JIPI (Jurnal IPA dan Pembelajaran IPA) 9(3), 721-735 (2025)
p_ISSN: 2614-0500-e_ISSN: 2620-553X
https://jurnal.usk.ac.id/JIPI/index https://doi.org/**10.4815/jipi.v9i3.46337**

Ethnophysics Study of Reog Ponorogo Art in Physics Learning: A Study of Students' Interests and Understanding

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Article History:
Received date: May 24 2025
Received in revised from: August 18 2025
Accepted date: August 30 2025
Available online: September 10 2025

Citation:
Habibi, R., Suprapto, N., Prahani, B.K., Satriawan, M., & Nisa, K. (2025). Ethnophysical Study of Reog Ponorogo Art in Physics Learning: A Study of Students' Interests and Understanding. *JIPI (Jurnal IPA dan Pembelajaran IPA)*, 9(3), 721-735

Abstract. Physics learning is still often considered abstract and less interesting by students, so a more contextual and relevant approach is needed. Ethnophysics, which connects the concepts of physics with the local culture, is one of the alternatives to increase students understanding and interest. This study aims to identify and analyze the influence of ethnophysics-based learning on studentslearning interests and assess its impact on students understanding of physics concepts. In this study used mixed method with concurrent triangulation approach, where quantitative data obtained through Likert scale questionnaire and compared with qualitative data from students open questions. The results showed that the integration of ethnophysics in physics learning has a positive impact, with an average score of students understanding of 3.65 (high category) and increased interest in learning with a score of 3.56 (high category). In addition, the effectiveness of culture-based learning was also rated high (3.65) by students. Concurrent triangulation approach shows most students can benefit cultural integration in physics learning. However, there are still some students who have difficulty in applying physics concepts to numerical problems. Therefore, this study recommends the use of problem based learning (PBL)model in ethnophysics-based LKPD as a strategy to strengthen students problem-solving skills. The conclusion obtained from this study is that the integration of ethnophysics in physics learning can improve students understanding, interest, and learning effectiveness. In addition, the development of culture-based learning with the PBL approach is recommended as an innovative strategy that not only enhances the understanding of physics but also preserves the local cultural heritage.
Keywords: Ethnophysics, Reog Ponorogo, student interest, problem-based learning

Introduction

Indonesia is a country rich in diversity of natural resources and customs. Globalization in the 21st century has led to a shift in local cultural values, causing younger generations to lose their connection with cultural heritage (Harianto et al., 2023). In this context, education plays a crucial role in revitalizing local cultural awareness as a means of coping with the pressures of globalization (Sumantri, 2023). One way to improve cultural values that began to fade is to collaborate ethnoscience in education (Khusniati et al., 2017). Education can be used as a form of effort in empowering human potential to inherit, develop

and build civilization in the future (Abid, 2023; Melchor & Yoder, 2024). Efforts are being made to build civilization by increasing one's understanding of the surrounding environment, especially those related to culture as an ancestral heritage. Culture will be maintained if incorporated into learning activities one of which is in the field of science education (Febrian et al., 2024). The values of local wisdom contained in the culture vary depending on each region, because Indonesia consists of various tribes, ethnicities, and traditions (Riyanto & Subroto, 2024; Widiarini, et al., 2025).

Reog Ponorogo, as one of the rich cultural heritages, offers a unique opportunity to associate physics concepts with real cultural experiences (Sari & Rifai, 2019; Wulansari & Admoko, 2021). By integrating elements of local culture in physics learning, students can not only understand physical theories in greater depth, but also feel the connection between science and their daily lives. For example, through the analysis of dance movements in Reog Ponorogo, students can learn the concepts of style and momentum in a practical way, which makes learning more interesting and relevant. This approach not only improves students understanding of physical matter, but also arouses their interest in further learning, as they can see the real application of the concepts taught (Rohmah et al., 2024). Thus, ethnophysics not only serves as a teaching method, but also as a bridge that connects students with their cultural heritage, creating a holistic and enjoyable learning experience (Alfiah et al., 2024; Sumarni et al., 2023).

However, in the world of education, students interest in learning in Physics subjects continues to decline (Wahyuni et al., 2021). This shows that while there is great potential in linking physics to culture, there are still challenges to be faced. According to recent studies, one of the main causes of low student interest is the lack of relevance between the material taught and everyday life (Dewi & Alam 2021; Tungka et al. 2023; Utami, et al. 2023; Yasin & Baresi, 2024). Therefore, an innovative approach such as ethnophysics is needed, namely the connection of physics concepts with local culture, as a more contextual and interesting learning method (Arifin et al., 2022; Rahayu et al., 2022).

Various attempts have been made by other researchers to integrate cultural elements into the learning of physics, with the aim of increasing students understanding and interest. For example, research by Dawana et al. (2023) shows that the use of traditional musical instruments in physics learning can help students understand the concepts of waves and frequencies in a more contextual way. In addition, Yuliono et al. (2017) conducted a study highlighting the importance of the introduction of local culture in the physics curriculum, where they found that students who studied physics through a cultural context showed significant improvements in motivation and learning outcomes. Another study by Deta et al. (2023) also revealed that culture-based approaches, such as ethnophysics, not only enhance understanding of physics concepts, but also strengthen students cultural identity. Thus, these efforts show that cultural integration in physics learning is not only a pedagogical innovation, but also an effective strategy to bridge the gap between theory and practice, as well as increasing the relevance of physics education in students daily lives (Asra et al., 2021).

