The Power of Supplements Material of Seagrass Ecology on Student Worksheets to Improve Scientific Literacy of Junior High School Students in Coastal Village, East Lombok

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Abstract—Environmental characteristics in coastal areas are receiving less attention, especially for science education development. However, it provides relevant learning objectives, such as the presence of seagrass and marine aquaculture. This study aimed to assess the contribution of student worksheets (synthesis of seagrass ecology and marine aquaculture values) in increasing students' scientific literacy. The method used is quasi experiment with pre-post-test design, followed up by the learning observation to strengthen the quantitative data. Data were analysed on using simple statistical analysis. The results showed that all students knew seagrass and marine aquaculture. Furthermore, the post-test results show that the average value of the control students is lower than the average grade of the experimental class. Meanwhile, student from the experimental classroom shows more innovative in completing project-based learning tasks. It is relevant to students who understand seagrass and marine culture, where they interact after returning from school. This research concludes that the use of student worksheets material based on local indigenous value played role in enhancing students' scientific literacy. Besides, the short essay on science and its values can replace the role of science teaching material that still rarely provided by teachers/schools.

Keywords—material learning supplements, seagrass ecology, student worksheets, scientific literacy

I. INTRODUCTION

Seagrass areas in East Lombok’s coastal waters are scattered along the mainland coastal waters of Lombok Island and small islands. The total area of seagrass in the southern part of East Lombok, which is around the waters of Tanjung Luar, is 264.60 ha and found 118 fish species associated with seagrass [1]. Also, in waters with seagrass areas, such as in Lombok’s southern coastal waters, there is a diversity of marine biota species such as bivalves and echinoderms [2]. Another potential of East Lombok's coastal water is the marine environment, the bay's waters, and has been used by the community to develop aquatic cultivation. In this regard, seagrass's ecological services are a location for taking seeds for cultivation, such as economically important fish and cuttlefish [3,4]. The strategic values of marine cultivation practices by the community are: (1) protection from exploitation of resources such as seagrass ecosystems, (2) small-scale fishers have alternative livelihoods, (3) increase the participation of fishers and local communities in protecting local scale seagrass and (4) raise awareness of the importance of togetherness's value to create a sense of security and comfort in people's social lives [4].

Local natural resources such as seagrass beds and marine culture are relevant learning resources to be developed, especially for contextual learning development. The two are learning objects (marine cultivation and seagrass ecosystem services) above can be extracted into relevant teaching materials at each level of education. Furthermore, the extract of results has been using for the development of teaching materials [5]. It is necessary because the extraction of teaching materials from the local environment has benefits including (1) local materials can be a cognitive bridge between abstraction and the realities of daily life of students (2) sources of teaching materials from the local environment enable teachers and students thinking has the initial cognitive similarity to be developed at a higher cognitive level, (3) local materials are present as a substitute for rare and expensive teaching materials (4) local materials can save costs, (5) local materials contribute to the achievement of educational goals because provide opportunities to develop scientific skills, attitudes, and practical skills and (6) local materials to some extent fill the gaps or absence of learning resources [6,7]. The concept of learning base on the local environment can be synthesis in Student worksheets. Also, local potential-based learning is quite effective in improving students' generic skills [8].
regard, environmental innovation-based science student worksheets significantly increase students’ critical thinking power and scientific attitude in junior high schools [9]. However, students’ obstacles are discovering new scientific explanations for findings that are classifying into several components, including a lack of initial knowledge, barriers to complex material structures, and failure of creative cognitive processes [10].

The curriculum 2013 has the same challenges expected in scientific literacy, facing the rapid advancement of the times and various problems related to environmental issues, advances in technology and information, the rise of creative and cultural industries, and education development. A guided inquiry learning model can have applied to learn to improve students’ scientific literacy skills. It is based on previous research results to enhance students’ scientific literacy skills and enhance the learning process. Guided inquiry-based teaching materials so that students are expecting to achieve optimal competence [11]. The presence of student worksheets is quite relevant to the scientific learning model because it can facilitate student creativity to find a concept and develop various scientific skills to overcome student learning barriers [12]. The preliminary observations about it were that student worksheets in junior high schools in the study location only used student worksheets that did not come from the environment. Therefore, research was conducted to study the impact of arranging essay in student worksheets based on the surrounding environment, seagrass ecosystem services and marine cultivation, to improve students’ scientific literacy.

