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Implementation of Environmental Education Based on Madura Local Wisdom to Increase Student Scientific Literacy

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ABSTRACT

Environmental Education is a lecture process that provides insight to students regarding the understanding and awareness of the environment as a means of sustainable development. Environmental education lectures can be used as a means to improve students' science literacy skills. Science literacy skills can increase in learning associated with local wisdom. Local wisdom has an important relationship with education, this is important for the development of education, so the educational process must be conducive to connecting learning with the environment. Therefore, local wisdom needs to be associated with learning, one of which is with environmental education lectures. The purpose of this research is to improve students' science literacy skills applied to Environmental Education lectures based on Madura local wisdom. This research is a quantitative descriptive research. Data collection techniques include observation, interviews, documentation and tests. Then, the data obtained was analyzed using quantitative descriptive data analysis. The results showed that science literacy in the science process domain for indicators identified scientific problems by 7.6%, explained scientific phenomena by 7.4%, and used scientific evidence by 66%. The achievement of science literacy in the science content domain was 78% (good category). Science literacy in the realm of students' attitudes towards science as a whole reached 76.3% (good category). The average result of students' overall science literacy achievement was 72% (sufficient category). Based on the results of the study, it can be concluded that research on the Implementation of Environmental Education Lectures Based on Madura Local Wisdom to Improve Student Scientific Literacy can improve students' science literacy skills and teach environmental conservation and local wisdom on Madura Island.

Introduction

Environmental Education is a lecture process that provides students with a perspective related to understanding and awareness of the environment as a means of sustainable development (Indahri, 2020). The meaning of the environment itself is a unity that has a reciprocal relationship between humans and nature for the survival and welfare of humans (Nugroho, 2022). The environment must be protected and preserved to carry out sustainable development. Environmental education lectures can be used as a means to improve students' scientific literacy skills.

Education or learning focuses on scientific literacy skills, namely learning that is parallel to the essential elements of science which is not only oriented towards knowledge but also towards achieving the formation of a scientific attitude and integrating the knowledge or understanding that has been obtained with the environment (Kristyowati &

Soeprapto, 2019). Lectures within the scope of science that have been carried out must be equipped with assessments such as providing evaluation questions which aim to develop thinking abilities and develop students' reasoning regarding the situations given (Gormally *et al*., 2012). So, it can be concluded that learning is related to students' scientific literacy who are expected to be able to apply their knowledge in life.

Scientific literacy is the ability, skill, competence possessed by students in using knowledge and understanding of scientific concepts and processes to identify, obtain new knowledge, explain scientific phenomena, and draw conclusions relating to nature based on changes in nature through human activities (Kristyowati & Soeprapto, 2019). Literacy skills have been used as the main aspect in efforts to improve the quality of learning (Landa *et al.,* 2021). Therefore, scientific literacy skills are one of the goals of the established science curriculum (Vo & Csapó, 2021).

Literacy abilities influence aspects of science which include literacy skills from various scientific fields such as health literacy and scientific literacy which are beneficial for life and sustainable development (Suharto *et al*., 2022). Scientific literacy is not only for understanding scientific concepts but also for everyday life (Sutrisna, 2021). In research conducted by Sapitri *et al* (2020), scientific literacy skills can increase in learning that is linked to local wisdom.

Local wisdom can be interpreted as local policies, local knowledge and local intelligence which are part of community life in carrying out social life, developing and sustaining life in the future (Irwan & Novianty, 2019). Local wisdom is a phenomenon that covers a wide and comprehensive scope that is unique and diverse so that there are almost no spatial boundaries (Eko & Putranto, 2019). Local wisdom can be new wisdom that has emerged recently in something of a community nature due to interactions with nature in the environment and interactions with other people's communities and cultures (Nurasiah *et al.,* 2022). Therefore, local wisdom is not always traditional because it can encompass modern wisdom because it has a broader meaning than traditional wisdom (Nurasiah *et al.,* 2022).

Local wisdom has an important connection with education, it is important for the development of education, therefore the educational process must be conducive to linking learning with the environment (Irwan & Novianty, 2019). Therefore, local wisdom needs to be linked to learning, one of which is environmental education lectures. The concept of local wisdom raised is related to environmental education lectures. This is because the concept of local wisdom taken is Slopeng Beach, Lombang Beach, Sumenep Palace, and Soekarno Cave. It is hoped that the use of the concept of the surrounding environment can improve the quality of the learning process that is being implemented (Wulandari, 2020). Ki Hajar Dewantara suggested that educators should consider the surrounding potential as a learning resource (Herawati, 2022).

Based on research conducted by Suharto *et al* (2022) students have an understanding of scientific literacy, students understand the importance of reading but it is still lacking because some students read only depending on the discourse. One of the factors causing low scientific literacy skills is that the learning process is limited to theory and memorizing concepts without any meaningful learning support, so it is difficult for students to draw

conclusions based on their understanding (Putri *et al*., 2022). The results of research conducted by Sontay (2015) stated that environmental literacy among students was very low, this was due to a lack of interest in knowing and studying environmental issues. Therefore, local wisdom in the Sumenep area and the environmental problems that occur need to be integrated into environmental lectures.

