The Use of Learning Media in Ethnophysics Learning: A Systematic Literature Review

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Abstract. In physics, there are still abstract topics that require visualization and relevant contextual connections to be well understood by students. Physics education is also important to be linked with local culture because this can provide relevant and familiar contexts for students, making it easier for them to understand abstract physics concepts. The integration of local culture in physics education can also enhance the appreciation and preservation of local culture, as well as foster pride in their cultural heritage. The purpose of this research is to analyze the literature review on physics education linked with local culture. This study applies the Systematic Literature Review (SLR) method. Data collection was carried out by documenting and reviewing related articles published between 2014-2024 from the Scopus, Erics, and Google Scholar databases. Based on the search results, 33 relevant articles were obtained, which were then filtered based on inclusion criteria, resulting in 21 articles used as primary studies. Each article was documented and then analyzed based on the skills developed from the research results. The results of the systematic literature review show that the most studied physics topics related to local culture are motion and heat, and the teaching media often used is teaching modules. Ethnophysics learning can attract students. This approach not only makes learning more interesting and meaningful but also helps build a bridge between modern science and local wisdom, ultimately promoting culture-based innovation and sustainability in society.

Keywords: ethnophysics, learning media, local wisdom, physics learning.

1 Introduction

Physics education in high school should be designed not only to focus on understanding abstract scientific concepts but also to relate the material to real-life situations that are relevant to students' everyday lives. This can be achieved by using a contextual approach, where physics concepts are taught through phenomena occurring in the students' environment, including the local culture they are familiar with. Additionally, physics education should encourage students to think critically and creatively by integrating experiments that utilize resources and tools available in their surroundings [1-2]. Project-based learning that addresses

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real-world community issues can also be employed to help students grasp the relevance of physics in everyday life [3-5] and how this science can be used to improve societal well-being [6]. Thus, physics education in high school not only equips students with theoretical knowledge but also with practical skills that are relevant and beneficial.

Physics education in schools is often delivered with an abstract and universal approach, without directly linking it to the local culture surrounding the students. This causes students to often feel that physics is a subject far removed from their daily lives and less relevant to their environment. Moreover, the physics material taught tends to focus on concepts and theories adopted from Western science and culture, without considering local wisdom that might provide real-world context and applications in the students' lives.

The lack of integration of local culture into physics education also has the potential to hinder students' understanding and interest in this subject. In fact, local culture has many natural phenomena that can be explained through physical principles, such as the use of traditional tools, building patterns, and wisdom in managing natural resources. If these aspects are utilized as teaching media, students will find it easier to understand physics concepts because they can relate them to the experiences and knowledge they already possess [7]. Therefore, connecting physics education with local culture not only enriches students' understanding but also strengthens their cultural identity [8-9].

Physics education that connects with local culture can be supplemented with appropriate teaching materials. Various types of teaching materials and learning media are already widely used by teachers in explaining physics concepts. The learning media commonly used by teachers include PowerPoint presentations. With the development of technology, there is an increasing number of digital learning media that support physics education in schools. The purpose of this study is to analyze a literature review of the use of physics learning media related to local culture.

2 Method

This research is a literature review conducted using the Systematic Literature Review (SLR) method. The researcher employed this method to identify, review, evaluate, and interpret all available research studies. Using this method, the researcher systematically reviewed and identified journals, following predetermined steps at each process. There are three stages in a systematic literature review (SLR) are planning, conducting, and reporting [10]. First, the planning stage. This stage involves determining the objectives of the literature review, developing a search protocol, selecting inclusion and exclusion criteria, and planning a data analysis strategy [11].

The second stage is the conducting stage, which involves searching for and identifying studies that meet the predetermined inclusion criteria. Subsequently, the quality assessment and data extraction from the selected studies are carried out. This conducting stage represents the execution phase in SLR research. At this stage, the search for articles begins, based on criteria and relevance to the keywords. This research is based on searches within the Scopus, ERIC, and Google Scholar databases. These databases were chosen because the aim is to obtain reviews on the use of learning media in ethnophysics learning. In order to construct the

analysis corpus, the initial phase of the research limited the search to journal articles published between 2014 and 2024, using the keywords “ethnophysics”, “local wisdom”, “physics lerarning,” and “learning media,” identified in the title, abstract, or keywords. A total of 200 articles were identified at the end of this phase and imported into the Publish or Perish software. At this stage, the PRISMA model was used.

