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Effectiveness of Content Booklets Conservation of Bryophyta Material in Gunung Kidul National Park Ciremai to Increase Student Science Literacy

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Abstract

Learning media is very important in help stimulate think critical students, research results about literacy science like effectiveness of Learning Booklets not yet applied in a way maximum in school. The purpose of study is to know effectiveness of booklet content conservation of Bryophyta material for increase ability literacy science students. The method used in this study is quantitative method. Quantitative methods is method research based on positivism, the method used to researching population or sample certain.Technique taking sample usually done with calculation technique appropriate sample. Quantitative data collection aiming for test hypothesis that has been set data literacy science based on the average value N-gain. Based on results can explained that, the effectiveness of the booklet contains conservation to increase literacy science class experiment more tall compared with class control. Learning using booklet learning media on Bryophyta material get strong response and got response positive from student.

How to Cite

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INTRODUCTION

Learning media is very important in help stimulate think critical students, using imagination, ability and attitude. There are many types of media that can used educator in the learning process teach, but educator should selective in choosing the media (Batlawi, 2022). Instructional Media is tool help educator in the learning process to make it easier in convey information to participant educate in the learning process (Audie, 2019). Appropriate learning media with need activity learning will create a activity effective and efficient learning so that the material presented by the teacher can absorbed optimally by participants educate (Junaidi, 2019). Teaching materials are various type materials used by teachers or participant educate in facilitate the learning process to increase experience and knowledge participant educate. Teaching materials function as source information materials used in the learning process (Indriani, 2023).

Teaching materials are an important aspect in all subjects including science. teaching materials in science learning make students have good scientific literacy so that they not only have extensive knowledge but are able to implement it in everyday life. Science literacy in Indonesia is still relatively low due to insufficient attention to the socio-cultural environment and local potential as a source of learning. In fact, the social environment or local potential is able to teach students to increase their knowledge of science material without limits. Students' literacy skills are described in six levels based on students' abilities in using knowledge content, procedural and epistemic, cognitive understanding levels, ability to draw conclusions, ability to represent data, and demonstrate scientific thinking, and ability to develop project-based learning arguments (Muhibbuddin, 2020). Various efforts have been made to improve science literacy skills, one of which is using the STEM integrated learning model (Kusumastuti, 2019), inquiry learning (Ni'mah, 2019), Research results on science literacy such as the development of various learning models have not been optimally implemented in schools (Kusumastuti , 2019).

Efforts that can be made to improve students' scientific literacy are to organize science learning according to the surrounding environment and insert conservation values. Mount Ciremai National Park can be used in conservation-based science learning to improve students' scientific literacy. Mount Ciremai National Park (TNGC) as a national park functions as a biological conservation area so that the entire area must be cut down again. The arrangement of forest logging plants needs to be studied more deeply regarding the number and types that must be provided, the inventory of pine plants that are widely used with an altitude of between 500-1,000 meters has an area of around 3,662 hectares, between 1,000-1,500 hectares has an area of around 3,175 hectares and above 1,500 meters has an area of around 773 hectares. Protected areas outside TNGC are generally used by the community as agricultural land.

This study was conducted to explore TNGC as a science teaching material on the Bryophyta material. The limited conservation-based learning and the many potential uses of TNGC that can be maximized in the learning process in the form of science teaching materials make this research important to do. The purpose of study is to know effectiveness of booklet content conservation of Bryophyta material for increase ability literacy science students.

M ETHOD

Methods used in this study is quantitative. Quantitative methods are described Sugiyono (2020) is method research based on positivism, the method used For researching population or sample certain. Technique taking sample usually done with calculation technique appropriate sample. Quantitative data collection to test hypothesis that has been set.

Research Design

This reseach using the pretest-posttest group design model (Sugiyono, 2020). .Before second group given treatment, second group given an initial test in the form of pretest to measure ability beginning students (O_1). Next, in class experiment given treatment with implementing learning media booklet containing conservation (X_1) and in class control no given treatment (X_2). After treatment second group given posttest to measure ability end students (O_2). The research design can be see in Table 1.

Table 1. Research Design

Group	Pretest	Treatment	Posttest
Experimental (E)	O_1	X_1	O_2
Control (C)	O_1	X_2	O_2

Information:
O_1 : Group with giving pretest
O_2 : Group with giving posttest
X_1 : Group experiment given treatment
X 2 : Group that is not given treatment

Instrument and Data Analysis

Observation

Observation conducted to know progress activity student during learning using a booklet containing conservation to increase literacy science on the science material at senior high school MAN 1 Kuningan.

