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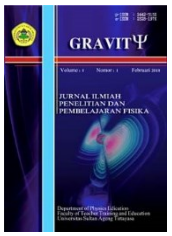

Introduction to the development of integrated science teaching materials based on inquiry labs to improve students' science literacy

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ABSTRACT

The purpose of this study was to describe the science learning process and the teaching materials used by teachers in science learning. The type of research to be conducted is descriptive quantitative research. Respondents in this study were 26 students of class VIIIA MtsN 6 Sijunjung. The research instrument was in the form of a questionnaire filled out by students and an interview sheet with the educator. The result of the research is that the science learning process is more predominantly carried out through the lecture method compared to the experimental / practicum / inquiry labs method by 83% and the teaching materials most often used by teachers in science learning are textbooks by 85%. Science learning has not facilitated students to have scientific literacy because science learning is more often carried out by the lecture method. Thus, teachers need to develop appropriate teaching materials in order to increase students' motivation and scientific literacy.

Keywords: inquiry labs; scientific literacy; teaching materials

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INTRODUCTION

Every citizen at various levels of education needs to have the knowledge, understanding, and scientific literacy skills as provisions in globalization. Knowledge, learning, and scientific literacy skills cannot be separated from the science/science education system. The reality in the field, many students have difficulty learning science. Wibowo (2015). stated that science subjects, especially physics, are considered difficult issues because they are identical to complex formulas and complex materials. Thus, science learning needs to be designed and possible and help students improve their scientific literacy skills.

One learning model that can improve students' scientific literacy skills is Inquiry lab learning. Inquiry Labs Learning is learning that can place students as scientists because students are directed to find scientific conceptions through experimental laboratory activities. (Saputra et al., 2017).

The problem that often occurs in science learning is the assumption that if students have mastered facts and theories, they are considered to have scientific literacy skills (Probosari, R. M et al., 2016). It is different from PISA's view of scientific literacy that in addition to learning science, it requires knowledge of concepts and theories, it also requires knowledge of general and practical procedures related to scientific investigation

and how to integrate them.

Based on interviews with science teachers at MTsN Sijunjung, it is known that science learning has so far been carried out through the lecture method and rarely uses the inquiry labs and practicum methods due to the limitations of the school's practicum equipment. Also, the media that teachers often use are animation videos and power points. Simultaneously, the teaching materials used in science learning are also limited to textbooks and handouts, even though the availability of various learning media and teaching materials plays a critical role in improving science learning quality.

Right teaching materials help educators/ teachers in creating a directed and structured learning process. According to Nurdyansyah (2018), teaching materials are useful for educators to direct all their activities and what should be taught to students in the learning process. Whereas for students, the teaching material is helpful as a guide in the learning process.

The inquiry learning process will be carried out well if the teacher prepares teaching materials that are by the characteristics of inquiry learning. Novitasari et al. (2016) stated that the supporting teaching materials used in education are generally limited to a textbook containing the teaching material to be delivered. So that students rarely re-read books and find it difficult to understand the content of the material. Other than that, Susanti et al. (2019) state that teachers' teaching materials in the science learning process are not yet varied and cannot fully enable students to be active and independent.

The selection of appropriate and appropriate teaching materials and learning media can increase student motivation and scientific literacy outcomes. Afradisca (2018) states that teachers' teaching materials in the science learning process are not yet varied and cannot fully enable students to be active and independent. States that teaching materials that are arranged systematically will be a factor that can encourage student motivation to learn. High motivation from students to learn can improve student learning outcomes and scientific literacy. It is in line with Sari's opinion (2013), which states that teaching media and motivation

Table 1. Research Instruments

No	Statement
1	So far, science learning has been carried out through the lecture method
2	Science learning is carried out through the inquiry labs / experiment / practicum method
3	So far, science learning has always started with a problem and then resolved in learning.
4	So far, science learning has always been associated with things that exist in everyday life
5	Learning science facilitates me to try something new
6	The science learning that was carried out by the teacher facilitated me to present the results of the experiment and material in front of the class
7	Media used in science learning
8	Teaching materials used in science learning
9	The science teaching materials currently available are easy to understand
10	Science teaching materials used in learning helped me to study independently
11	The science teaching materials used have an attractive appearance and are equipped with attractive pictures.
12	Science teaching materials help me with my assignments
13	I like learning science which provides an opportunity to try it out firsthand
14	I am more happy and motivated to learn by using the experimental / practicum / inquiry labs method
15	Learning by doing investigations and experiments increases enthusiasm in learning science
16	Learning Science facilitates me to have scientific literacy (science literacy)
17	The available teaching materials add to my enthusiasm for learning science
18	Teaching materials that have an attractive appearance make me enthusiastic about learning science
19	I like group learning over individual learning

learning significantly affect student achievement/learning outcomes. Based on the above background, this research requires an in -depth analysis of the science learning process and science teaching materials as a study in developing inquiry labs-based integrated science teaching materials to improve students' scientific literacy. This study aimed to analyze the science learning process and the teaching materials used by the teacher in the learning process.