Other research has also shown that by linking learning to local culture, students more easily grasp abstract concepts that were previously difficult to understand in traditional classroom contexts (Putra et al., 2024). According to Rahayu at al. (2022), physics learning integrated with culture improves students critical thinking skills and helps them see the relevance of Science in everyday life. Several studies have shown that the use of Traditional Arts in physics learning can increase student engagement and motivation. The movement in Reog Ponorogo reflects the principle of balance and center of mass, while the use of large masks and traditional musical devices can explain the concepts of resonance and acoustics (Deta et al., 2023; Nasution et al. 2024).

In addition, culture-based methods also improve understanding of concepts through direct experience, compared to more theoretical conventional methods (Puspasari et al.,

2019; Yasin & Baresi, 2024). Study by Gifani et al. (2023) showed that students who studied using the ethnophysical approach experienced an increase in concept comprehension scores compared to students who only used conventional methods. Therefore, the integration of traditional arts in the curriculum can be an alternative in improving the effectiveness of physics learning (Namukasa, 2024).

Based on various previous studies, there are still very limited studies that deeply explore students learning interests in studying physics through a regional arts approach, especially Reog Ponorogo. In fact, this art contains various physical elements such as momentum, balance, center of mass, torque, force, and resonance which are reflected in dance movements and the use of traditional musical instruments. This study offers a novelty by examining the integration of ethnophysics of Reog Ponorogo in physics learning to see the extent to which this approach can increase students interest and understanding of physics concepts. Therefore, this study aims to identify and analyze the influence of ethnophysics-based learning on studentslearning interests and assess the impact on students' understanding of physics concepts. Thus, this study is expected to contribute to the development of contextual, meaningful, and local culture-based physics learning models to bridge the gap between science and students real lives.

Methods

This study used a mixed method with concurrent triangulation approach, which is the collection of quantitative and qualitative data simultaneously to complement and confirm the results (Creswell & Clark, 2018). This approach was chosen to obtain a comprehensive picture of students perceptions of the integration of Reog Ponorogo culture in physics learning.

The sample in this study was determined by purposive sampling, taking into account the involvement of students who have experience or understanding of the local cultural context. Data collection was carried out through two main instruments, namely the Likert scale questionnaire and the open question questionnaire (Sugiyono, 2022). The Likert scale questionnaire consists of 10 statements divided into three indicators: (1) understanding of cultural and philosophical values in the art of Reog Ponorogo, (2) interest and enthusiasm for learning physics, and (3) motivation and effectiveness of learning through a cultural approach. Open-ended questionnaires are used to delve deeper into students perceptions and experiences in culture-based learning. Research procedures as presented in Figure 1.

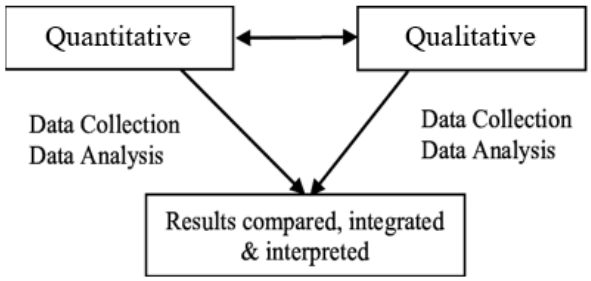

Figure 1. Research flow diagram

Quantitative data were analyzed using descriptive statistical techniques, namely calculating the average value, frequency, and percentage of each indicator. The average response results were analyzed based on a 5-point Likert scale classification. Determination of interpretation categories refers to the class interval method (Arikunto, 2014; Riduwan, 2016), with the results interpretation criteria in Table 1.

Table 1. Interpretation category criteria

Average Score Range	Interpretation Category
4.21 – 5.00	Very High
3.41 – 4.20	High
2.61 – 3.40	Medium
1.81 – 2.60	Low
1.00 – 1.80	Very Low

Meanwhile, qualitative data from open questionnaires were analyzed using a thematic analysis approach, namely grouping students' answers based on themes or patterns that emerged. This analysis was used to capture deeper meaning regarding how students interpret the physics learning experience associated with the Reog Ponorogo culture. To strengthen the validity of the data, triangulation methods were used, where findings from quantitative data were compared with qualitative data to see consistency or inconsistency. This approach allows researchers to capture students' subjective nuances more comprehensively and provide strong support for quantitative results. Validation and reliability testing of the instrument were carried out by education practitioners, and the results showed that the instrument was suitable for use in the context of this study (Azwar, 2018; Taherdoost, 2016).

Results and Discussion

Physics is still often considered a difficult subject because many concepts are abstract and lack a direct relationship with the daily activities of students. An approach that can be done to improve students understanding and interest in studying physics is by integrating the material with local cultural arts. Ethnophysics is a relevant method used to relate physics concepts to aspects of local culture that are already familiar to students. This approach is in line with the findings of Gifani et al. (2023), which states that students understand physics concepts more easily when matter is associated with their daily experiences or local culture.