Questionnaire (Survey)

Questionnaire in this study used scale Likert to measure students respons using booklet learning media on the material Bryophyta with choice four alternative that is strongly agree, agree, disagree agree, and strongly disagree agree. The analysis of student responses can be calculated using the formula below:

$$RS = \frac{A}{B} \; x \; 100\%$$

Explanation:

RS = Student response
A = Total score obtained
B = Total maximum score

The criteria for student responses can be seen in Table 2.

Table 2. Student Response Criteria

Score (%)	Criteria
81-100	Very Good
61-80	Good
41-60	Enough
21-40	Not Good
0-20	Very Not Good

Test

Test is a series question or exercises used For measure skills knowledge, intelligence, ability or talents possessed by individuals or group (Riduwan, 2011). Test in this research to measure improvement literacy science students. The test used is test choice multiple 30 questions. The analysis of science literacy can be calculated using the formula below.

$$\text{<N-gain>} = \frac{Spost - Spre}{Smax - Spre}$$

Explanation:

<N-gain> = Improvement of Science Literacy Values
S_{pre} = Pre-test Score
S_{post} = Post-test Score
S_{max} = Maximum Score

RESULT AND DISCUSSION

Activity students at the time learning biology use Booklet, obtained with observations by 5 observers for the smooth running of the learning process. Observation conducted to know activities carried out, level participation in a activities, process of activities carried out, and abilities even results obtained from activities. Observation done during 3 meetings (Figure 1).

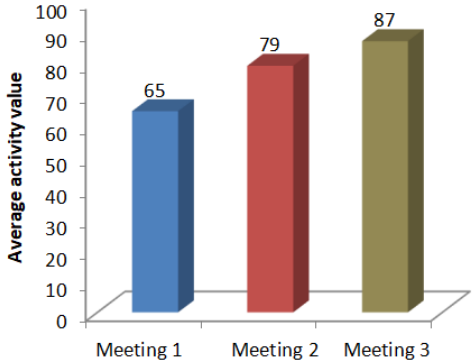

Figure 1. Activity graph at the first, second and third meeting in class experiment

Based on Figure 1, it can be seen that there is an increase in student learning activities at each meeting. In the first meeting, the average value of student learning activities itself gets the lowest value, which is 65%. The low student learning activity at the first meeting is because it is the initial stage of student adaptation using Booklet learning media. Students still feel unfamiliar with learning activities using Booklet learning media. At the second meeting, there was an increase in student learning activities, which was 79%. Students began to adapt to the environment, learn it and can participate in learning activities using Booklet learning media, so that students are actively involved during learning. Students can follow the stages of learning activities through the experiences they had at the first meeting. While at the third meeting, there was another increase, which was 87%. The increase in student learning activities is because students are used to and like learning with the application of Booklet learning media on Bryophyta material.

The improvement of students' scientific literacy with the application of Booklet learning media can be measured from the dimensions of scientific literacy. The dimensions of scientific literacy observed in this learning are: 1) Knowledge; 2) Competence; 3) Context; and 4) Attitude. Through pretest and posttest data, it is known that there is an increase in students' scientific literacy through learning using booklets. The average pretest and posttest results of students in the experimental and control classes can be seen in Figure 2.

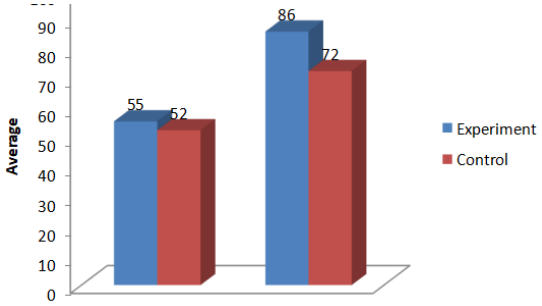

Figure 2. Average value pretest and posttest science literacy experiments and classes control

Based on Figure 2, the average pretest score of the experimental class is smaller than the control class, which means that the initial knowledge of students in the control class is better than that of the experimental class. After learning, the scores obtained by students in the experimental class and the control class through the posttest increased. The difference in scores in the experimental class was 14 and in the control class was 3. These results indicate that the scientific literacy scores of students in the experimental class were higher than those in the control class.

There is a difference in the increase in students' scientific literacy carried out with pretest and posttest questions. The pretest was given before implementing learning using Booklet learning media. While the posttest was carried out after implementing Booklet learning media. The results of this study indicate that there is a difference in students' scientific literacy abilities in the control class that did not implement Booklet learning media compared to the experimental class that implemented Booklet learning media.

The difference in the average science literacy scores of students between the control class and the experimental class can be described and observed in more detail in Table 3. The following is a table of the average pretest-posttest scores for each scientific literacy indicator between the control class and the experimental class.

