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Analysis of Learners' Needs for Energy Literacy as a Reference for E-Module Development at Waterfall Edupark

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ABSTRACT

Purpose of the study: This research aims to analyze the needs of students in learning physics related to energy literacy by utilizing the potential of waterfalls as a reference for developing e-modules in Edupark.

Methodology: The methodology of this study is survey- quantitative descriptive research. Data collection through questionnaires given to respondents using google form. The research location is at Senior High School 1 Prabumulih, Senior High School 04 Ogan Komering Ulu, Senior High School 1 Merapi Timur, Senior High School 6 Prabumulih, Senior High School 1 Makarti Jaya, Senior High School 1 Bayung Lencir, Senior High School 10 Palembang, Senior High School 2 Palembang, Senior High School 1 Unggulan Muara Enim.

Main Findings: The findings of this study tentang Do you think physics is a difficult subject to learn percentage 64%, Have you ever visited a waterfall before percentage 50,1%, Have you ever been taught energy related concepts on waterfalls percentage 31,5%, Have you ever been taught using E-Modules related to waterfall eduparks percentage 51%, Have you ever heard of hydropower before percentage 87,1%, Do you agree that hydropower can provide more stable energy than other renewable energy sources percentage 89,1%.

Novelty/Originality of this study: The novelty of this study lies in the e-module associated with the waterfall edupark towards students' energy literacy. The findings can provide new insights in the context of education and researchers to develop appropriate innovations to improve e-modules**.**

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1. INTRODUCTION

The development of the 21st century emphasizes the importance of literacy in the basic skills that learners must have [1], [2]. One of them is energy literacy, as part of science literacy [3], energy literacy in Indonesia is still not much highlighted by experts [4] Most studies only discuss the assessment of the energy literacy curriculum without measuring the energy literacy curriculum that has an impact on students' knowledge, attitudes, and actions [5], [6]. Energy literacy is not just knowledge. But also understanding the use of energy in daily life, the impact of energy consumption on the environment, and the need for energy conversion and the development of alternative resources for sustainable living [7], [8].

In the context of physics learning, the integration of energy literacy is one important aspect that needs to be developed [9], [10]. Energy literacy among Indonesian students is still relatively low, which is supported by the PISA results from the science literacy program that has been run by the government since 2015 showing that Indonesia's OECD scores are still low [11]. This is due to the lack of learning materials that are relevant, innovative, and in accordance with the needs of students [12]. One innovative approach to improve energy literacy among students is to integrate learning into the environment through the use of Edupark or educational park [13].

Edupark is a natural or artificial tourist spot that is used as a learning resource [14]-[16]. Edupark utilization of tourist attractions shows a change in mindset towards physics learning which is considered a difficult and monotonous lesson [17]. By utilizing eduparks, students can be more interested and happy in learning [18]. One of the ideal alternative natural attractions to be used as an edupark is a waterfall. However, the utilization of eduparks as a learning resource has not yet reached an optimal level, especially in terms of integrating energy literacy into a planned and structured learning process.

The development of information technology also requires innovation in the development of teaching materials [19], [20], one of which is e-modules. E-modules in this *edupark* contain many studies of related physics concepts. E-modules in Edupark are also able to integrate learning materials with visual and interactive experiences [21], [22], thus supporting students' modern learning styles. To produce an effective e-module, an in-depth needs analysis of students in physics learning is required [23].

This research aims to analyze the needs of students in learning physics related to energy literacy by utilizing the potential of waterfalls as a reference for developing e-modules in *Edupark*. This analysis is expected to provide a comprehensive picture of the needs of learners, as well as a basis for developing learning media in accordance with the demands of the curriculum and the real needs in the field. Thus, this research is expected to contribute to improving the quality of physics learning based on the local context and the needs of students.

2. RESEARCH METHOD

This research is a descriptive qualitative research using survey method and was conducted in 2024 at Senior High School 1 Prabumulih, Senior High School 04 Ogan Komering Ulu, Senior High School 1 Merapi Timur, Senior High School 6 Prabumulih, Senior High School 1 Makarti Jaya, Senior High School 1 Bayung Lencir, Senior High School 10 Palembang, Senior High School 2 Palembang, Senior High School 1 Unggulan Muara Enim. Data collection through questionnaires given to respondents using *google form* as an initial needs analysis stage to find out the students on the teaching materials used in the learning process product.

The data analysis technique in this study was carried out descriptively by processing survey data through questionnaires distributed using Google Form. Quantitative data was analyzed by calculating percentages to understand general patterns and students' needs for teaching materials. The results of the analysis are presented in the form of a percentage table providing a comprehensive picture of the need for e-module development in the waterfall edupark ajar in the learning process.