This study aims to analyze the relationship between students understanding of the art of Reog Ponorogo with interest and attraction to learn physics through a cultural approach. Questionnaire Data obtained from each indicator can be presented in the form of a diagram as Figure 2.

a. First Indicator

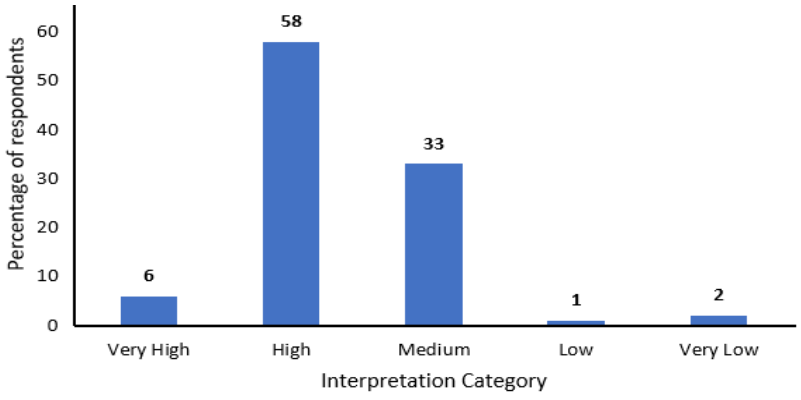

Figure 2. Indicator questionnaire results 1

Figure 2, showing the results of the study with the indicator" understanding the value of culture and philosophy in the Arts Reog Ponorogo " obtained an average score of 3.65, which is categorized as high level. The majority of respondents (58%) have a high understanding of the value of culture and philosophy in Reog art, while 6% are in the very high category. A total of 33% of respondents showed understanding in the medium category, and only a small percentage of respondents (3%) had low or very low understanding. These results indicate that the understanding of the value of culture and philosophy in the art of Reog Ponorogo is quite good among respondents. This can be attributed to the role of Reog as a means of cultural education that is still sustainable in the community

b. Second Indicator

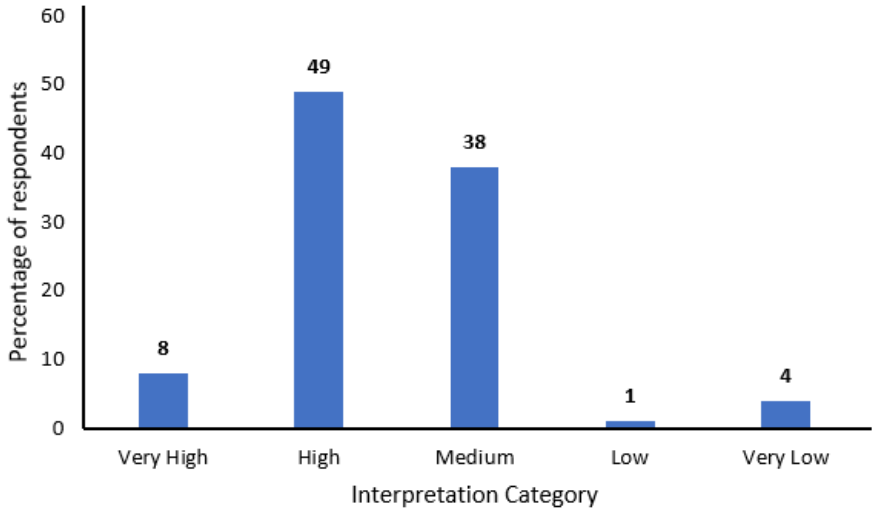

Figure 3. Indicator questionnaire results 2

Figure 3, showed the results of the analysis of indicators of interest and enthusiasm for learning physics obtained an average score of 3.56, which is categorized as high. Most respondents (49%) have interest and enthusiasm in the high category, while 8% are in the very high category. A total of 38% are in the medium category, while only a small percentage of respondents (5%) have low or very low interest. These findings indicate that the majority of students have a fairly good interest in learning physics, although there are still some who are less enthusiastic.

The results of this study are in line with the findings of Ardianti & Widodo (2017) which shows that the relationship of physical matter with local culture can increase student interest. Ethnophysical approaches, such as linking physics concepts with The Art of Reog Ponorogo, can be an effective strategy in increasing student engagement in learning. In addition, research by Safitri et al. (2023) found that experiment-based learning methods can increase students enthusiasm for studying physics, especially if the experiments are associated with real phenomena in the culture of the local community. Integration of technology in physics learning also plays an important role in increasing student interest. In this context, the use of simulations or learning videos depicting movement in the art of Reog Ponorogo, such as momentum Analysis and movement coordination dynamics, can be an innovation that increases students interest in physics concepts. Therefore, the results of this study further strengthen the argument that a culture-based contextual approach in physics learning can be an effective strategy in increasing student interest and enthusiasm.

