-1400.

Parrish, P. & Linder-VanBerschot, J. (2010). Cultural dimensions of learning: Addressing the challenges of multicultural instruction. *The International Review of Research in Open & Distributed Learning*, 11(2), 1-19.

Parmin, P., Sajidan, S., Ashadi, A., Sutikno, S. & Fibriana, F. (2017). Science Integrated Learning Model to Enhance the Scientific Work Independence of Student Teacher in Indigenous Knowledge Transformation. *Jurnal Pendidikan IPA Indonesia*, 6(2). https://doi.org/10.15294/jpii.v6i2.11276

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. *Science Education Journal (SEJ),* 3(1), 25-31. https://doi.org/10.21070/sej.v3i1.2426

Rikizaputra, Festiyed, Diliarosta, S. & Firda. (2021). Pengetahuan Etnosains Guru Biologi di SMA Negeri Kota Pekanbaru. *Journal of Natural Science and Integration,* 2(2), 186-194. http://dx.doi.org/10.24014/jnsi.v4i2.14257

Rosyidah, A.N., Sudarmin & Siadi, K. (2013). Pengembangan Modul IPA Berbasis Etnosains Zat Aditif dalam Bahan Makanan untuk Kelas VIII SMP Negeri 1 Pegandon Kendal. *Unnes Science Education Journal*, 2(1), 133-139. https://doi.org/10.15294/usej.v2i1.1765

Sarini, P. & Selamet. K. (2019). Pengembangan Bahan Ajar Etnosains Bali Bagi Calon Guru IPA. *Wahana Matematika dan Sains: Jurnal Matematika, Sains, dan Pembelajarannya*, 13(1), 27-39. https://doi.org/10.23887/wms.v13i1.17146

Seroto. (2012). Student Teachers Presentations of Science Lessons in South African Primary Schools: Ideal and Practice. *International Journal Education Science*, 4(2), 107-115. https://doi.org/10.1080/09751122.2012.11890033

Setyowati, R., Parmin, P. & Widyatmoko, A. (2013). Pengembangan Modul IPA Berkarakter Peduli Lingkungan Tema Polusi Sebagai Bahan Ajar Siswa SMKN 11 Semarang. *Unnes Science Education Journal*, 2(2), 245-253. https://doi.org/10.15294/usej.v2i2.2031

Singarimbun, M. & Efendi, S. (2006). *Metode Penelitian Survai (Edisi Revisi)*. Jakarta Barat: Pustaka LP3ES Indonesia.

Suastra, I W. (2009). *Pembelajaran Sains Terkini: Mendekatkan Siswa dengan Lingkungan Alamiah dan Sosial Budayanya*. Singaraja: Penerbit Universitas Pendidikan Ganesha.

Sudjana, N. (2011). *Penilaian Proses Hasil Belajar Mengajar*. Bandung: Remaja Rosdakarya.

Sudarmin & Asyhar, R. (2012). Transformasi Pengetahuan Sains Tradisional menjadi Sains Ilmiah dalam Proses Produksi Jamu Tradisional. *Edu-Sains*, 1(1), 1–7.

Sudarmin. (2014). *Pendidikan karakter, etnosains dan kearifan lokal (pertama ed.)*. Semarang: Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Negeri Semarang.

Sudarmin, Sumarni, W. & Mursiti, S. (2018). The learning models of essential oil with science technology engineering mathematic (STEM) approach integrated ethnoscience. *Journal of Physics: Conference Series*, 1-7. https://doi:10.1088/1742-6596/1321/3/032058

Sudarmin, Febu, R., Nuswowati, M., & Sumarni, W. (2017). Development of Ethnoscience Approach in The Module Theme Substance Additives to Improve the Cognitive Learning Outcome and Student's Entrepreneurship. *Journal of Physics: Conference Series* 824 (1).

Sumadewa, I.N.Y. & Hasbullah, H. (2021). Transformasi Pada Corak Kain Songket *Sasak* Lombok Sebagai

Tipografi Identitas. *Jurnal Ekspresi Seni*, 23(2), 394-406. http://dx.doi.org/10.26887/ekspresi.v23i2.1751

Toharudin, U., & Kurniawan I. S. (2017). Sundanese Cultural Values of Local Wisdom: Integrated to Develop a Model of Learning Biology. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*. 32(1), 29-49. https://gssrr.org/index.php/JournalOfBasicAndApplied/article/view/6872

Wahyu, Y. (2017). Pembelajaran Berbasis Etnosains Di Sekolah Dasar. *Jurnal Inovasi Pendidikan Dasar,* 1 (2). 140-147.

Widianti, A.K. (2017). Preservasi Rumah Adat Desa Sade Rembitan Lombok Sebagai Upaya Konservasi. *Vitruvian: Jurnal Arsitektur, Bangunan, & Lingkungan,* 6(3), 79-84.

Wir'aen, R. (2017). Nilai Edukatif pada Arsitektur Rumah Adat Bale *Sasak* di Dusun Limbungan Lombok Timur Nusa Tenggara Barat. Skripsi: Rogram Studi Pendidikan Seni Rupa Fakultas Bahasa Dan Seni Universitas Negeri Yogyakarta.