Table 3. Average Pretest-Posttest Values for Each Indicator Science Literacy Students

Indicator Science Literacy	Control		Experiment	
	Pretest	Posttest	Pretest	Posttest
Knowledge	49	71	47	89
Competence	44	64	54	81
Context	53	67	41	77
Attitude	62	86	78	96

Based on Table 1, the highest average pretest percentage in the control class was on science literacy indicator 4 (attitude) with a value of 62%. While in the experimental class, the highest average pretest percentage was on indicator 4 (attitude) with a value of 78%. This is because students in both the control and experimental classes better understand questions about material that is adjusted to the science literacy indicator. While the lowest average pretest percentage value in the control class was on indicator 2 (competence) with a value of 44%. Meanwhile, the average pretest percentage value in the experimental class that obtained the lowest value was on indicator 3 (context) with a value of 41%. This is because students in both the control and experimental classes did not understand questions about material that was adjusted to the science literacy indicator.

Table 1 not only shows the average pretest percentage, but also shows the average posttest percentage value of the control and experimental classes for each indicator. The results of the analysis of the table above show an increase in the control class and also the experimental class in each indicator of student science literacy. The highest average posttest percentage value in the control class is on indicator 4 (attitude) with a score of 86%, while in the experimental class the highest average posttest percentage value is on indicator 4 (attitude) with a score of 96%. In the control class the lowest average posttest percentage value is on indicator 2 (competence) with a score of 64%. In the experimental class the lowest average posttest percentage value is on indicator 3 (context) with a score of 77%. This is because students have received the material that has been taught in accordance with the indicators of science literacy. The results of the analysis of Table 1 show an increase in the pretest-posttest.

In the control class and the experimental class on each indicator of student science literacy. The science literacy indicator 4 (attitude) in the control class experienced the highest increase with a percentage difference of 24% and the lowest percentage increase was in the science literacy indicator 3 (context) with a percentage difference of 14%. While for the experimental class, the highest average percentage increase was in the science literacy indicator 1 (knowledge) with a difference of 42%, and the lowest was in the science literacy indicator 4 (attitude) with a percentage difference of 18%. However, based on the results of the recapitulation of the pretest-posttest data above, it can be seen that the highest increase was dominated by the experimental class which

was caused by the different treatment in that class with the application of Booklet learning media. Based on the data above, it can be concluded that the highest average increase in science literacy scores for each student science literacy indicator between the control class and the experimental class was in the science literacy indicator 4 (attitude) and the lowest was in indicator 2 (competence). For the control class, the average score for each student science literacy indicator between the control class and the experimental class was highest in science literacy indicator 4 and lowest in indicator 3 (context). The difference in the increase in students' science literacy between the control class and the experimental class can be seen from the N-Gain value. After calculating the average value of the experimental and control classes, to see the difference, the N-gain value is used from the pretest and posttest scores of students in the experimental and control classes, which can be seen in the Figure 3.

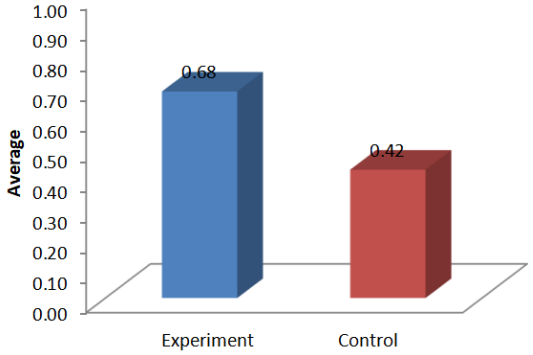

Figure 3. Average N-gain value of science literacy

Based on (Figure 4.6) above shows the average N-gain score of students' science literacy in the experimental class and control class. The average N-gain value of the experimental class is (0.68) which is greater than the average N-gain value of the control class which is (0.42). Based on the average N-gain value, it can be explained that the science literacy of students in the experimental class and control class both increased, because the average posttest value of the experimental class was higher than that of the control class, as well as the pretest value of the experimental class itself, the value was higher than that of the control class. The difference in N-Gain value between the experimental class and the control class is (0.42). This is because the experimental class received learning using Booklet learning media on the topic of Bryophyta, while the control class did not receive learning using Booklet learning media. Based on the data above, it can be concluded that the average N-gain value of the experimental class is greater than the average N-gain value of the control class. In general, more detailed improvements in students' scientific literacy achieved by the control class and the experimental class obtained the average N-Gain value of scientific literacy skills. For the four aspects of scientific literacy, it can be seen in the Figure 4.

