

Kompang as a Medium for Introducing Physics Concepts in Ethnoscience-Based Co-curricular Activities: A Study of Students' Perceptions

Tesa Liantika Putri^{1*}, Fakhruddin Z²

^{1,2} Physics Education Program, Universitas Riau, Pekanbaru, Indonesia

*Email: tesa.liantika1664@grad.unri.ac.id

Abstract

Connecting physics learning to local culture can help students understand concepts in meaningful contexts. However, its integration into co-curricular activities remains limited. This study describes students' views on using the kompang, a traditional musical instrument from Bengkalis Regency, to introduce physics concepts in ethnoscience-based co-curricular activities at SMAN 9 Mandau. This quantitative descriptive study involved 50 Grade 10 students participating in the kompang activity during the 2025–2026 implementation period. Data were collected using a 20-item questionnaire covering three areas: students' perceived understanding of physics concepts, learning interest, and appreciation of local culture. Data were analyzed using the ideal percentage method. The results showed that students' perceptions were categorized as good, with an average score of 74.92%. Appreciation of local culture received the highest score. These findings suggest that the kompang can serve as a contextual medium for introducing physics concepts while supporting ethnoscience-based education and local cultural preservation.

Keywords: Co-curricular Activities; Ethnoscience; Kompang; Local Wisdom; Physics Learning.

Article History:

Received: 30 June 2026

Accepted: 14 October 2026

Published: 20 October 2026

How to cite:

Putri, T. S., & Fakhruddin, Z. (2026). Kompang as a Medium for Introducing Physics Concepts in Ethnoscience-Based Co-curricular Activities: A Study of Students' Perceptions. *Jurnal Literasi Pendidikan Fisika*, 7(2), 198-208. <https://doi.org/10.30872/jlpf.v7i2.6925>

Copyright © 2026 Jurnal Literasi Pendidikan Fisika. This work is licensed under CC BY 4.0.

INTRODUCTION

Physics education is crucial for helping students develop scientific thinking skills, problem-solving abilities, and overall scientific literacy. If these concepts are taught only through traditional formulas, without real-world experiences, students may struggle to connect with the material. Rizaldi & Fatimah, (2024) found that nearly 62% of students do not enjoy learning physics. Additionally, about 46% find waves and optics to be the toughest topics to grasp. This leads to a lack of interest in learning and poor conceptual understanding among students (Anwar et al., 2020; Saputra et al., 2024). This situation shows a clear need for innovative teaching methods that are more relevant and meaningful (Aprilia et al., 2025).

One effective way to tackle this issue is through ethnoscience-based learning. This method integrates local knowledge into the science learning process (Warliani et al., 2023; Jannah et al., 2022; Sari et al., 2023). Panis et al. (2023) state that integrating local wisdom into science instruction can serve as a bridge between abstract scientific concepts and students' real-world experiences. Local knowledge can include various elements like traditional musical instruments, folk games, food, and other cultural practices (Rahmat et al., 2023; Rahmawati et al., 2020). Traditional musical

instruments can serve as engaging media for introducing physical concepts, particularly vibrations and sound waves (Lestari et al., 2025). By playing musical instruments, students can observe the relationships among force, vibration, frequency, and sound. Previous research has also demonstrated the use of musical instruments as physics learning media for teaching sound wave concepts (Wanasita et al., 2025).

One traditional musical instrument with such potential is the kompong. It is part of Malay culture and frequently appears in religious and traditional ceremonies (Ritawati, 2025). Beyond its physical characteristics, the kompong also represents Malay cultural identity that should be preserved (Pamenang, 2021; Festiyed et al., 2024). Its use in physics learning can provide concrete examples of physics concepts while fostering students' appreciation of local culture (Sholahuddin & Admoko, 2021; Fitriah et al., 2025). The kompong is a traditional Malay musical instrument played by striking its membrane, with a playing technique similar to that of the rebana (Nugraha & Prabowo, 2022). When the kompong's membrane is struck, observable phenomena related to vibration and sound occur, providing a contextual basis for introducing basic physics concepts (Naba et al., 2024; Mustofa et al., 2021). The observable phenomena in the kompong and their related physics concepts are presented in Table 1.