There has been a lot of research on lectures based on local wisdom to improve science literacy, but no one has carried out lectures on Environmental Education based on local wisdom in Madura. This research involves Herawati (2022) who researched improving science literacy skills in STEM Physics learning at SMAN 4 Seluma which integrates the local wisdom of the Seluma community. Perkasa (2018) who researched the improvement of science literacy skills in the development of environmental sustainability education teaching materials that integrate local wisdom Mbojo. Leksono *et al* (2015) who researched the improvement of students' science literacy skills in the conservation biology lecture program based on local wisdom.

The aim of this research is to improve students' scientific literacy skills which are implemented in Environmental Education lectures based on Madurese local wisdom. This is in accordance with Herawati's (2022) research that learning integrated with local wisdom can increase scientific literacy. Environmental education lectures are not only intended to increase student awareness regarding the importance of maintaining environmental health (Fienda, 2023). The importance of scientific literacy skills for the nation's next generation is a separate responsibility for an educator. Educators must implement new strategies in an effort to increase scientific literacy, one of which is linking lectures with local wisdom. The hope is that environmental education lectures based on local Madurese wisdom can improve students' scientific literacy skills.

Research methods

This research is a quantitative descriptive research. The subject of this research is students who take Environmental Education courses. Data collection techniques include observation, interviews, documentation and tests. Then, the data obtained was analyzed using quantitative descriptive data analysis. The flow of this research is presented in **Figure 1.**

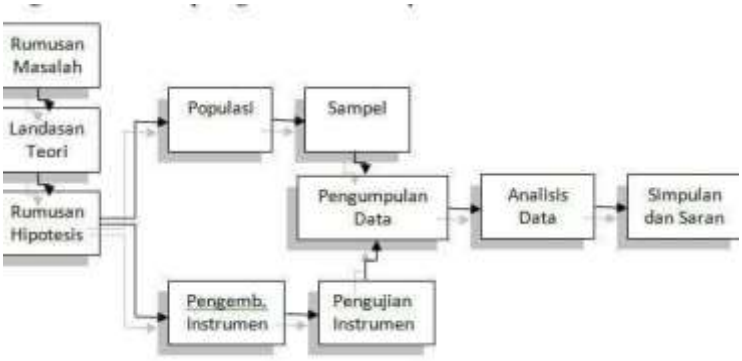

Figure 1. Research flow

Findings

Based on the research results, research data was obtained which included, 1) the results of students' scientific literacy achievement; 2) achievement of overall attitude scores; 3) achievement of student attitude scores for each indicator; 4) recapitulation of student response questionnaires to Environmental Education lectures; 5) the concept of local wisdom for Sumenep tourism.

The Sub Findings

The criteria for students' scientific literacy achievement are shown in **Table 1** .

Table 1. Criteria for achieving student scientific literacy

Score (%)	Category
$75 < \overline{X} \leq 100$	Very good
$50 < \overline{X} \leq 75$	Good
$25 < \overline{X} \leq 50$	Enough
$0 \leq \overline{X} \leq 25$	Not good

Table 2. Results of students' scientific literacy achievements

Mark	Achievement
Maximum value	86
Minimum value	48
Average scientific literacy	72

Based on table 1, the results of students' scientific literacy achievements were obtained, taken in terms of maximum and minimum scores, then the average was calculated. The results obtained for achieving scientific literacy were a maximum score of 86 (Very Good Category) and a minimum score of 48 (Fair Category). Then, from the maximum and minimum scores, the average of students' scientific literacy achievement results was obtained, namely 72 (Good Category).

Table 3. Overall student attitude achievement

Indicator	Process Score	Category
identify scientific issues	7 6	Very good
explain scientific phenomena	72	Good
using scientific evidence	66	Good

Based on table 3, the science process domain for indicators identifying scientific issues is 7.6 % (very good category) , indicators explaining scientific phenomena are 72% (good category) and indicators using scientific evidence are 66 % (good category).

Table 4. Overall student attitude achievement

Many students	Attitude score	Category
85	$75 < \overline{X} \leq 100$	Very good
23	$60 < \overline{X} \leq 75$	Good
Average attitude	**76.3**	**Very good**

Based on table 4, the overall student attitude achievement was 76.3 in the very good category. The results obtained for 85 students obtained a score of $75 < \overline{X} \leq 100$ in the very

good category, for 23 students obtained a score of 60 < $\overline{X}$≤ 75 in the sufficient category. The average achievement of overall student attitudes is 76.3 in the very good category.

Table 5. Results of achieving student attitude scores for each indicator

Indicator	Mean attitude score	Category
Support scientific inquiry	77.1 %	Very good
Responsibility for resources and the environment	70.6%	Good
Student interest in science	81.2%	Very good

Based on table 5, the results of achieving student attitude scores for each indicator that have been determined are obtained. These indicators include supporting scientific inquiry with an average attitude score of 77.1% in the very good category. The indicator of responsibility for resources and the environment received an average score of 70.6% in the good category. The indicator of student interest in science obtained an average attitude score of 81.2% with an interpretation of the very good category.