3. RESULTS AND DISCUSSION

The data from the questionnaire that has been distributed is shown in Table 1.

Table. 1 Results of the needs analysis of e-module development at the waterfall *edupark*

No.	Question	Answer Options	
		Yes	No
1.	Do you think physics is a difficult subject to learn?	64%	34%
2.	Have you ever visited a waterfall before?	50.1%	50.4%
3.	Have you learned about potential, kinetic, mechanical, and electrical energy?	63.3%	38.1%
4.	Have you ever been taught energy related concepts on waterfalls?	31.5%	69.6%
5.	Do you feel the information about the energy material in the waterfall concept is important to learn?	91.7%	8.6%
6.	Have you ever been taught using E-Modules related to waterfall eduparks?	51%	49%
7.	Have you ever heard of hydropower before?	87.1%	13.2%
8.	Do you agree that hydropower can provide more stable energy than other renewable energy sources?	89.1%	12.6%
9.	Do you agree that hydropower is a solution to meet energy needs in remote areas?	94.8%	5.7%
10.	Do you agree that hydropower is less polluting than fossil fuel power plants?	81.9%	19.2%
11.	Do you have any other power generation solutions if a hydroelectric power plant cannot be built near the waterfall?	49%	53%

3.1. Analysis Questionnaire

Data from the needs questionnaire that has been distributed to students shown in Table 1, shows that 64% of students stated that physics is still a difficult subject to learn. This data illustrates that physics learning in the classroom needs innovation so that students become enthusiastic and easily understand the material. The Merdeka Curriculum, which has been developed from the 2013 curriculum as stated in the 2016 Ministry of Education and Culture's Senior High School / Madrasah Aliyah Subject Syllabus, states that physics learning can use existing resources in the region by observing objects or phenomena that occur in the surrounding environment [24].

From the needs questionnaire data, question item number 2 shows 50.1% of learners have never visited a waterfall tourist spot before and question item number 5 shows 91.7% of learners state that information about energy material related to waterfalls is important to learn. This data shows that learners are interested in hands-on learning that is connected to the surrounding nature. And reinforced by the results of the questionnaire that students who have been taught energy material related to waterfalls in question number 4 shows 31.5% while item number 3 obtained 63.3% that students have learned potential, mechanical, kinetic, and electrical energy material, this data illustrates that educators at school do not relate energy material to natural or artificial phenomena around [25], [26].

The survey results of question item 6 show that 51% of students have ever been taught using E-Modules related to waterfall eduparks. Various Physics concepts can be found in the *edupark* [27]. Question item 7 shows that 87.1% of students have heard the term hydropower. This shows a fairly good level of energy literacy. As a renewable energy source, hydropower has long been recognized for its efficiency and sustainability [28].

In item number 8, 89.1% of learners agreed that hydropower can provide more stable energy compared to other renewable energy sources. and strengthened in item number 10 show 81.9% of learners agreed that the way hydropower works is lower in pollution compared to fossil fuel power plants. This is because hydropower provides a more stable and predictable energy supply [29], [30] compared to other energy sources. Item number 9 shows 94.8% of participants agreed that hydropower is a solution to meet energy needs in remote areas. This shows that learners understand the function of hydropower to provide solutions in remote areas. The solution presented is that microhydro hydropower is very suitable to be applied in remote areas that have access to waterfall flows [31].

In the last question item, 49% of learners provided other power plant solutions if a hydroelectric power plant could not be built near the waterfall area. Here are some of the learners' solutions:

1. Wind Power Plant (PLTAangin): if the region has strong enough and consistent winds, wind turbines can be a solution. These plants can be onshore or offshore.
2. Solar Power Plant (PLTS): If the area receives enough sunlight, solar power can be an efficient solution. Solar panels can be installed on rooftops or in open fields to capture solar energy and convert it into electricity.
3. MHP is one that is very suitable for waterfalls because it can use natural power by utilizing water, such as irrigation channels, rivers or falls by utilizing the height of the descent in the amount of water discharge.
4. If it is not possible to build a hydropower plant, we can use thermal or geothermal power plants if the location is suitable.

The results of this study found that there is a need to develop an *edupark* e-module that examines the concept of physics in the waterfall associated with the development of energy literacy today. The availability of this e-module is expected to provide insight and knowledge that needs to be developed. The results of this needs analysis study can be used as reference material for developing *edupark* e-modules during further developer research.

4. CONCLUSION

Based on the results of the research conducted, it is concluded that an e-module on the waterfall edupark needs to be developed. The aim is to improve students' understanding of energy literacy, especially in the context of renewable energy, and make the learning process more relevant and interesting. This research uses the ADDIE development model, involving students, educators and experts as participants to ensure that the e-modules produced have high validity, practicality and effectiveness.

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