Table 1. Observable phenomena in the kompong and related physics concepts

No	Phenomena in the Kompong	Physics Concepts	Explanation
1.	Striking the surface of the kompong membrane	Vibration	Striking the membrane causes it to move back and forth, producing vibration
2.	The production of sound after the kompong is struck	Sound waves	The vibrations of the membrane produce sound waves that propagate through the surrounding air and can be heard by the listener.
3.	Differences in the loudness and softness of the kompong's sound	Amplitude of vibration	Differences in vibration amplitude can be associated with differences in perceived loudness; larger amplitudes are generally associated with louder sounds.
4.	Variations in pitch or the character of the sound	Vibration Frequency	The frequency of vibration is related to the perceived pitch; higher frequencies are associated with higher-pitched sounds, while lower frequencies are associated with lower-pitched sounds.
5.	The sound can be heard by the players and the audience	Sound Wave Propagation	Sound propagates through the air from the source to the listener's ears.
6.	Playing the kompong together	Sound Resonance	Resonance may occur when an external vibration has a frequency close to the natural frequency of a vibrating system, resulting in a stronger response.
7.	Differences in the Size and Tension of the Kompong Membrane	Natural Frequency	The size and tension of the membrane affect the type of sound produced
8.	The Sound Weakens After a While	Vibration Damping	Vibrations diminish due to energy loss, causing the sound to weaken

These characteristics make the kompong a useful tool for connecting physics concepts with students' experiences (Saminan et al., 2024; Anwar et al., 2020). Co-curricular activities in schools provide a flexible context for integrating local cultural practices into students' learning experiences (Fianti & Neratania, 2024; Martawijaya et al., 2025). Through co-curricular activities, schools can also connect cultural practices with scientific concepts in a contextual way (Aprilia et al., 2025). In this study, the kompong activity is primarily a local-culture-based co-curricular activity rather than a formal

or scheduled physics lesson. However, the activity provides opportunities for students to encounter physical phenomena directly through playing and observing the kompang, particularly vibration and sound production. From this perspective, physics concepts can be introduced contextually without changing the primary cultural purpose of the activity.

Previous studies have explored the use of local wisdom and traditional musical instruments in physics learning, particularly in relation to vibration and sound phenomena (Lestari et al., 2025; Sholahuddin & Admoko, 2021). However, research specifically examining the use of the kompang within a local-culture-based co-curricular activity to introduce physics concepts remains limited. In particular, limited attention has been given to students' perceptions of physics concepts encountered through their direct participation in such cultural activities, rather than through formal classroom physics instruction.

The novelty of this study lies in examining the kompang from two interconnected perspectives: as a local cultural practice and as a contextual medium for introducing basic physics concepts within a co-curricular setting. The study focuses on students' perceptions of physics concepts encountered through their direct participation in the cultural activity, rather than through formal classroom physics instruction.

Based on this background and the identified research gap, this study aims to describe students' perceptions of the use of the kompang as a medium for introducing physics concepts in ethnosience-based co-curricular activities at SMAN 9 Mandau. Accordingly, the research question is: How do Grade 10 students perceive the use of the kompang as a medium for introducing physics concepts in ethnosience-based co-curricular activities at SMAN 9 Mandau?