RESEARCH METHODS

This type of research is descriptive quantitative research. The population was students of class VIII MTsN Sijunjung. The sample were 26 students of class VIIIA MtsN 6 Sijunjung. Sampling was done by using a simple random sampling technique. The research instrument was in the form of questionnaires filled out by students and interview sheets filled out by educators. This questionnaire measures three aspects: the learning process, the teaching materials used, and student motivation. Details of the questionnaire used in this study can be seen in Table 1.

The scale on the questionnaire uses a scale consisting of 4 alternative answers. The reason for choosing four alternative solutions to the questionnaire is to eliminate social bias. Social bias is taken into account when determining the number of response points. The number of even response points (scale 4) is preferred over the odd number of response points (scale 5) because social bias can be reduced (Budiaji, W., 2013). So the scale used in this research questionnaire is a scale of 4 with the following details: (a) score 1 if "never / strongly disagree"; (b) score 2 if "sometimes / disagree"; (c) score 3 if "often / agree"; (d) score 4 if "very often / strongly agree".

Next, calculate the total score obtained on each indicator and then convert it into a value ranging from 0-100. The presentation of data in this study is presented in graphical form and analyzed in every aspect. The cost for each indicator is determined by equation 1 (Arikunto, 2010).

$$Value = \frac{Score\,Obtained}{Maximum\,Score} \times 100\% \qquad (1)$$

Data analysis on each indicator follows the provisions in Table 2.

Table 2. Data Analysis Categories

No	Score	Category
1	90 < N ≤ 100	Very good
2	75 < N ≤ 90	Well
3	60 <N ≤ 75	Enough
4	≤60	Less

(Kemendikbud, 2013)

For instruments number 7 and 8 concerning teaching materials used in science learning students are asked to choose more than one of the choices given because the media and teaching materials used by the teacher in learning can be more than 1.

RESULTS AND DISCUSSION

Aspects of the Science Learning Process

The results of the analysis of the science learning process carried out by the teacher can be seen in Figure 1.

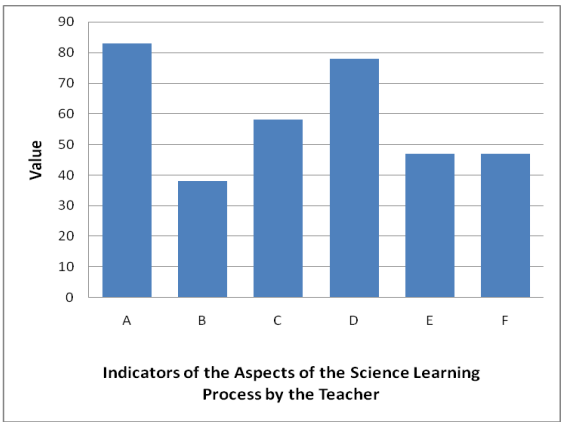

Figure 1. The Value of Each Indicator on the Aspects of the Science Learning Process

Information in Figure 1, A: So far, science learning has been carried out through the lecture method; B: Science learning is carried out through the inquiry labs/ experiment/practicum method; C: So far, science learning has always started with a

problem and then resolved in learning; D: So far, science learning has always been associated with things that exist in everyday life; E: Learning science facilitates me to try something new; F: The science learning that was carried out by the teacher facilitated me to present the results of the experiment and material in front of the class.

Based on Figure 1, it is known that the aspect that has the highest value is science learning carried out by the lecture method with an amount of 83%, which means it is often carried out. While the lowest score is the aspect of science learning carried out through the inquiry method labs/experiments/practicum with a value of 38%, which means less or rarely implemented. According to the results of interviews with teachers, the science learning process is more predominantly carried out by the lecture method than the inquiry labs/ experiment/practicum method. Materials that should be taught through the inquiry labs method, such as heat material, cannot be implemented because the inadequate laboratory equipment is insufficient. It can be overcome by conducting and making simple experiments from existing equipment. Also, the reason is that the lecture method is more comfortable and more uncomplicated to implement. The teacher explains the material in front of the class while only listening to the teacher's explanation. Unlike the method of inquiry labs, teachers must be able to design and have to be creative, especially if the laboratory equipment is limited. Guntara & Nona (2019) stated that the teacher's important task in learning using the inquiry training model is that all activities are under the teacher's supervision. Likewise, with classroom management in inquiry learning, students must have the skills to conduct experiments, be ready to work together in groups, and have communication skills in delivering the results of experiments in front of the class.

