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INITIAL ANALYSIS OF STUDENTS SCIENCE LITERACY ON ALTERNATIVE ENERGY MATERIAL

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ABSTRACT

Scientific literacy is one of the skills that symbolizes expanding knowledge and resolving issues. PISA 2018 findings, however, show that scientific literacy in Indonesia is still very poor. Aspects of students' scientific literacy, including their capacity to evaluate and plan scientific research, interpret data and scientific evidence, and explain occurrences scientifically, will be examined in this study. Analyzing students' scientific literacy in alternative energy content was the aim of this study.. The method used is quantitative descriptive using a scientific literacy test instrument in the form of questions for students and questionnaires for teachers on alternative energy material used to collect data. Twenty-five students and two physics professors made up the research sample. The findings of the examination of two instructors' learning implementation were 60.48%. The average overall competency domain indicator was 47.80% with a very low category, based on students' mastery of scientific literacy in the competency domain indicator explaining scientific phenomena (51.42% with a low category), evaluating and designing scientific investigations (68% with a moderate category), and interpreting data and scientific evidence (24% with a very low category). Thus, it can be said that pupils' scientific literacy regarding alternative energy content is still rather low.

Keywords: Science Literacy; Alternative Energy.

I. INTRODUCTION

In the realm of science, literacy is needed to solve problems. Scientific literacy is a 21st-century skill that is an important foundation for everyday life In order to prepare a generation capable of addressing societal issues and difficulties, scientific literacy will be crucial [1] . Pupils who possess scientific literacy will also be able to cultivate attitudes, actions, and personalities that show concern for the cosmos, society, and themselves [2]. Additionally, they will be able to raise a new generation of people with scientific attitudes and viewpoints who can share their research and expertise with the community [3], [4].

The capacity to apply one's knowledge to formulate new ideas, clarify scientific concepts, and make judgments based on empirical data is known as scientific literacy, and develop reflective thinking patterns so that they can participate in issues or ideas related to science [5]. In the twenty-first century, one of the abilities required is scientific literacy [6]. Scientific literacy also acknowledges the significance of thinking and doing abilities, such as the capacity to think scientifically and identify and address societal issues via scientific reasoning. In actuality, scientific literacy is not a recent development in the field of education [7]. In recent years, scientific literacy has emerged as the primary focus of discussions aimed at achieving the objectives of science education in schools [8] [9].

The PISA findings show that Indonesian pupils continue to have relatively low levels of scientific literacy on a global scale. With a score of 396, Indonesian students' scientific literacy was placed 70th out of 79 nations in 2018 [10]. The insufficient scientific literacy of students is generally attributable to educational activities that do not prioritize the development of scientific literacy [11], [12]. The government has long been concerned about the future value of scientific abilities and Indonesia's poor level of scientific literacy in the global community, as demonstrated by the direct introduction of the National Literacy Movement Program [13].

Inability to relate learning to science topics, inability to apply science concepts in real-world situations, inability to support scientific literacy-based learning evaluation tools, and the capacity to only remember and recognize scientific knowledge are some of the other factors that contribute to students' low scientific literacy [14]. Furthermore, numerous additional factors remain deficient, including students' attitudes towards science, as well as their intensity and enthusiasm in studying [15].

Owing to the inadequate degree of scientific literacy, it must be fostered as early as possible in its application [16]. Scientific literacy applied to students will affect the importance of digital technology and interactive media [17]. This will result in the development of student literacy, namely reading and writing, which must be expanded through multimedia and IT [18]. The advancement of technology-driven media in the 21st century will now guide information and communication education [19]. Students require digital literacy and scientific literacy abilities to align with advancements in technology-based media [20].

Scientific literacy research is worthwhile because advancements in multimedia and information technology should have an impact on students' scientific literacy [21]. As a result, a preliminary examination of scientific literacy proficiency with a particular focus on alternative energy content was carried out. By carrying out this preliminary investigation, it is anticipated to ascertain the current level of scientific literacy among students, enhance the caliber of instruction, and identify the best way to address these issues. Thus, the purpose of this study is to examine students' preliminary scientific literacy in relation to alternative energy content.

II. METHOD

of this study is to examine the foundational understanding of scientific literacy and the ways in which learning is used to enhance students' scientific literacy about alternative energy content at SHS 8 Padang. This study was completed by 25 students.

Scientific literacy questions and questionnaires were distributed as part of the data gathering method [22]. The questionnaires and scientific literacy questions that were distributed were given to 2 physics teachers and 25 students. The scientific literacy questions consisted of 10 questions related to alternative energy material. The aspect measured in this study was the competency aspect. According to [10] Explaining scientific phenomena, assessing and planning scientific research, and interpreting scientific data and evidence are the three components of scientific competency. A grid of questions from the alternative energy content is shown below.