METHODS

Data analysis used a quantitative approach with a descriptive design. Research data were collected by distributing a questionnaire to measure students' perceptions of the use of the kompang to introduce physics concepts in co-curricular activities. The study took place at SMAN 9 Mandau, located in Bengkalis Regency, Riau Province. This area is a Malay-speaking region known for its traditional musical instruments, like the kompang. The kompang activity is an official school co-curricular program implemented under the Merdeka Curriculum. The activity was conducted every Thursday from the fourth to the eleventh lesson period, equivalent to 8 lesson hours (JP) per week, with each lesson hour consisting of 45 minutes. The activity was implemented during October 2025, November 2025, January 2026, and February 2026. Students participated directly in learning and practicing the kompang as part of the co-curricular activities. The research sample included 50 students who participated in the activity. I included all members of the population in the research sample using total sampling. The research instrument was a student perception questionnaire consisting of 20 statements covering three aspects. Students' responses to each statement were measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), as shown in Table 2 (Likert, 1932). The questionnaires was administered once after the students had participated in the kompang co-curricular activity. Each student completed the questionnaire individually based on their own experience during the activity. No pre-test or post-test was conducted because the study employed a quantitative descriptive design intended to describe students' perceptions.

Table 2. Questionnaire rating scale

Description	Score
Strongly Agree	5
Agree	4
Somewhat Agree	3
Disagree	2
Strongly Disagree	1

The research instrument indicators were developed by adapting the concept of ethnosience-

based learning proposed by Munandar et al., (2022) regarding the implementation of ethnoscience-based learning in the context of local culture. These findings served as the basis for developing an instrument to measure students' perceptions of the use of the kompang musical instrument as a medium for introducing physics concepts in ethnoscience-based co-curricular activities. Details of the instrument's aspects, indicators, and items are presented in Table 3 (Munandar et al., 2022) .

Table 3. Research aspects and indicators

Aspect	Indicator
Students' Perceptions of the Use of the Kompang Musical Instrument as a Medium for Introducing Physics Concepts	1. Ease of Understanding Physics Material
	2. Interest and Engagement in Learning
	3. Appreciation for Local Culture

The quantitative data obtained from the student perception questionnaire were analyzed using descriptive statistics. The percentage of ideal scores (P) for each statement item and indicator was calculated using Equation (1), adapted from Sugiyono (2019), where P is the percentage; $\sum X$ is the total score obtained from all assessment items; and N is the maximum possible score.

$$P = \frac{\sum X}{N} \times 100\% \quad (1)$$

To determine the grading categories, score intervals based on the following calculations are used as shown in Equation (2) (Arikunto, 2019).

$$I = \frac{\text{Maximum Score} - \text{Minimum Score}}{\text{Number of Categories}} \quad (2)$$

Data analysis involved calculating the mean and percentage for each student perception indicator. These indicators include ease of understanding physics material, interest and engagement in learning, and appreciation for local culture. The criteria for interpreting the ideal percentage are presented in Table 4 (Sugiyono, 2019).

Table 4. Percentage of Ideality

Percentage of Ideality (%)	Criteria
81 – 100	Very Good
61 – 80	Good
41– 60	Fair
21 – 40	Poor
0 – 20	Very Poor

The table shows the analysis results to help interpret the data. The open-ended questionnaire data were also used to support and clarify the quantitative findings. This approach offers a clearer understanding of students' views on using the kompang to introduce physics concepts.

RESULTS AND DISCUSSION

Results

The analysis focused on three main indicators: ease of understanding physics material, interest and engagement in learning, and appreciation of local culture. These indicators were used to examine students' perceptions of integrating kompang into physics learning activities, particularly its potential to facilitate understanding of physics concepts, encourage active participation, and strengthen students' appreciation of local cultural heritage. Each indicator was assessed using students' questionnaire responses, which were analyzed based on the average score and percentage to determine the corresponding evaluation criterion. This analysis provides an overview of students' responses to the use of kompang as a culturally contextualized approach to physics learning. The results for each indicator, including the number of questionnaire items, average score, percentage,

and assessment criterion, are presented in Table 5.