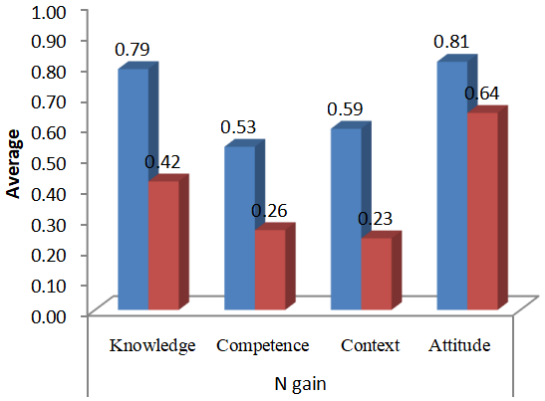

Figure 4. N-gain value per-indicator of science literacy

Figure 4 shows a comparison of the N-gain achieved by each class on each indicator of science literacy. Based on the presentation graph, the highest N-gain was in the experimental class, namely on science literacy indicator 4 (attitude), while the lowest was in science literacy indicator 2 (competence). This is because in learning using Booklet learning media on Bryophyta material, students looked enthusiastic and participated in the ongoing learning activities. While in the control class, the highest presentation of N-gain was in indicator 4 (attitude), while the lowest N-gain percentage was in indicator 3 (context). This is because the control class did not apply Booklet learning media on Bryophyta material. The highest increase in science literacy marked by the N-gain score was in the experimental class on science literacy indicator 4 (attitude) and the lowest was in indicator 2 (competence). For the control class, the highest N-gain was achieved on science literacy indicator 4 and the lowest on indicator 3 (context).

In addition, there is a student response questionnaire on the use of booklets in learning which is divided into five categories, namely very good, good, enough, not good, and very not good. The results of student responses can be seen in Figure 5.

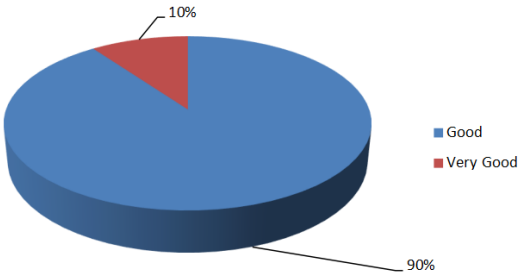

Figure 5. Percentage of Response Student in Implementation of Booklet Containing Conservation on Bryophyta Material

Based on Figure 5 shows the percentage of student responses to the use of Booklet learning media on Bryophyta material, consisting of 10% giving a very good response and 90% having a good response. This shows that overall learning using Booklet learning media on Bryophyta material gets a response from students with an average percentage of 74.96% in the good category. Beside that, it was found that use of learning media give positive impact on improving literacy science class that the use based success increase literacy science students and reduce misconceptions that occur in students (Ilyas & Liu, 2020). Even so use interactive E-book can increase literacy science student with improvement score by 40-55% (Nurhayati. 2020).

The use of conservation-based booklets of Mount Ciremai National Park as a learning medium for Bryophyta material is a contextual approach to improve students' scientific literacy. Bryophyta material, which includes groups of mosses, is often difficult for students to understand due to limited direct observation in the surrounding environment. In fact, moss has an important ecological role in maintaining environmental balance, such as absorbing water, being an indicator of air quality, and maintaining the humidity of the forest ecosystem (Pratama, et al., 2024). Mount Ciremai National Park, as a conservation area with high biodiversity, especially in the Bryophyta group, offers great potential to be used as a local-based learning resource.

Through booklets that highlight the potential and real facts of this area, students are not only invited to understand the biological aspects of Bryophyta, but also raise awareness of the importance of environmental conservation (Andila, et al., 2023). With this conservation booklet for learning bryophyta material, students not only gain conceptual knowledge, but are also encouraged to develop science process skills and scientific attitudes, such as curiosity, concern for the environment, and critical and analytical thinking skills (Tabun, et al., 2024). This is an important part of improving scientific literacy, namely students' ability to apply science in everyday life and decision-making based on scientific information (Prihatini, 2023; Suhayati & Watini, 2024).

CONCLUSION

Based on the results of the study, it can be concluded that the Gunung Ciremai National Park conservation booklet for learning bryophyta material can improve students' scientific literacy. The scientific literacy of students in the experimental and control classes both increased, because the average posttest score in the experimental class was higher than the control class, as well as the pretest score in the experimental class itself was higher than the control class. The difference in N-Gain values between the experimental and control classes was (0.48). The difference in values in the experimental class was 25 and in the control class was 18. These results indicate that the scientific literacy scores of students in the experimental class were higher than those in the control class.

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