Table 1. Science Literacy Grid Questions on Alternative Energy Sources

Competency Aspects	No Question	Question Indicator
Explaining phenomena scientifically	1,2,3	An illustration of energy sources is presented. Students can determine the alternative energy sources referred to according to the illustration correctly.
	4,5,6	An illustration of alternative energy is presented. Students can determine the area of alternative energy users correctly.
	7	An illustration of energy changes is presented. Students can determine the energy changes in question correctly.
Evaluating and	8	An illustration is presented. Students are expected to be

designing scientific investigations		able to understand the concept of changes in kinetic energy and potential energy in a freely falling object and relate it to the law of conservation of energy correctly.
Interpreting scientific data and evidence	9,10	Data is presented regarding the law of conservation of energy. Students are able to determine kinetic energy and potential energy correctly.

The end of this research is at the data analysis stage. The data to be analyzed are the results of a 10-question science literacy test given to students. The results that need to be computed are the student's right and wrong responses to each question.. The score obtained will be calculated based on a percentage technique such as equation 1

$$Skor\ (\%) = \frac{The\ number\ of\ right\ responses\ in\ each\ category}{The\ quantity\ of\ pupils} x\ 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

After data analysis is carried out, the next stage is to group the data based on the results of mastery of scientific literacy and conclude it based on the criteria in table 2.

III. RESULTS AND DISCUSSION

Based on the results of preliminary research conducted through the distribution of physics learning process questionnaires to two physics teachers, it was found that several things were problems related to students' scientific literacy. The results of the questionnaire distribution showed that the learning model used by teachers had not been able to overcome problems related to students' scientific literacy. The method used by teachers was still general, namely teacher center. The learning media in the form of new technology used was only Power Point. Animation-based media has not yet been utilized, yet. According to the findings of the scientific literacy questions that were distributed to the students, their proficiency in this area was still rather poor. This demonstrates that pupils still struggle to analyze, recognize, and demonstrate an issue that is directly tied to scientific literacy. Students' inadequate scientific literacy has been linked to a number of causes, including instructional materials and models that do not prioritize scientific literacy.

Table 3. Educator Questionnaire Instrument for Learning Implementation Analysis

NO	Indicator	Results (%)
1	Use of Learning Models	44
2	Identification of Student Science Literacy	68.18
3	Use of Teaching Materials and Media	56.25
4	Experiment Implementation	46.66
5	Use of Supporting Facilities and Equipment	53.33
	Total	53.68

Based on the educator questionnaire instrument, the learning analysis shows that the indicator of the use of learning models is 44%. In the identification of student science literacy, the average obtained is 68.18%. Furthermore, in the indicator of the use of teaching materials and media, the average obtained is 56.25%. In the

indicator of the implementation of experiments and the use of supporting facilities, the average obtained is 46.66% and 53.33%. So that the total analysis of the implementation of learning is 53.68%.

Table 4. Science Literacy Skills of Grade X Students

No.	Competency Domain Indicators	Question Number	Results (%)	Category
1.	Explaining phenomena scientifically	1,2,3,4,5,6,7	51.42	Low
2.	Evaluating and designing scientific investigations	8	68	Currently
3.	Interpreting scientific data and evidence	9,10	24	Very Low
	Students' scientific literacy skills		47.80	Very Low

Table 4's competency indicators show that, at 51.42%, the average competency indicator for describing scientific phenomena is still low. At 68%, the average competency indicator for assessing and planning scientific studies falls into the moderate category. At 24%, the average competency indicator for interpreting data and scientific evidence remains in the extremely poor category. This may suggest that pupils are still unfamiliar with queries based on scientific literacy.

The results of this study are supported by research conducted by Dhanil & Mufit, (2023) which obtained similar results in the competency aspect, namely 35.3% with a very low category. In line with research conducted by [13]where the results of initial data on students' scientific literacy were obtained with a very low category as reviewed from the PISA aspects, specifically: competence, context, and content characteristics.

Students' low levels of scientific literacy show that they are unable to respond to and work on challenges based on scientific literacy [23]. Because kids are still learning how to solve problems and are not yet accustomed to questions that provide perspectives on a particular subject, this is made possible.. Low scientific literacy results from students' incapacity to solve issues, their delayed decision-making, and their incapacity to grow and enhance their creative talents in applying science in real-world contexts. Students who lack scientific literacy also have a harder time responding to environmental problems and advancements. [24].

The enhancement of students' scientific literacy abilities and comprehension may be achieved through the selection of appropriate learning material and the availability of supportive technologies [25]. Therefore, a technology-driven educational strategy and learning resources are necessary to enhance students' scientific literacy.

CONCLUSION

The results of data analysis and discussion show that students' scientific literacy skills on alternative energy material in the competency domain are still in the "very low" category of 47.80%. Therefore, it is necessary to take action to improve students' scientific literacy in physics subjects, especially alternative energy material. One of the factors causing low student scientific literacy is the learning model and media that do not emphasize scientific literacy. Therefore, efforts that can be made to overcome this problem are to use appropriate learning models and technology-based learning media to improve students' scientific literacy.

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