Table 5. Students' perceptions of the use of the kompang

Indicator	Number of Items	Average Score	Percentage (%)	Criterion
Ease of Understanding Physics Material	7	3,52	70,34	Good
Interest and Engagement in Learning	7	3,66	73,20	Good
Appreciation for Local Culture	6	4,11	82,27	Very Good
Overall Average	20	3,76	74,92	Good

Referring to Table 5, students' perceptions of the use of kompang to introduce physics concepts ranged from "good" to "very good." The appreciation of local culture indicator recorded the highest percentage, falling into the "very good" category, indicating that students showed a particularly positive perception toward the role of kompang in strengthening their appreciation of local culture. Meanwhile, the indicators of learning interest and ease of understanding the material were categorized as "good," indicating that students perceived the kompang activity as an engaging and contextual way to encounter physics concepts. To obtain a more detailed picture, an item-by-item analysis of students' responses to the questionnaire statements is presented in Table 6. At the item level, the statement 'I support the use of local culture in school learning activities' recorded the highest percentage (86.80%). This result indicates that students had a highly positive perception of the use of kompang in the school environment. Conversely, the statement "Physics concepts become easier to understand when related to the kompang" recorded the lowest percentage (62.40%), although it remained within the "good" category.

Table 6. Item-level analysis of students' perceptions

Rank	Statement	Questionnaire Item No.	Percentage (%)
1	I support the use of local culture in school learning activities.	20	86,8
2	I am interested in learning more about the kompang musical instrument as part of local culture.	19	84
3	Learning with the kompang has increased my awareness of the importance of preserving local culture.	17	83,6
4	Using the kompang has made me appreciate local culture more.	15	83,2
5	Using the kompang has helped me understand the concept of vibrations.	1	82,4
6	I realize that local culture can be a valuable learning resource.	18	80,8
7	Using the kompang helps me understand the concept of sound waves.	2	78,4
8	I take part in learning activities that use the kompang.	11	78,4
9	Using the kompang makes learning physics more enjoyable.	10	77,6
10	I feel more motivated to study physics through activities based on local culture.	14	75,6
11	I feel proud when local culture is incorporated into physics lessons.	16	75,2
12	Learning physics using the kompang makes me more enthusiastic about studying.	9	73,2
13	I'm more interested in studying physics when using the kompang.	8	72,8
14	Using the kompang helps me understand the real-world applications of physics.	7	70,4
15	I'd like to see local cultural elements incorporated into other physics topics.	12	68,8
16	The kompang helps me connect physics theories to everyday life.	4	67,6
17	I find it easier to remember the physics material I've learned through the kompang.	6	66
18	Using the kompang has made me even more curious to learn about physics concepts.	13	66
19	Learning with the kompang makes physics concepts more concrete.	5	65,2

20	Physics concepts become easier to understand when related to the kompang.	3	62,4
----	---	---	------

Discussion

This difference in students' responses indicates that students perceived the cultural dimension of the kompang activity more positively than its role in helping them understand physics concepts. This finding is consistent with Yusuf, (2023) who reported that ethnoscience-based education can support affective aspects, such as cultural values and attitudes. Through their participation in the kompang activity, students encountered physics phenomena such as vibration, amplitude, period, frequency, and sound propagation. When the membrane is struck, it vibrates and produces sound, providing a contextual way to introduce these physics concepts through local cultural practices.

The Use of the Kompang to Introduce Physics Concepts

Referring to Table 5, the Ease of Understanding Physics Material indicator was categorized as "good," with a percentage of 70.34%. This result reflects students' perceptions of the extent to which the kompang activity provided opportunities to recognize and relate to physics concepts. Through co-curricular activities, students directly encountered sound and vibration phenomena, as presented in Figure 1. These phenomena are related to physics concepts such as vibration, amplitude, period, frequency, and sound propagation.



Figure 1. Students observing physics concepts through the kompang musical instrument

The students' activity in playing the kompang, as shown in Figure 1, demonstrates their direct involvement in the co-curricular activity through an ethnoscience approach that connects physics concepts with local culture. This approach helps students recognize scientific principles within local traditions (Ritawati, 2025).