c. Third Indicator

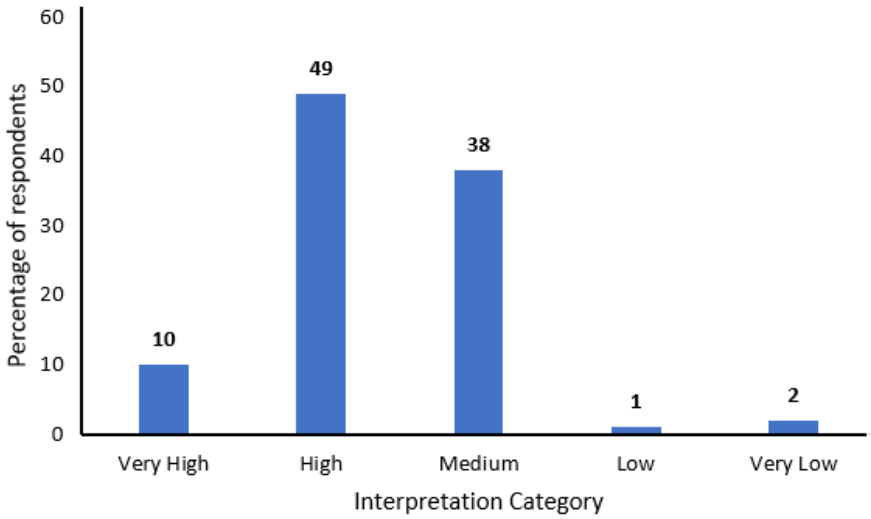

Figure 4. Indicator questionnaire results 3

Figure 4, showed the results of the analysis of motivation indicators and the effectiveness of learning through a cultural approach obtained an average score of 3.65, which is in the high category. Most respondents (49%) consider that the cultural approach to learning physics is quite effective and increases their motivation. As many as 10% of respondents even showed very high motivation, while 38% were in the medium category. Only a small percentage of respondents (3%) felt this approach was less effective or did not improve their motivation.

This finding is in line with research by Astuti & Bhakti (2021) which states that ethnophysical approaches can increase the relevance of physics learning to students daily lives, thereby increasing learning motivation. In addition, Abdjul & Katili (2021) research confirms that the effectiveness of physics learning can be improved through the integration of local culture, especially if supported by the use of technology such as digital simulations and experiments based on local wisdom. Thus, the results of this study reinforce the evidence that a culture-based approach not only improves understanding of physics, but is also able to significantly increase students learning motivation.

d. Results of grouping open questions 1

Table 2. the results showed that the majority of respondents (74%) have a positive view of the use of Reog Ponorogo in physics learning. This shows that the integration of traditional arts in education can increase the attractiveness and relevance of the subject matter for students. Respondents who gave a positive answer may feel that Reog Ponorogo not only enriches their learning experience, but also helps them understand physics concepts in a more interesting and contextual way. In contrast, only 14% of respondents gave a neutral answer and 12% gave a negative answer. Neutral respondents may feel less confident about the effectiveness of using Reog Ponorogo in learning, while negative respondents may have doubts or less positive experiences related to this method.

Table 2. Results of grouping answers to question 1

Question Answer	Group Answers
Making learning methods more exciting Make learning more interesting and real Making learning tools to be better understood by students, more innovative and creative	Positif

Maybe it can make learning physics even more interesting My opinion is normal Somewhat unique	Neutral
Not because art reyog Ponorogo including learning history No because there is no Reog ponorogo art material in physics lack of understanding	Negatif

Research by Hsiao & Su (2021) shows that the integration of art in STEAM education can increase student motivation and engagement, as well as help with more in-depth understanding of subject matter. This is in line with the results of the study and supports the argument that Reog Ponorogo, as a traditional art form, can serve as an effective tool for teaching physics concepts. However, it is important to note that although the majority of respondents gave positive responses, there were still a number of respondents who felt neutral or negative. This indicates the need for further evaluation of the teaching methods used and how the local culture can be effectively integrated into the curriculum. Eisner (2002) also emphasizes the importance of training teachers to properly implement art-based learning methods, in order to maximize the potential of art in education.

e. Results of grouping open questions 2

The results of the study are contained in Table 3. showed that the majority of respondents (67%) feel that the use of Reog Ponorogo as an art-based learning media is effective. This suggests that the integration of art in physics education can help students understand complex concepts in a more engaging and interactive way. The impact of the effectiveness of the use of performing arts such as Reog Ponorogo can help students visualize abstract physical concepts. Research by Aswara et al. (2021) showed that learning involving visual elements can improve students understanding of difficult material. By engaging the various senses, students can more easily remember and understand the material.

Table 3. Results of grouping answers to question 2

Question Answer	Group Answers
Increase student engagement and motivation Yes can improve students understanding of physical matter Art-based learning media, such as Reog Ponorogo, can help improve understanding of physical materials in a more interesting, interactive, and effective way	Effective
Might help Maybe it can, because it depends on each person Depends on the person can understand it well or not	May Be Effective
I don't think it's connected, what's the connection, and why it should be in physics Less helpful, because I think it can make the material more difficult to understand because they have to know a lot of things from the art of reog I do not know because in physics it is not taught that way	Ineffective