II. MATERIAL AND METHODS

This research has been conducting in the odd semester of the 2020/2021 school year, at the Pantai Desa Junior High School in East Lombok Regency. The design used in the research was a quasi-experimental (Quasi Experiment) by applying student worksheets guided inquiry model based on marine cultivation in the experimental class and conventional student worksheets in the control class. The population of this study was all schools in the research location. The design used in this study is the non-equivalent pre-test-post-test control group design the data collection of scientific literacy skills using carried out test instrument, namely a multiple-choice type test. The data from the pre-test and post-test in tabular form for interpretation purposes. The mean, standard deviation, and difference of mean for each group at each school. The significance of the difference between the mean scores of the two experimental and control groups on the pre-test score variable, the post-test score at the significance level of 0.05, was carried out through the Independent sample T-test using SPSS 17.003.

III. RESULTS AND DISCUSSION

Research on the development of supplement materials from seagrass ecology as material for guided inquiry-based written in student worksheets aims to improve junior high school students’ scientific literacy in coastal areas, East Lombok. Before the student worksheets are using, an expert lecturer should first assess the student worksheets feasibility. Feasibility validation is carried out so that the product being developed is valid when it is tested extensively. The results of the media expert validation are as follows in (Table 1, 2,3)

| No | Aspect Score | Score | Value | Category |
|----|--------------|-------|-------|----------|
| 1  | Language     | 3.5   | A     | Very good|
| 2  | Characteristics | 4     | A     | Very good|
| 3  | Complete Student Worksheets Format | 4     | A     | Very good|
| 4  | Presentation | 3.5   | A     | Very good|
| 5  | Technical Usage | 3.6   | B     | good     |

Average | A | Very good |

TABLE II. MATERIAL EXPERT VALIDATION ASSESSMENT

| No | Aspect Score | Score | Value | Category |
|----|--------------|-------|-------|----------|
| 1  | Language     | 3.7   | A     | Very good|
| 2  | Characteristics | 4     | A     | Very good|
| 3  | Complete Student Worksheets Format | 3.8   | A     | Very good|
| 4  | Presentation | 3.5   | A     | Very good|
| 5  | Technical Usage | 3.6   | A     | Very good|

Average | A | Very good |

TABLE III. ASSESSMENT OF PRACTICALITY BY THE TEACHER

| No | Aspect Score | Score | Value | Category |
|----|--------------|-------|-------|----------|
| 1  | Language     | 4     | A     | Very good|
| 2  | Characteristics | 3.5   | A     | Very good|
| 3  | Complete Student Worksheets Format | 3.8   | A     | Very good|
| 4  | Presentation | 3.5   | A     | Very good|
| 5  | Technical Usage | 3.6   | A     | Very good|

Average | A | Very good |

Besides, the declared are valid; the product developed is also displayed practical as assessed in Table 3, with a perfect category. The advice given by the teacher is to detail work steps so that students can easily use them. Student worksheets have gone through the validation stage and have been revised according to the validator's input. Then student worksheets were applied to students in 3 junior high schools in the coastal area of Lombok Timur, namely SMP 4 Jerowaru, SMP 1 Labuhan Haji, and SMP 1 Keruak. The student worksheets test was carried out by learning using the student worksheets based on seagrass ecology in the experimental class and the student worksheets used by teachers for the control class. Learning begins with a pre-test then ends with a post-test to measure scientific literacy skills. Scientific literacy can be interpreted as the ability to understand the scientific process and engage with scientific information in everyday life [13].

Meanwhile, "scientific literacy" explains that the main component of scientific literacy is understanding science content, namely the basic science concepts. The second group of "scientific literacy" views scientific literacy as a requirement to adapt to the challenges of a rapidly changing world [14]. The pre-test and post-test results in control, and experimental classes were used to determine Student Worksheets' effectiveness to improve students' scientific literacy skills. The

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Pre-test and post-test results in the practical class and control class in 3 schools in the coastal area of East Lombok are as follows in Figure 1.

The assessment of students’ scientific literacy abilities shows that when the initial average pre-test results show an almost identical value, the two classes used for research are practically equal. However, after being given different treatments, the average post-test results of the two types have differences, where the practical level is superior to the control class. It is shown that the use of student worksheets IPA as a learning supplement that uses the ecology of seagrass can improve students’ scientific literacy skills. The result (Table 4) of data analysis of scientific literacy skills in this study used the Independent Sample T-test with the SPSS 17.0 program's help at the 5% significance level.

IV. CONCLUSION

Student worksheets are vital to assist the learning process of students. The material sourced from seagrass ecology material can supplement students' scientific literacy skills in schools in the research location. Therefore, a more comprehensive teacher's cognitive abilities are needed to take advantage of the environment's potential in helping students' learning process. Also, the utilization of the surrounding environment's potential can increase awareness of preserving the environment through formal education.

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