This aligns with the essence of contextual learning, which connects subject matter with students' lived experiences and may support the learning process (Sudirman et al., 2025). This finding is also

Kompang as a Medium...

consistent with Jufrida et al., (2025), who reported that ethnoscience-based physics learning can support students' understanding of physics concepts through contextual learning experiences. The findings suggest that the kompang provides a contextual experience for introducing physics concepts, while deeper conceptual understanding may require further instructional activities, such as group discussions and experiments.

The Use of the Kompang to Support Interest and Engagement in Learning

Referring to Table 5, the Interest and Engagement in Learning indicator obtained a percentage of 73.20%, which was categorized as "good." This result indicates that students had a positive perception of their interest and engagement during the kompang co-curricular activity. This finding is consistent with Nugraha & Prabowo, (2022) who state that traditional instruments can create engaging and meaningful learning experiences. Activities such as playing the kompang, discussing, and observing sound phenomena firsthand provide opportunities for students to participate actively in the co-curricular activity, as illustrated in Figure 2.



Figure 2. "Malam Berinai" co-curricular activity accompanied by the melody of the kompang

The findings of Silla et al., (2023) support the principle of constructivism, in which students construct their knowledge independently through direct experience using cultural artifacts that are familiar to them.

In line with the ideas of Munandar et al., (2022), ethnoscience learning can support students' motivation and interest in learning because it addresses topics closely related to their environment. In the present study, this finding is reflected in the Interest and Engagement in Learning indicator, which obtained a percentage of 73.20% and was categorized as "good" (Table 5). Furthermore, the overall perception score reached 74.92%, also categorized as "good." These results indicate that connecting physics with local culture through the kompang was positively perceived by students and was associated with their engagement in the co-curricular activity.

The Use of the Kompang to Support Appreciation of Local Culture

The appreciation for local culture indicator recorded a "very good" percentage, indicating that students had a highly positive perception of the use of kompang in the co-curricular program and its role in connecting local culture with physics learning. An example of students' participation in a local cultural activity is presented in Figure 3.



Figure 3. Students using the kompang in the tradition of welcoming guests

The activity provides a highly contextual learning experience because it is directly related to the students' familiar environment. This finding is consistent with Warliani et al., (2023), who reported that the integration of local wisdom can support learning experiences while strengthening students' understanding of local culture. This ethnosience-based co-curricular activity provides students with opportunities to experience and appreciate local culture in Mandau Subdistrict, Bengkalis Regency, Riau Province; it also allows students to learn how to play the kompang and to understand the cultural values embedded in it. This finding aligns with the ethnosience approach, which utilizes local culture as a learning resource. Thus, the use of the kompang not only supports the introduction of physics concepts but also contributes to fostering awareness of the importance of preserving local culture among the younger generation (Sudirman et al., 2025).

Implications of Using the Kompang in Ethnosience-Based Physics Learning

The physics concepts that can be introduced through the kompang are related to waves, particularly mechanical and sound waves, including vibration, amplitude, period, frequency, sound propagation, and resonance. This topic aligns with the Kurikulum Merdeka learning outcome, which requires students to analyze wave phenomena and their applications in everyday life.

This is also supported by Sihombing et al., (2025), who found that integrating local wisdom into co-curricular activities can create more contextual, engaging, and meaningful learning experiences. Rahmawati et al., (2020) also noted that students were not only introduced to physics concepts related to vibration and sound waves but also had opportunities to learn about and appreciate local culture, such as kompang. The school learning process can play a significant role in introducing local cultural values to students. This finding supports the view of Yuni S et al., (2025) who state that an ethnosience-based approach can strengthen students' connection to the culture present in their environment.

CONCLUSION

This study shows that the use of the kompang as a medium for introducing physics concepts in co-curricular activities was viewed positively by students. The activity provided a contextual opportunity to introduce concepts related to vibration and sound waves while supporting students' interest and engagement.