Although the majority of respondents felt that the use of Reog Ponorogo was effective, there were 22 respondents who felt that this method might be effective and 11 respondents who felt it was ineffective. This indicates the need for further evaluation of the implementation of this method in the context of learning physics. Some respondents may feel that although Reog Ponorogo has potential, not all aspects of this art can be applied effectively in physics learning. Research by Lauss & Helm (2025) shows that the successful integration of art in education is highly dependent on the

readiness of teachers and existing facilities. Based on these results, the use of Reog Ponorogo as an art-based learning media has great potential to improve students understanding of physics. However, it is important to conduct training for teachers and provide adequate resources to ensure the effectiveness of these methods.

f. Results of grouping open questions 3

Research results contained in Table 4, showed that 68% of respondents felt that the use of Reog Ponorogo can increase their interest in learning. This shows that the integration of art in physics learning not only makes the material more interesting, but also relevant to the local culture of students. Research by Liu et al. (2024) showed that the emotional involvement of students has a positive impact on the learning process. Arts such as Reog Ponorogo can evoke a sense of pride and connectedness with culture and emotional influences, which in turn can increase interest in learning. According to Muhartini et al. (2022), contextual learning helps students relate material to their real experiences. By using Reog Ponorogo, students can see the application of physics in their cultural context, thus making learning more meaningful.

Table 4. Results of grouping answers to question 3

Question Answer	Group Answers
Yes, because they may be familiar with Reog ponorogo, and may be interested in it, and will increase students interest in learning. Yes, the use of Reog Ponorogo in physics learning can increase student interest because it is more interactive, contextual, and interesting and connects physics concepts with local culture. It could be because our own art is involved	Increase Interest
Perhaps, depending on the interests of the student of the student himself Maybe, because I think physics is difficult to understand Maybe then there will be less intention to study physics not necessarily, because I haven't gotten this 2-element merge material	May Increase
No interest Less know Don't know	Does Not Increase

A total of 25 respondents stated that the use of Reog Ponorogo might increase interest in learning. This suggests that despite the potential, some students may still have doubts or need more experience to experience the benefits. Research by Herpratiwi & Tohir (2022) shows that interest in learning has a significant influence on student motivation. This indicates that learning approaches that match individual interests, such as art and culture-based approaches, can increase students motivation and involvement in physics learning. Only 7 respondents felt that the use of Reog Ponorogo did not increase their interest in learning. This suggests that despite some skepticism, the majority of students felt a positive impact. Research by Schunk et al. (2014) showed that external factors, such as the learning environment and support from teachers, can influence student interest. If students don't feel enough support, they may not feel the benefits of an arts-based approach. The use of Reog Ponorogo in physics learning not only serves as a tool to increase interest, but also as a bridge to connect students with their culture. By integrating local cultural elements, students can feel the relevance of the material taught, which in turn can increase their motivation and engagement.

Concurrent Triangulation approach in this study allows simultaneous analysis of quantitative and qualitative data to obtain a more comprehensive picture of the effectiveness of culture-based physics learning. Through this triangulation, the quantitative data from the Likert scale questionnaire are compared with the qualitative data from the students open responses, so that alignment and discrepancy between the two can be

identified. This method is important in educational research because it allows cross-validation between the numerical perception and the subjective experience of students in learning (Creswell & Clark, 2018).

Quantitative results showed that ethnophysical approach based on Reog Ponorogo had a positive impact on students understanding and interest in physics learning. The average score on the indicator of understanding physics concepts reached 3.65 (high category), which indicates that the majority of students find it easier to understand the concepts of momentum, balance, and center of mass through Reog movements. These Data are reinforced by qualitative results, where most students reveal that a culture-based approach makes physics more contextual and easy to understand. This is in line with the research of Gifani et al. (2023), which suggests that a culture-based approach can enhance the interrelation of science materials with students everyday experiences, thereby strengthening their conceptual understanding.

In addition, the indicators of students interest and enthusiasm for learning physics also showed positive results, with an average score of 3.56 (high category). Qualitative results support this finding, where students state that cultural integration in physics makes learning more interesting than conventional methods. They feel more motivated because learning is not only theory-based, but also has cultural values close to their lives. Previous research by Ardianti & Widodo (2017) found that the ethnophysical approach was able to increase students learning motivation because they could see the relationship between local culture and science concepts. Thus, the results of this study confirm that the ethnophysical approach can be an innovative strategy in increasing students interest and involvement in physics learning.

However, the Concurrent Triangulation approach also reveals discrepancies in the data, which is an important insight for further innovation. Although quantitative results indicate a high understanding of physical concepts, some qualitative responses indicate that students still have difficulty applying those concepts to numerical problems. Some students also revealed that they needed more time to understand the relationship between Reog movement and physical principles. This suggests that although a culture-based approach can improve conceptual understanding, additional strategies are needed to bridge physics concepts with problem solving skills. These findings are in line with the study of Simbolon (2015) stating that although a culture-based approach improves conceptual understanding, students still require explicit training in the application of concepts into numerical computation.

The mismatch of these data implies that ethnophysical approach can be further optimized by the use of PBL model that connects cultural phenomena in Reog Ponorogo with physical concepts exploratively. The PBL model allows students to not only conceptually understand physics principles but also develop problem-solving skills in their own cultural context. Yu & Zin's (2023) research suggests that PBL can promote deeper understanding because students are actively involved in constructing knowledge through the investigation of real problems. In the context of ethnophysics, this approach can help students discover for themselves how the laws of physics work in Reog art, such as how dancers maintain balance while carrying the head of a Singa Barong or how force and momentum work in their dance movements.

