



## The Effectiveness of Living Things with The Environment Teaching Materials as A Supplement to Improve Scientific Literacy of Junior High School Students

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### Abstract

The ideal science learning reflects the domain of balanced scientific literacy. Student who has scientific literacy are able to master science content, understand the characteristics of science and be able to recognize the environment through scientific process and apply science concepts in real life. Based on that statement we developed a research-based teaching material. This study aims to analyze the effectiveness and appropriateness of teaching materials about Interaction of Living Things with the Environment for grade VII. The research method was used Research and Development teaching materials. Data taken in the form of module eligibility was validated by the media and material experts. Teaching materials effectiveness was analyzed by posttest score, teaching materials characteristics was described by the percentage of teaching materials characteristics based on scientific literacy. The results showed that the science teaching materials have developed was valid, feasible, and effective to support Interaction of Living Things Learning. It have characteristics based on scientific literacy and equipped with pictures to clarify the practicum process, completed with observation tables as testing data that could guide students to find the concepts being taught.

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## INTRODUCTION

The ideal science learning reflects the domain of balanced scientific literacy. Science literacy in teaching materials and students' abilities in science literacy are able to make students master science material, understand the characteristics of science and be able to recognize the environment through the science process and apply science concepts in real life.

The low ability of students' scientific literacy is also influenced by the selection of teaching materials used in schools. Teaching materials play an important role in the learning process, namely as a medium for delivering information. Thus, good teaching materials are needed to reach the learning objectives maximally (Paramita et al., 2017). According to Sandi (2013) as quoted by Safitri et al. (2014) one of the low levels of scientific literacy is because the textbook which is used do not yet show a balance of scientific literacy category. The Integrated Science teaching materials developed in this study contain a combination of each of the fields of natural science studies (physics, biology, chemistry and earth space) that are discussed in a balanced and oriented literacy based on the 2013 curriculum.

The data of student's daily assessment results which are low show that students' literacy abilities are also low. For this reason, solutions are needed to solve the low literacy skills of students. One of them is by providing integrated teaching materials of science literacy oriented. In this research, what will be developed is Integrated Science teaching materials of Interaction of Living Things with the Environment in order to improve Science Literacy.

## METHODS

The method used in this research is Research and Development (R&D) method. The steps in the research R&D according to Sugiyono are potential and problems, gathering information, product design, design validation, design improvement, product testing, product revision, trial use, product revision, final product. Data analysis on module development uses percentages. There are two kinds of data in the module development namely qualitative data in the form of suggestions and input, and quantitative data from the questionnaire

scores. Data collection instruments in this study used two types of instruments, namely tests and non-tests.

### 1. Characteristics of Science-Literate Teaching Materials

The instrument used to determine the characteristics of science literacy teaching materials is a non-test instrument in the form of a questionnaire validation sheet of scientific literacy components.

### 2. The Eligibility of Science Literate Teaching Materials

The instrument used to determine the appropriateness of science literate teaching materials is a non-test instrument obtained from a questionnaire validation questionnaire for teaching materials that includes the appropriateness of content/ material, presentation, and language.

### 3. The Effectiveness of Science Literate Teaching Materials

The instrument used to determine the effectiveness of science-literate teaching materials is a test instrument in the form of questions to measure students' abilities.

## RESULT AND DISCUSSION

The research data consisted of lecturer validation results data on the value of aspects of characteristics, feasibility, effectiveness of the science teaching materials of Junior High School

### **Biotic and Abiotic Components in SMP 1 Jekulo Kudus.**

Based on the research result which was conducted in the environment of SMP (Junior High School) 1 Jekulo Kudus, obtained data on biotic and abiotic components and their interaction patterns. Components obtained in SMP 1 Jekulo Kudus are 25 biotic components and 7 abiotic components.