The Appreciation of Local Culture indicator received the most positive response, while the Ease of Understanding Physics Material indicator received the lowest response and was still categorized as "good." These findings suggest that the kompang provides a contextual medium for introducing physics concepts while connecting students' learning experiences with local culture.

Acknowledgements

The author thanks the school administration, teachers, and students of SMAN 9 Mandau for their support and participation in this study.

Conflict of Interest

The authors declare that they have no conflict of interest related to this study.

Funding

This research received no external funding.

Author Contributions

T.L.P. contributed to the conceptualization, methodology, investigation, data collection, data analysis, and preparation of the original manuscript. F.Z. contributed to supervision, validation, and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

Formal ethics approval was not sought for this study. Permission to conduct the research was obtained from the school administration of SMAN 9 Mandau. Participation in the study was voluntary, and participants were informed about the purpose of the research before completing the questionnaire. Informed consent was obtained from the participants and/or their legal guardians, as applicable.

Generative AI Declaration

The authors declare that no generative artificial intelligence tools were used in the preparation, writing, or revision of this manuscript.

REFERENCES

- Anwar, K., Rusdiana, D., Kaniawati, I., & Viridi, S. (2020). Teaching wave concepts using traditional musical instruments and free software to prepare prospective skillful millennial physics teachers. *Journal of Physics: Conference Series*, 1521(2), 022056. <https://doi.org/10.1088/1742-6596/1521/2/022056>
- Aprilia, V., Sartika, S. B., & Salim, A. (2025). Contextual Teaching and Learning Based on Ethnoscience in Natural and Social Sciences. *Indonesian Journal of Education Methods Development*, 20(4). <https://doi.org/10.21070/ijemd.v20i4.901>
- Arikunto, S. (2019). *Prosedur Penelitian*. Rineka Cipta.
- Festiyed, F., Asrizal, A., Mufit, F., Tanjung, Y. I., Gunawan, R. G., Ilwandri, I., & Zulherman, Z. (2024). Ethnophysics Studies in Various Indonesian Cultures: A Systematic Literature Review. *Journal of Innovation in Educational and Cultural Research*, 5(1), 169–179. <https://doi.org/10.46843/jiecr.v5i1.905>
- Fianti, F., & Neratania, A. (2024). Developing Physics Teaching Materials Based on Differentiated Merdeka Curriculum Using an Ethnoscience-Integrated Contextual Approach. *Jurnal Inovasi Pendidikan IPA*, 10(2), 160–174. <https://doi.org/10.21831/jipi.v10i2.76663>
- Fitriah, L., Yuliati, L., Parno, P., Sunaryono, S., & Taufiq, A. (2025). Indonesian Local Wisdom-Based Physics Learning: Strategy and Media. *Journal of Education Culture and Society*, 16(1), 335–364. <https://doi.org/10.15503/jecs2025.2.335.364>
- Jannah, R., Festiyed, F., Yerimadesi, Y., Lufri, L., & Putra, S. (2022). Ethnoscience in Learning Science: A Systematic Literature Review. *Scientiae Educatia*, 11(2). <https://doi.org/10.24235/sc.educatia.v11i2.11488>
- Jufrida, J., Kurniawan, W., Furqon, M., Anwar, K., Shidow Falah, H., & Riantoni, C. (2025). AI-Driven Ethnoscience Learning: Enhancing Physics Education Through Malay Cultural Insights. *Journal of Information Technology Education: Innovations in Practice*, 24, 013. <https://doi.org/10.28945/5520>