The next highest aspect is that science learning is associated with things in everyday life with a 78% value, which is in the right criteria. Science learning is very much related to everyday life. Thus, it is appropriate for teachers always to link the material being studied with students' daily lives to understand the material more easily.

The lowest aspect is the aspect of science learning, which facilitates students to present the experiment results and material in front of the class. The learning science element encourages me to try something new, with a 47% value in the low criteria. Furthermore, the aspect that is classified as lacking is that science learning always begins with a problem and then resolves it in learning with a value of 58%. It is undoubtedly in line with the teacher's method, namely the dominant form of lecturing and rarely through inquiry labs. Whereas according to Nurhidayati et al. (2015), the inquiry method has many advantages, including increasing student activity to be involved in obtaining and processing learning acquisition.

Aspects of Natural Science Teaching Materials Used in Science Learning

Students may choose more than one of the options given in the media and teaching materials used in the science learning process. They can write down the media and other teaching materials used by the teacher. Graphics about the media used by teachers in learning can be seen in Figure 2.

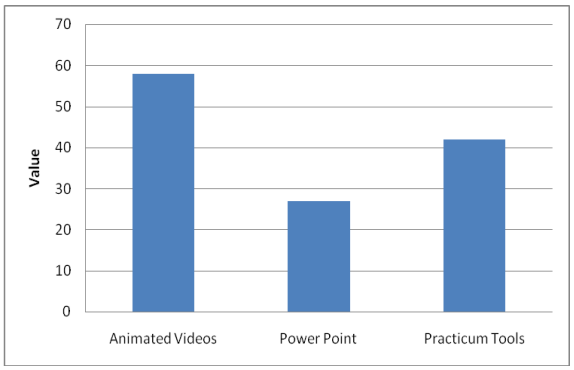

Figure 2. Media used by teachers in science learning

Based on Figure 2, it is known that the media most often used by teachers is animated videos that are played on a laptop and watched using an LCD with a value of 58%. Meanwhile, practicum tools with a value of 42% are rarely used in science learning because of the limited laboratory equipment

available. The PowerPoint presentation media with a 27% value is also rarely implemented by teachers in science learning. Afriyanti et al. (2019) state that the implementation of learning in science (physics) lessons in schools is still unable to maximize the media and learning models. In comparison, appropriate and maximum media and learning are necessary for improving student learning outcomes and scientific literacy.

The graphic of the materials used by the teacher in learning can be seen in Figure 3.

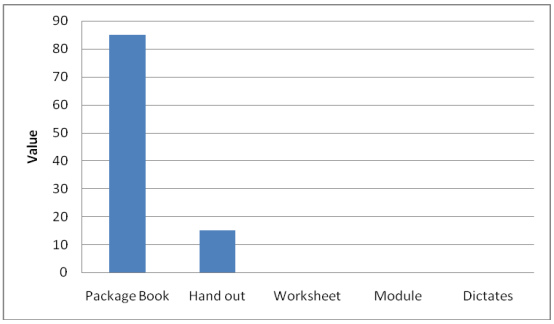

Figure 3. Teaching Materials used by Teachers in Science Learning.

Based on Figure 3, it is known that the available teaching materials are textbooks (85%) and handouts (15%). Meanwhile, other teaching materials have never been used in science learning. Thus, information is obtained that teachers rarely develop science teaching materials as a reference in education. In contrast, the teacher created good teaching material because it is the teacher who knows better about each student's problems and abilities. Darman et al. (2017) stated that the lack of availability of teaching materials is a problem that needs to be resolved in learning science (physics). Even though teaching materials are essential in schools' learning process, it improves student performance and teacher efficiency. It is in line with the opinion of Yusmanila et al. (2017) that to maximize their role, teachers need to develop teaching materials that are by the curriculum and the characteristics of their students.

The results of the analysis of the media and teaching materials used in teaching science by the teacher can be seen in Figure 4.

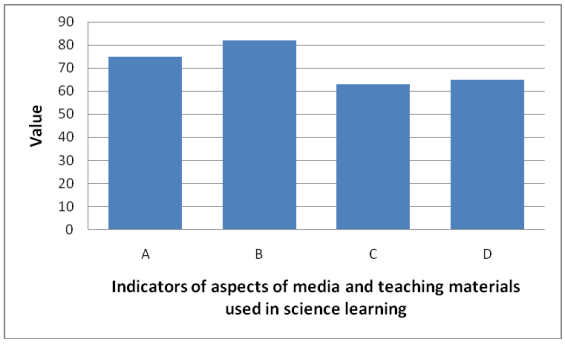

Figure 4. The Value of Each Indicator on Aspects of Media and Teaching Materials

Information, A: The science teaching materials currently available are easy to understand; B: Science teaching materials used in learning helped me to study independently; C: The science teaching materials used have an attractive appearance and are equipped with attractive pictures; D: Science teaching materials help me with my assignments.