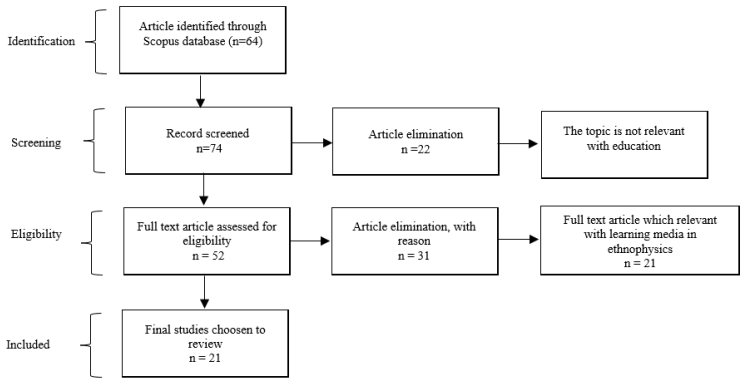

Fig 1. PRISMA model

The final stage is the reporting stage, which involves the compilation of the literature review report. This report includes an explanation of the methodology used, the findings, and the interpretation and implications of those findings. The reporting stage is the final step in the SLR method. In this stage, the researcher presents the results of the analysis and evaluation of the reviewed journals in written form, following the specified format.

3 Results and Discussion

The research results are presented based on the SLR method from the analysis of articles on the use of learning media in ethnophysics education, focusing on the learning media utilized. From the article analysis, 21 articles were identified that describe the learning media commonly used in ethnophysics education. Research on physics learning linked with local culture can be seen in Table 1 below.

Table 1. Articles Relevant to Ethnophysics

No	Year	Local wisdom	Author
1	2017	Marning gumbili	[12]
2	2017	Balines local wisdom	[13]
3	2017	Kelud Mounth	[14]
4	2018	Batik	[15]
5	2018	Waterwheel Gunungkidul	[16]
6	2018	Hulu Sungai Tengah	[17]
7	2018	Saraba kawa	[18]

No	Year	Local wisdom	Author
8	2019	Game "carbide cannon"	[19]
9	2019	Local wisdom	[20]
10	2019	Gandrang Bulo Dance	[21]
11	2019	Long Bumbung	[22]
12	2020	Train kayuh baimbai	[23]
13	2020	Games Nakeran	[24]
14	2020	Terbang Papat and Larung Sasaji	[25]
15	2020	Local wisdom	[26]
16	2020	Local wisdom	[27]
17	2021	Sasak Sade Village	[28]
18	2022	Plait	[29]
19	2023	Local wisdom	[30]
20	2024	Angklung	[31]
21	2024	Larung Sembonyo	[32]

In Table 1, we can see articles discussing various local cultures in Indonesia that are integrated into physics education. The local cultures covered are diverse and represent the rich cultural heritage found throughout Indonesia. The local cultures connected to physics education vary in explaining different physics concepts. Below are the physics concepts that have been extensively researched by scholars, linking them to local cultures in Indonesia, as illustrated in Figure 1.

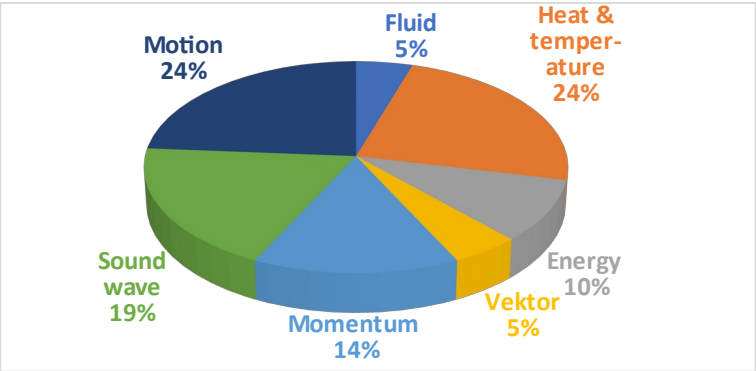

Fig 2. Trends of research topic of etnophysics

In Figure 2, it can be seen that the most commonly linked physics topics with local culture are motion and heat. Many aspects of local culture can be analyzed in terms of physics concepts related to motion and heat. One example is the traditional foods of each region, which can be analyzed through the process of making these foods. The concept of motion is frequently found in local cultural practices such as traditional dances and games. Another topic that has been widely researched is sound waves, which are often related to traditional music within local cultures.