- Lestari, R. T. I., Aji, S. D., & Jufriadi, A. (2025). Exploration of Sound Wave Concept in the Making and Playing of Yogyakarta Gamelan: STEM Learning Approach. *Jurnal Ilmiah Pendidikan Fisika*, 9(3), 401. <https://doi.org/10.20527/jjpf.v9i3.15638>
- Likert, R. (1932). *A Technique for the Measurement of Attitudes*. Archives of Psychology.
- Martawijaya, M. A., Sujiono, E. H., Halim, A. D., Siew Wei, T., Mahir, M., Palloan, P., & Zharvan, V. (2025). The Impact of Physics Co-curricular Activities Based on Makassar Local Wisdom on Improving the Pancasila Student Profile and Learning Satisfaction. *Jurnal Pendidikan IPA Indonesia*, 14(1). <https://doi.org/10.15294/jpii.v14i1.13178>
- Munandar, R., Ika Ristanti, C., Nurhidayati, N., Busyairi, A., & Rokhmat, J. (2022). Analisis Potensi Pembelajaran Fisika Berbasis Etnosains Untuk Meningkatkan Kecintaan Budaya Lokal Masyarakat Bima. *Jurnal Penelitian Dan Pembelajaran Fisika Indonesia*, 4(1). <https://doi.org/10.29303/jppfi.v4i1.169>
- Mustofa, H. A., Gunawan, G., & Kosim, K. (2021). Validity of documentary video learning media based on local content traditional musical instruments on sound waves. *Jurnal Pijar Mipa*, 16(5), 576–582. <https://doi.org/10.29303/jpm.v16i5.1189>
- Naba, S. D., Kuswanto, H., Kurniawan, A., & Adrianto, N. (2024). Exploring Of Physics Concepts Of “Sound Waves” In The Moronene Tribe’s Tamburu Musical Instrument As A Physics Learning Material. *SCIENCE: Jurnal Inovasi Pendidikan Matematika Dan IPA*, 4(4), 519–527. <https://doi.org/10.51878/science.v4i4.3773>
- Nugraha, B. S., & Prabowo, P. (2022). Respon Siswa SMA Terhadap Pembelajaran Fisika Berbasis Kearifan Lokal Pada Alat Musik Tradisional Rebana Untuk Meningkatkan Keterampilan Literasi Sains. *PENDIPA Journal of Science Education*, 6(2), 556–564. <https://doi.org/10.33369/pendipa.6.2.556-564>
- Pamenang, F. D. N. (2021). Local Wisdom In Learning As An Effort To Increase Cultural Knowledge: Students: Perception As Prospective Teachers. *IJJET (International Journal of Indonesian Education and Teaching)*, 5(1), 93–101. <https://doi.org/10.24071/ijet.v5i1.3050>
- Panis, I. C., Mukin, M. U. J., & Uran, Y. L. (2023). Pengembangan Modul Pembelajaran Fisika Berbasis Kearifan Lokal Pada Alat Musik Tradisional Untuk Meningkatkan Pemahaman Konsep. *JKTP: Jurnal Kajian Teknologi Pendidikan*, 6(1), 050. <https://doi.org/10.17977/um038v6i12023p050>
- Rahmat, A. D., Kuswanto, H., Wilujeng, I., & Pratidhina, E. (2023). Improve critical thinking skills using traditional musical instruments in science learning. *International Journal of Evaluation and Research in Education (IJERE)*, 12(4), 2165. <https://doi.org/10.11591/ijere.v12i4.25753>
- Rahmawati, Y., Ridwan, A., Cahyana, U., & Wuryaningsih, T. (2020). The Integration of Ethnopedagogy in Science Learning to Improve Student Engagement and Cultural Awareness. *Universal Journal of Educational Research*, 8(2), 662–671. <https://doi.org/10.13189/ujer.2020.080239>
- Ritawati, T. (2025). Musik Tradisional Melayu Riau: Refleksi Sosial dan Budaya Masyarakat Melayu. *Jurnal Syntax Admiration*, 6(1), 947–961. <https://doi.org/10.46799/jsa.v6i1.2113>
- Rizaldi, D. R., & Fatimah, Z. (2024). Analysis of Various Contexts of Difficulties Experienced by Students in Learning Physics. *Physics Education Research Journal*, 6(2), 103–108. <https://doi.org/10.21580/perj.2024.6.2.14122>
- Saminan, S., Irwandi, I., Kamza, M., & Bin Rasul, M. S. (2024). Acehese Ethnoscience as an Interdisciplinary Approach in Physics Education: Innovating in the Era of Merdeka Belajar. *Jurnal Ilmiah Peuradeun*, 12(3), 1071–1098. <https://doi.org/10.26811/peuradeun.v12i3.1277>
- Saputra, O., Satriawan, M., Anggaryani, M., Habibullo, M., & Kholiq, A. (2024). Development of multimedia oriented to local wisdom to improve students’ understanding of physics concepts. *Journal of Physics: Conference Series*, 2900(1), 012046. <https://doi.org/10.1088/1742-6596/2900/1/012046>
- Sari, F. P., Maryati, M., & Wilujeng, I. (2023). Ethnoscience Studies Analysis and Their Integration in Science Learning: Literature Review. *Jurnal Penelitian Pendidikan IPA*, 9(3), 1135–1142. <https://doi.org/10.29303/jppipa.v9i3.2044>
- Sholahuddin, M. I., & Admoko, S. (2021). Exploration of Physics Concepts Based on Local Wisdom Kolecer Traditional Games. *PENDIPA Journal of Science Education*, 5(1), 70–78. <https://doi.org/10.33369/pendipa.5.1.70-78>
- Sihombing, R. A., Anwar, S., Liu, S.-Y., Muslim, M., Winarno, N., & Sihombing, P. J. (2025).