Table 6. Recapitulation of student response questionnaires to environmental education lectures

Aspect	Positive response	Negative response
Student opinion	89.8 %	10.2 %
Student interest	93.5 %	6.5 %
Benefits of lectures	94.4 %	5.6 %
Average student response	92.6 %	7.4 %

Based on table 6, the results of the questionnaire recapitulation of student responses to environmental education lectures were obtained which consisted of three aspects with positive and negative responses. First, the student opinion aspect received a positive response of 89.8% and a negative response of 10.2%. Second, the aspect of student interest received 93.5% positive responses and 6.5% negative responses. Third, the benefits aspect of lectures received a positive response of 94.4% and a negative response of 5.6%. The average summary of student responses was 92.6% for positive responses and 7.4% for negative responses.

Table 7. Concept of local wisdom for Sumenep tourism

Picture	Information
	Rubbish
	Rubbish bin
	Dry Twigs
	Organic trash
	Sink

Discussion

The local wisdom used in this research is the local wisdom of Sumenep tourism. The local wisdom used is Slopeng Beach, Lombang Beach, Sumenep Palace, and Sokearno Cave. After observing, it was found that there were many things that could be integrated with environmental education lectures.

Environmental education lectures based on Madura local wisdom need to be carried out to improve students' science literacy skills, in accordance with Herawati (2022) ; Perkasa (2018) ; Leksono *et al* (2015) research that learning based on local wisdom can increase science literacy, the use of instruments based on local wisdom can improve science literacy skills. The results of the science literacy test students obtained a maximum score (Very Good Category) and a minimum score of 48 (Fair Category). The average achievement of science literacy of students as a whole is 72% (Good Category), according to Purwanto (2002) This percentage of achievement is in the good category. This is in accordance with the statement Toharudin (2011) which states that students' science literacy skills can be trained through learning that provides direct experience to students through investigative activities like a scientist.

In addition to looking at the results of students' science literacy as a whole, there are three domains of science literacy that are observed, namely the process domain, content, and students' attitudes towards science. The results of students' science literacy achievements in the science process domain consist of aspects of identifying scientific problems, explaining scientific phenomena and using scientific evidence. Based on the research that has been conducted, the average score of science literacy achievement in the process domain is for the indicator of identifying scientific problems of 7.6% (very good category), the indicator of explaining scientific phenomena is 72% (good category) and the indicator of the use of scientific evidence is 66% (good category). The results of this study are in accordance with the analysis of science literacy conducted by Herawati (2022) which states that the highest aspect is obtained in the competency spec. The research conducted is in line with Slavin's (2005) which states that science literacy for the competency domain that is relatively more mastered by students is found in the indicators of explaining scientific phenomena and identifying scientific. As for process indicators that use scientific evidence, they are the indicators with the lowest achievement in the scientific process domain. The results of students' science literacy achievement in the science content domain were 78% (good category). In discussing the content, lectures are carried out using discussion methods related to the environment. The discussion method carried out during lectures allows students to learn from other students.

Based on the research that has been conducted, the average score of science literacy achievement in the attitude domain is 72 with a good category. The results of the test of each indicator include scientific support with an average attitude score of 77.1% with an interpretation in the very good category. The indicator of responsibility for resources and the environment obtained an average score of 70.6% with a good category interpretation. The indicator of student interest in science obtained an average attitude score of 81.2% with the very good category. Based on the results of the study, it can be concluded that the science literacy ability in the process domain of students who took environmental education courses based on local wisdom in Sumenep obtained results in the category of quite good. The results of this research are in line with one of the goals of science education, which is to develop a responsive attitude to scientific issues and apply its science and technology to provide personal, social, and global benefits (OECD, 2012) .

Based on the research that has been conducted, the student response score to the environmental education lecture shows that students give a positive response to the lecture that is carried out. by 92.6% (very good category), while negative responses were 7.4%. This shows that students like Environmental Education lectures based on local Madura wisdom. This is in accordance with previous research conducted by Herawati (2022) that students respond positively to learning associated with local wisdom.

Conclusion

Based on the discussion above, it can be concluded that the research on Implementation of Environmental Education Lectures Based on Madura Local Wisdom to Increase Student Scientific Literacy can increase students' scientific literacy abilities. The

results of the study show that the average achievement of science literacy of students as a whole is 72% (sufficient category). The achievement of science literacy in the science process domain for indicators identifying scientific problems was 7.6% (very good category), indicators explaining scientific phenomena were 72% (good category), and indicators using scientific evidence were 66% (good category). The achievement of science literacy in the science content domain was 78% (good category). Science literacy in the realm of students' attitudes towards science as a whole reached 76.3% (very good category). Thus, this research can have a good impact on improving students' science literacy skills. This research has a positive impact on the environment and the education system. This research not only improves students' science literacy, but also teaches environmental conservation and local wisdom on Madura Island.

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