For example, in PBL model learning activities, in one of the stages, namely by providing opportunities for students to try to explore what physics concepts can be learned from the movement of one part of the Reog Ponorogo art. The results of understanding are discussed to strengthen concepts, exchange understanding with other groups, and reinforcement from teachers. One of them is by visualizing the Warok dance as in Figure 5. here's:

Figure 5. Two Warok dancers in moving and jumping positions

Furthermore, research by Gifani et al. (2023) found that students who learned through a culture-based approach with investigative methods experienced improved conceptual understanding and better analytical skills compared to students who only received the material directly. Therefore, the development of ethnophysics-based LKPD with PBL approach can be an innovative solution to bridge the gap between conceptual understanding and numerical application in culture-based physics learning. By giving students the opportunity to develop solutions to problems related to physical phenomena in Reog Ponorogo, this model not only enhances their understanding of physics, but also strengthens critical and creative thinking skills that are much needed in 21st Century Education.

Thus, the analysis using the concurrent triangulation approach in this study not only confirms the effectiveness of culture-based learning, but also identifies challenges that need to be addressed to improve its effectiveness. The convergence of quantitative and qualitative data reinforces the conclusion that the integration of Reog Ponorogo in physics learning can improve students' understanding and interest (Smith et al., 2022), while the discrepancy of the data provides new insights into the need for more adaptive learning strategies. The implication of this study is that the ethnophysical approach can not only be applied in physics, but also potentially developed in other science subjects as an effort to preserve culture while increasing the effectiveness of learning (Habibi et al., 2023).

Conclusion

This study concludes that integrating Reog Ponorogo through an ethnophysics approach in physics learning effectively increased students' learning interest, which reached a mean score of 3.56 (high category). It also improved students' conceptual understanding of physics concepts such as momentum, balance, and resonance, with a mean score of 3.65 (high category). The overall effectiveness of culture-based learning was likewise rated high (mean = 3.65), confirming the relevance of linking science to students' real-life cultural experiences. Therefore, ethnophysics has strong potential to serve as a contextual and culture-based learning model that enhances engagement and conceptual mastery while preserving local traditions.

Acknowledgement

I would like to thank my supervisor, instrument validator, friends who have supported me in completing this paper and I would like to thank the Physics Education Department of Surabaya State University for giving me the opportunity to increase my knowledge.

References

Abdjul, T. & Katili, N., (2021). The Application of Local Wisdom-Based Learning to Enhance Students' Science Process Skills. *Jambura Physics Journal*, 3(2), 112–119. https://doi.org/10.34312/jpj.v3i2.11166

Abid, S.A. (2023). Education for Civilization: Building a Better Future. *Suara Beradab*. https://suaraberadab.com/2023/07/22/pendidikan-untuk-peradaban-membangun-masa-depan-yang-lebih-baik/

Alfiah, L.C., Qiroah, I.F., Maysaputri, Y., & Saputra, O. (2020). Ethnophysics Study of Local Wisdom on the Persistent Fire in Pamekasan Regency. *Jurnal Ilmiah Pendidikan Fisika*, 2(2), 84–89. https://doi.org/10.58706/jipp.v2n2.p84-89

Ardianti, R.S. & Widodo, B. (2017). Identification of Local Wisdom of South Kalimantan as A Source of Learning Physics for Class X. *Prosiding Seminar Nasional Pendidikan Banjarmasin*, pp. 158–169.

Arikunto, S. (2014). Research Procedures: A Practical Approach. Jakarta: Rineka Cipta.

Asra, A., Festiyed, F., Mufit, F., & Asrizal, A. (2021). Physics Learning Integrates Ethnoscience with Traditional Games. *Konstan: Jurnal Fisika dan Pendidikan Fisika*, 6(2), 66–73. https://doi.org/10.20414/konstan.v6i2.67

Astuti, I.A.D. & Bhakti, Y.B. (2021). Ethnophysical Study of the Plate Dance as a Medium for Learning Physics. *Prosiding Seminar Nasional Sains (SINASIS)*, 2(1), 86-92.

Aswara, S., Amanda, F.D. & Fitriani, R. (2021). The Influence of Video-Based Physics Learning Media to Increase Interest and Understanding of the Concept of Pressure Material for Students at SMAN 2 Sungai Penuh. *Integrated Science Education Journal (ISEJ)*, 3(1), 16–23. https://www.researchgate.net/publication/360665953

Azwar, S. (2018). *Reliabilitas dan Validitas (Edisi revisi)*. Yogyakarta: Pustaka Pelajar.

Creswell, J.W. & Clark, V.L.P. (2018). *Designing and Conducting Mixed Methods Research*. SAGE Publications.