**Tabel 1.** Biotic Component Data and Abiotic Components

Biotic Components	Abiotic Component
Butterflies	Water
Grasshopper	Temperature
Caterpillars	Soil
Ant	Light
Dragonflies	Stone
Lizard	Sand
Wasps	Moss crust
Aphids	Roses Plant
Walang Sangit Plants	Yellow bamboo plant
Sensitive Plants	Edible Leave Flower
TaliPutri Plants	Reeds
Grass	Sunflower Plants
Betel Plants	Weed fruits Plants
PakuTandukRusa Plants	Guava Plants
Pine trees	Mango Plants
Tea plants	

The following are some of the biotic components found such as butterflies, wasps, grasshoppers, *tali putri*. Abiotic components found such as rock, earth, water and light. The pattern of interactions found in the SMP 1 Jekulo Kudus environment is a symbiotic mutualism that occurs between butterflies with flowers, wasps with flowers, and crust moss with their host trees. Symbiotic parasitism that occurs between *tali putri* and its host. Commensalism symbiosis that occurs between betel leaves with its host and *paku tanduk rusa* with pine trees.

The biotic component and abiotic component along with the patterns of interaction found are arranged attractively into a module with general information and descriptions that are easily understood by students, so that the science module can be used as an interesting learning medium in schools and increase the students' curiosity. In line with the research of Fega et al. (2013) states that students' curiosity also influences the learning process to be active and interesting. According to Yerimadesi et al. (2017) that the development of teaching materials is the provision of additional information for students so that students can have broader insights. Information on research results can encourage students to get to know contextual information and stimulate students to become scientists (Dyah & Suarsin, 2016).

### Characteristics Module of Science Literacy Oriented Material Interaction of Living Things with the Environment

The results of the validation of the module characteristics obtained a percentage of 83.93% and categorized with very feasible criteria to meet the characteristics of scientific literacy. The characteristics of the module developed are the scientific literacy aspects that are presented in detail including science as the body of knowledge, science as a way to investigate, science as a way of thinking, and the interaction between science, technology and society. Each sub material has an example along with more complete explanation and its sources so that it can add to the aspects of student scientific literacy in learning.

The developed science literacy-based modules are also equipped with student worksheets in the form of identification or investigation activities. Students are asked to carry out identification in the school garden as an application of the material they have obtained using science-based literacy modules. Students are formed in several groups then they discuss the results they get and present it.

This science literacy-based module is also complemented with research results in the field or based on research results. The results of this study are equipped with pictures, explanations and their sources, so that aspects of students' scientific literacy increase with the presence of science literacy based modules particularly on the material of living things interaction with the environment.

The science literacy-based science module contains many images to clarify the student practicum process. Modules can be used to practice scientific literacy. The material presented in the science module has previously been validated by material and media experts to get a valid thing and in accordance with the learning objectives.

Material suitability must support students in learning because the material is the most important thing (Setiowati et al., 2017). In order to avoid misconceptions, students must understand the limits and scope of the material so that the objectives can be achieved. The validity of the material and the truth of the material are concepts and facts that are appropriate so that students' misconceptions are not formed (Rizqiyah et al., 2018).

The validity of the material includes the content sequence, the scope of the material in accordance with the prepared learning plan. Explain the material that is logical and easy to understand by students is one of the supporting capacities so that the material is easily conveyed to students (Sari et al., 2016). The validity of the material will also increase student curiosity, can be connection for students to be able to explore the material deeper. So, the material taught will become long-term memory in students' thinking (Mulyati et al., 2017)

### **Feasibility of Science Literacy Oriented Module Material of Living Things Interaction with the Environment**

Module eligibility is assessed based on the results of the questionnaire and validation. Questionnaire aims to determine student's responses to science literacy-based module which is developed. Questionnaire of student's responses were given during small-scale trials and large-scale trials. A small-scale trial questionnaire was given to class VIII as much as one class while a large-scale trial questionnaire was given to two classes namely classes VII F and VII G. The results of the recapitulation of student's responses to the small-scale trial were obtained by 28 students giving very good responses and 4 students give good responses to science literacy-based science modules, where the aspect of responses that gets the highest percentage is the aspect of language used in a simple and easy to understand module with a percentage of 95%.