- Integrating Local Wisdom into Environmental Education: A Systematic Review of Ethnoscience Research in Indonesia. *Journal of Natural Science and Integration*, 8(1), 57. <https://doi.org/10.24014/jnsi.v8i1.35762>
- Silla, E. M., Dopong, M., Teuf, P. J., & Lipikuni, H. F. (2023). Kajian Etnosains pada Makanan Khas Usaku (Tepung Jagung) sebagai Media Belajar Fisika. *Jurnal Literasi Pendidikan Fisika (JLPF)*, 4(1), 30–39. <https://doi.org/10.30872/jlpf.v4i1.2060>
- Sudirman, S., Sutikno, S., Indriyanti, D. R., Sumarni, W., & Rahayuningsi, M. (2025). Integration of Ethnoscience in Natural Science learning: Literacy Study. *Jurnal Penelitian Pendidikan IPA*, 11(6), 68–77. <https://doi.org/10.29303/jppipa.v11i6.9980>
- Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.
- Wanasita, W., Santoso, R., Wahyono, U., & Untara, K. A. A. (2025). Implementation of Physics Learning Media Using Kakula Musical Instruments on Student Learning Outcomes on Sound Wave Materials. *Jurnal Ilmiah Pendidikan Fisika*, 9(3), 366. <https://doi.org/10.20527/jipf.v9i3.16064>
- Warliani, R., Irvani, A. I., & Khoiril, A. (2023). Analisis Modul Ajar Fisika berbasis Kearifan Lokal pada Platform Merdeka Mengajar. *Jurnal Ilmu Fisika Dan Pembelajarannya (JIFP)*, 7(2), 7–13. <https://doi.org/10.19109/jifp.v7i2.19297>
- Yuni S, A., Wibowo, S. E., & Susanto, S. (2025). Identification Of Ethnoscience Studies in Science Learning to Strengthen Cultural Relevance in Primary Education. *Jurnal Penelitian Pendidikan IPA*, 11(6), 862–869. <https://doi.org/10.29303/jppipa.v11i6.9814>
- Yusuf, F. A. (2023). Meta-Analysis: The Influence of Local Wisdom-Based Learning Media on the Character of Students in Indonesia. *International Journal of Educational Methodology*, 9(1), 237–248. <https://doi.org/10.12973/ijem.9.1.237>