Dawana, R., Safitri, L. & Admoko, S. (2023). Analyzing the Physics Concepts in Traditional Dance: A Case Study of Wave and Frequency in Tari Remo Surabaya, *Journal of Physics Education and Culture*, 10(1), 45–58. http://dx.doi.org/10.26737/jipf.v8i3.4178

Deta, U. A., Arisanti, A., Hudha, M. N., Lestari, N. A., Admoko, S., Uulaa, R. F. R., … Suprapto, N. (2024). Physics Concepts Analysis in the Traditional Games of *Kekehan*. *International Journal of Research and Community Empowerment*, 2(1), 24–34. https://doi.org/10.58706/ijorce.v2n1.p24-34

Dewi, A.E.R. & Alam, A.A. (2021). The Effect of Contextual Teaching and Learning Approach and Learning Creativity on Student Learning Outcomes, *Journal of Educational Science and Technology (EST)*, 7(3), 261–268. https://doi.org/10.26858/est.v7i3.24675

Eisner, E.W. (2002). *The Arts And The Creation Of Mind*. New Haven, CT: Yale University Press.

Febrian, A., Wilujeng, I. & Prasetyo, Z.K. (2024). Literature Review: Development Of Science Learning Based On Local Wisdom And Indigenous Knowledge for ESD. *International Conference on Mathematics and Science Education (ICMScE)*. KnE Publishing, pp.103-110.

Gifani, A.G., Novianti, W., Nabila, L. & Bhakti, Y.B., (2023). Development of an Android-Based Ethnophysics Application on the Traditional Spinning top Game to Improve Students' Understanding of Physics Concepts. *Jurnal Inovasi dan Pembelajaran Fisika*, 10(1), 63–73. https://www.researchgate.net/publication/372214846

Habibi, H., Herayanti, L., & Sukroyanti, B. A. (2023). Development of Ethnophysics-Based Teaching Materials to Improve the Self-Regulatory Skills of Prospective Physics Teachers. *Jurnal Penelitian Pendidikan IPA*, 9, 724–731. https://doi.org/10.29303/jppipa.v9iSpecialIssue.6557

Harianto II, Zulfitri, & Amin, T.S. (2023). Stimulation of Local Cultural Values and Wisdom in the Globalization Era. *Cendekia: Jurnal Ilmu Sosial, Bahasa dan Pendidikan*, 3(2), 196–213. https://doi.org/10.55606/cendikia.v3i2.1147

Herpratiwi & Tohir, A. (2022). Learning Interest and Discipline on Learning Motivation. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, 10(2), 424-435. https://doi.org/10.46328/ijemst.2290

Hsiao, P.-W. & Su, C.-H. (2021). A Study on the Impact of STEAM Education for Sustainable Development Courses and Its Effects on Student Motivation and Learning. *Sustainability*, 13(7), 3772. https://doi.org/10.3390/su13073772

Khusnıatı, M., Parmin, & Sudarmin. (2017). Local Wısdom-Based Scıence Learnıng Model Through Reconstructıon of Indıgenous Scıence to Improve Student's Conservatıonıst

Character. *Journal of Turkish Science Education*, 14(3), 16-23. https://files.eric.ed.gov/fulltext/EJ1344573.pdf

Lauss, J. & Helm, C. (2025). The Role of the Arts in the Classroom: Does Integration of the Arts Promote Social Relationships in the Classroom?. *Education Sciences,* 15(1), 14-21. https://doi.org/10.3390/educsci15010014

Liu, Y., Ma, S. & Chen, Y. (2024). The Impacts of Learning Motivation, Emotional Engagement, and Psychological Capital on Academic Performance In A Blended Learning University Course, *Frontiers in Psychology*, 15, 1357936. https://doi.org/10.3389/fpsyg.2024.1357936.

Melchor, J.A. & Yoder, R. (2024). The Role of Education on Human Dignity: Fostering Peace and Respect. *Religions*, 15(1), 66-73. https://doi.org/10.3390/rel15010066.

Muhartini, M., Amril, M., & Bakar, A. (2022). Contextual Learning and Problem Based Learning. *Lencana: Jurnal Inovasi Ilmu Pendidikan*, 1(1), 66–77. https://doi.org/10.55606/lencana.v1i1.88

Namukasa, S. (2024). Integrating Arts into Science Curriculum for Holistic Education. *Research in Education Journal*, 7(1), 37–45. https://doi.org/10.59298/RIJRE/2024/433741

Nasution, S.W.R., Nasution, H.N. & Nasution, U.S.Z. (2024). Ethnophysics Study of Movement Material in the Tortor Dance in South Tapanuli in Physics Learning. *Jurnal Education and Development*, 12(3), 359–362. https://doi.org/10.37081/ed.v12i3.6362

Puspasari, A., Susilowati, I., Kurniawati, L., Utami, R. R., Gunawan, I., & Sayekti, I. C. (2019). Implementation of Ethnoscience In Science Learning at Muhammadiyah Alam Surya Mentari Elementary School, Surakarta. *Science Education Journal (SEJ)*, 3(1), 62-68. https://doi.org/10.21070/sej.v3i1.2426

Rahayu, G., Khoiri, A. & Firdaus. (2022). Integrating Local Culture (Bundengan) in Wave and Sound Learning to Improve Students' Love of the Homeland and Scientific Literacy. *Jurnal Ilmiah Pendidikan Fisika*, 6(1), 117–125. https://doi.org/10.20527/jipf.v6i1.4323

Riduwan. (2016). *Measurement Scale of Research Variables*. Bandung: Alfabeta.