Based on Figure 4, it is known that the highest score is the aspect of the science teaching materials used in learning to help me learn independently, which is in the excellent category. Furthermore, the element that is in the excellent category is that the science teaching materials currently available are easy to understand. The science teaching materials (textbooks and handouts) used by students in learning help students learn independently and are easy to understand. In comparison, the lowest score is that the aspect of the science teaching materials used has an attractive appearance and is equipped with stunning pictures in less category. Factors that are in the low class are Science teaching materials that help me in doing my assignments.

The Relationship Between Learning Process, Media, and Teaching Materials and Student motivation

The relationship between the learning process, media, and teaching materials and student motivation can be seen in Figure 5. Based on Figure 5, the highest score is in the aspect of teaching materials that have an attractive appearance that makes me enthusias-

tic about learning science and I like group learning compared to individual learning. Both of these aspects are excellent criteria. It means that the teaching language's attractive appearance aspect is perfect in making students enthusiastic about learning. Group learning is very liked by students and very good in improving student learning outcomes. One of the learning methods in groups is the inquiry method. The inquiry method is very influential on student motivation. Research result Dwi (2018), that inquiry learning can make students work together through group discussions where students provide input to each other so that less able students become more motivated in learning material that is less understood.

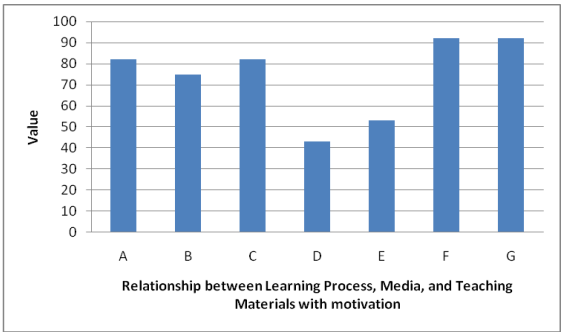

Figure 5. Relationship between learning process, media and teaching material with motivation

Information in Figure 5, A: I like learning science which provides an opportunity to try it out firsthand; B: I am more happy and motivated to learn by using the experimental / practicum / inquiry labs method; C: Learning by doing investigations and experiments increases enthusiasm in learning science; D: Learning Science facilitates me to have scientific literacy (science literacy); E: The available teaching materials add to my enthusiasm for learning science; F: Teaching materials that have an attractive appearance make me enthusiastic about learning science; G: I like group learning over individual learning.

These three aspects are related to the inquiry. Students like learning by trying directly using the experimental / practicum/inquiry labs method, which increases enthusiasm for learning science. It is in line with the research results Yusmanila & Widya (2020) that the Group Investigation learning process with the Inquiry Labs method focuses more on student activities. Student freedom in activities can cause students to be enthusiastic in learning and more motivated in carrying out learning through experiment and discovery.

The lowest score aspect is that the element of learning science facilitates me to have scientific literacy (scientific literacy) with a score of 43%, which is in the low criteria. Science learning, which has been dominated by the lecture method, does not facilitate students' scientific literacy. In addition, thAlsoeaching materials developed by the teacher, especially inquiry-based teaching materials, also causes students to lack scientific literacy. Inquiry-based dials can improve student literacy. Kamala et al (2020) stated a significant positive relationship between students' scientific literacy when students used the inquiry-based module. While the research results, Utomo (2018) noted that the inquiry-based module effectively improved students' scientific literacy. Thus the learning process using the inquiry method and inquiry-based teaching materials significantly affects scientific literacy skills.

The aspect that is in the insufficient criteria is the aspect of the teaching materials available which adds to my enthusiasm for learning science with a value of 53%. Currently the teaching materials available are only textbooks and handouts. The two teaching materials did not increase the enthusiasm of students in learning science. The limitations of teaching materials are because teachers have not developed other teaching materials in the science learning process. Thus, the development of teaching materials by teachers that modulate the conditions and abilities of students and have an attractive appearance can improve students' enthusiasm, learning outcomes, and scientific literacy skills.

CONCLUSION

Based on the results of the analysis, it can be concluded that (1) the science learning process is more predominantly carried out through the lecture method compared to the experimental / practicum/inquiry labs method; (2) the media most often used by teachers in science learning is animated video; (3) The teaching materials most often used by teachers in science learning are textbooks; (4) science learning has not facilitated students to have scientific literacy; (5) teachers must be able to develop the science learning process and appropriate teaching materials to increase motivation and student scientific literacy.

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