The results of the recapitulation of student responses in the large-scale trials of the two classes obtained 54 students gave very good responses and 10 students gave good responses to science literacy-based science modules, where the response aspect that received the highest percentage was the evaluation aspect that could test the understanding of the material interactions of living organisms with a percentage of 93%.

Validation of module eligibility includes validation in terms of material / content and media. Modules are validated by material expert lecturers and media experts.

**Tabel 2.** Module Validation Based on Material Expert and Media Expert.

Componen	Value (%)	Criteria
Expert Material/Content	88.33	Very feasible
Expert Media	95.00	Very feasible
Average	91.67	Very feasible

The results of the validation of this material expert obtained a percentage of 88.33% and were categorized as very feasible while for the results of the validation of the media experts obtained a percentage of 95.00% and categorized as very feasible. Although the module is categorized as very feasible, but there are still some parts that must be revised based on the advice from the material expert and the media expert validator. Evaluation and revision of the module from the validator is done to obtain the appropriate module quality to use in learning.

Development of teaching materials that are appropriate to the needs of students and material which is learned is the best effort to improve understanding the concept (Sugent et al., 2017). One of the core stages of modules development is validation test which is done to create a good module and must be relevant to the basic of theoretical development (Mahendrani & Sudarmin, 2015). Modules are validated by two experts who are material expert and media expert.

Modules are arranged according to the material requirements. The presented materials must be systematic and easy to understand by students. In line with the opinion of Dewi et al. (2014) Modules must be arranged in accordance with the need of taught material. A good module must be based on the curriculum. The indicators presented in the module must be fulfilled because of learning which is done (Esmiyati et al., 2013). Present the material completely, systematically, qualified, and easily understand by the students. Materials which are presented in the module should have more additional information which the student's cannot find it in the textbook (Rizqiyah, 2018). Material completeness is to be tested so as not to give the wrong concept (Kartuti et al., 2016).

### Effectiveness of Module Science Literacy Oriented Material of Living Things Interaction with the Environment

Based on the results of the analysis, it can be seen that from the two classes used as large- scale trials namely classes VII F and VII G, 27 students from class VII F received grades above the KKM (grade  $\geq 70$ ) and 5 other students received grades below the KKM with classical completeness is 84.375%. While for class VII G, 26 students scored above the KKM (value  $\geq 70$ ) and 6 other students scored below the KKM with a classical completeness of 81.25%.

**Tabel 3.** Recapitulation of Student Learning Outcomes in class VII F

Posttest Value	Amount
Highest value	95
Lowest values	45
Students who have finished learning	27
Students who have not yet finished studying	5
Classical completeness grade	84.38 %

**Tabel 4.** Summary of Student Learning Outcomes in class VII G

Posttest Value	Amount
Highest value	100
Lowest values	55
Students who have finished learning	26
Students who have not yet finished studying	6
Classical completeness grade	81.25 %

The classical completeness results of the two classes show that the science literacy-based science module is effective in increasing students' scientific literacy shown by the large number of students who have completed grades above the KKM.

The Science Module makes it easy for students to do practical work, with work instructions and the use of language that is easily understood by students, according to the opinion of Hartoyo et al. (2009) module teaching materials are given to students in order to facilitate them when following the learning process. The module guides students to make observations that can give effect to students becoming more enthusiastic (Wahyudi & Supardi, 2013). According to Cimer (2012) Learning resources based on the environment are the effective learning resources for students'

thinking processes because they contain a learning based on their daily, according to Shofiyah *et al* (2014) The use of learning modules environment can increase student learning interest because the learning resources used can be applied in dayli life.

### CONCLUSION

Based on the results of research and discussion that has been stated, it can be concluded that the science module which is used as a science teaching material based on scientific literacy of material living things interaction with the environment is considered to be very effective as teaching material from the average posttest value. The developed science module is considered appropriate as a science teaching material based on scientific literacy of material interaction of living things with the environment. The developed Sciences Module has characteristics of a percentage of 83.93% and is categorized with very feasible criteria to meet the characteristics of scientific literacy and is also equipped with pictures to clarify the practicum process, completed with observation tables as testing data that can guide students to find the concepts taught.

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