Riyanto, Y. & Subroto, W.T. (2024). Science Learning Based on Local Wisdom to Realize Sustainable Education. *Proceeding Unesa*, 1(1), pp. 2823–2830.

Rohmah, A.N., Agustinaningrum, N.A., Rohmah, N.L., & Mazayu, N. (2024). Ethnophysics Analysis of Traditional Patil Lele Game: Unveiling Physics Concepts in Local Wisdom. *International Journal of Research and Community Empowerment*, 2(2), 40–47. https://doi.org/10.58706/ijorce.v2n2.p40-47

Safitri, A.N., Sarwanto, & Harjunowibowo, D. (2023). Development of Physics Learning Module Based on Local Wisdom on the Topic of Temperature and Heat'. *Jurnal Materi dan Pembelajaran Fisika*, 12(1), 45–58. https://doi.org/10.20961/jmpf.v13i1.60093

Sari, D.P. & Rifai, H. (2019). Analysis of Physics Concept of Newton's Laws on the Dadhak Merak Dance in the Reog Ponorogo Cultural Arts. *Journal of Physics: Conference Series*, 1185(1), 012091. https://doi.org/10.1088/1742-6596/1185/1/012091.

Schunk, D.H., Pintrich, P.R. & Meece, J.L. (2014). *Motivation in Education: Theory, Research, and Applications* (4th ed.). Pearson Higher Ed.

Smith, T., Avraamidou, L., & Adams, J.D. (2022). Culturally Relevant/Responsive and Sustaining Pedagogies in Science Education: Theoretical Perspectives and Curriculum Implications. *Cultural Studies of Science Education*, 17, 637–660. https://doi.org/10.1007/s11422-021-10082-4

Simbolon, D.H., & Silalahi, E.K. (2015). The Effect of Guided Inquiry Learning Model Based on Real Experiments and Virtual Laboratories on Students' Physics Learning Outcomes. *Jurnal Pendidikan dan Kebudayaan*, 21(3), 299-316. https://doi.org/10.24832/jpnk.v21i3.192

Sugiyono. (2022). *Educational Research Methods: Quantitative, Qualitative, and R&D Approaches* (26th ed.). Bandung: Alfabeta.

Sumantri. (2023). Mitigating the Negative Impacts of Globalization on Local Culture. *Jurnal Pendidikan Sosial Indonesia*, 2(1), 15–27. https://doi.org/10.62238/jupsi.v1i2.99

Sumarni, R.A., Setiadi, I., Astuti, I.A.D., Suhaya, M.E. & Zahra, R.A. (2023). Ethnophysics Analysis of the Siloloa Dance as a Source of Physics Learning. *Prosiding Seminar Nasional Sains (SINASIS)*, 4(1), pp. 7118.

Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; How to test The Validation of a Questionnaire/Survey in a Research. *International Journal of Academic Research in Management*, 5(3), 28–36. https://doi.org/10.2139/ssrn.3205040

Tungka, A.N., Misnah, Rore, I. & Latif, J.A. (2023). Contextual Teaching and Learning Models In Improving Learning Motivation and Communication Skills of Students in the Social Sciences Subject at Tadulako Sports Public High School. *Journal of Scientific Research, Education, and Technology (JSRET)*, 2(3), 945–956. https://doi.org/10.58526/jsret.v2i3.169

Utami, N., Yahrif, M. & Rosmayanti, V. (2023). The Effectiveness of Contextual Teaching and Learning in Improving Students' Reading Comprehension. *Journal of Languages and Language Teaching*, 11(1), 83–93. https://doi.org/10.33394/jollt.v11i1.6732

Wahyuni, I., Maison, M., & Pathoni, H. (2021). Analysis of Students' Learning Interest in Physics Subjects at State Senior High School 2, Jambi City. *Physics and Science Education Journal (PSEJ)*, 1(1), 22–28. https://doi.org/10.30631/psej.v1i1.711

Widiarini, P. (2025). Integration of Balinese Local Wisdom In Contemporary Science Learning. *Educational: Jurnal Inovasi Pendidikan & Pengajaran*, 5(1), 48-60. https://doi.org/10.51878/educational.v5i1.4431

Wulansari, N., & Admoko, S. (2021). Exploration of the Concept of Physics in the Dhadak Merak Reog Ponorogo Dance. *Pendipa: Journal of Science Education*, 5(1), 56–62. https://doi.org/10.33369/pendipa.5.1.56-62

Yasin, M. & Baresi, I.S. (2024). Cultivating Students' Interest in Learning through Creative Learning Methods. *Journal of International Multidisciplinary Research*, 2(2), 367–379. https://doi.org/10.62504/JIMR75xf4w76

Yu, L. & Zin, Z.M. (2023). The Critical Thinking-Oriented Adaptations Of Problem-Based Learning Models: A Systematic Review. *Frontiers in Education*, 8, 1139987. https://doi.org/10.3389/feduc.2023.1139987

Yuliono, S.N., Sarwanto, & Cari. (2017). Physics-Based Scientific Learning Module to Improve Students' Motivation And Results. *Journal of Education and Learning*, 12(1), 137-142. https://doi.org/10.11591/edulearn.v12i1.6112