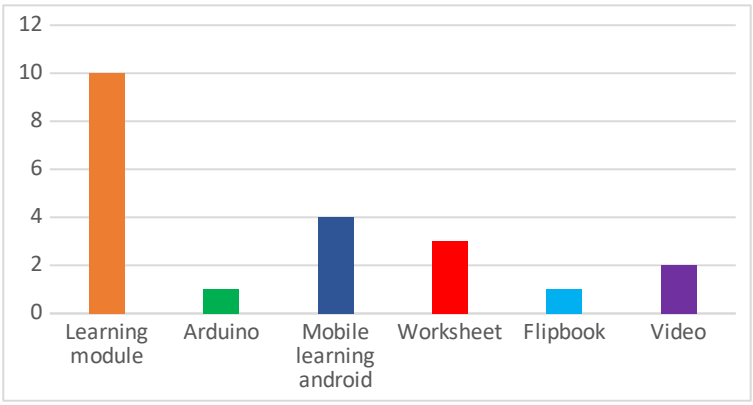

Fig 3. Trends of research learning media in ethnophysics learning

Based on figure 3 shown from several studies, it is evident that instructional media integrating physics learning with local culture often employs learning modules as the primary instructional tool. These learning modules are the most frequently used by teachers in teaching ethnophysics because they can easily explain physics concepts in a detailed and comprehensive manner. In addition to modules, Android-based learning media are also widely used by teachers to explain physics concepts integrated with local culture. Mobile learning applications are easy to use and convenient for studying without spatial and temporal limitations. Worksheets are also commonly used by teachers to train students in solving physics problems.

The use of instructional media plays a crucial role in the process of physics learning based on local culture because it helps connect physics concepts with the cultural context familiar to students [33-34]. By utilizing specially designed modules, mobile applications, and worksheets, teachers can explain physics concepts more clearly and relevantly, making it easier for students to understand the material. This instructional media not only facilitates student comprehension but also encourages their engagement in the learning process [35], as the material feels closer and more relevant to their daily lives [36]. Thus, instructional media becomes an effective tool to bridge the gap between physics theory and local cultural practices, enriching the students' learning experience [37-38].

Physics learning by linking it to local culture (ethnophysics) can explain physics concepts in a way that is more relevant and contextual for students [39]. By integrating cultural elements that students are already familiar with, physics concepts can be more easily understood as they are directly connected to their everyday experiences [40-41]. This not only makes learning

more engaging but also helps students see how physics plays a role in their local life and traditions.

Ethnophysics learning is highly aligned with the indicators for enhancing students' abilities in four key areas, there are conceptual understanding, critical thinking skills, creativity, and active engagement in learning [42]. By integrating physics with local culture, students can understand physics concepts through a context they know and experience in their daily lives, thereby improving their comprehension. Additionally, this approach encourages students to think critically by connecting theory with cultural practices, hones their creativity in finding locally-based solutions, and increases active engagement because the material taught feels more relevant and interesting. All of these contribute to a holistic improvement in students' abilities.

4 Conclusion

Based on results and discussion, it shows that from 33 relevant articles were obtained, which were then filtered based on inclusion criteria, resulting in 21 articles used as primary studies. Each article was documented and then analyzed based on the skills developed from the research results. The results of the systematic literature review show that the most studied physics topics related to local culture are motion and heat. Then, the teaching media often used is teaching modules. Ethnophysics learning can attract students. This approach not only makes learning more interesting and meaningful but also helps build a bridge between modern science and local wisdom, ultimately promoting culture-based innovation and sustainability in society.

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