

## **THE EFFECT OF APPLYING STUDENT WORKSHEETS BASED ON SCIENTIFIC LITERACY TO THE THEME OF ALWAYS SAVING ENERGY ON STUDENTS' MATERIAL UNDERSTANDING**

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**Abstract.** The purpose of this study was to determine the effect of student worksheets based on scientific literacy implementation on the theme Always Save Energy on students' understanding of the material. Scientific literacy-based student worksheets are worksheets composed of four aspects of scientific literacy, namely science as a body of knowledge, science as investigation, science as a way of thinking, and the interaction of science with the environment, technology, and society. Pre-test is done at the beginning of learning and post-test at the end of learning. Pre-test and post test value data were analyzed using the gain test. The results of the analysis showed that there was a significant increase in pre-test and post test scores. It was concluded that the application of scientific literacy-based student worksheets on the theme Always Save Energy can improve students' understanding of the material.

**Keywords:** student worksheets, scientific literacy, material understanding

### **INTRODUCTION**

Learning is planned by the teacher to develop strategies so that students can learn in a fun way and easily understand the material. Learning is a process of interaction that occurs between students and educators, with learning resources, learning strategies, methods of delivering material, and learning materials within a scope of the learning environment (Padangsidimpuan, 2017). Learning as a communication between one individual and another individual in which there is an effective and efficient transfer of concepts or ideas (Masdul, 2018). Learning is providing training and experience for individuals in the process of changing behaviour for the better (Waskitoningtyas et al., 2016). The problem faced at this time is that students have difficulty understanding the subject matter. According to Fauzi and Arisetyawan, the difficulty in understanding student subject matter is dominated by the factor of the lack of interest of students in the material being studied because the learning process is not pleasant (Fauzi & Arisetyawan, 2020).

Providing material understanding can be done by providing ideas or knowledge so that they can build their own material concepts for use by other individuals in solving problems or developing innovations (Deta, 2017). One of the difficulties in understanding student material is caused by the lack of habituation of the ability to think logically and systematically. Students' thinking skills need to be developed using a scientific approach. The scientific way of thinking provides development for students to think logically and systematically. Innovation models and learning materials need to be done to overcome these problems. It is necessary to use additional teaching materials other than books such as the use of student worksheets to help students understand the material.

Scientific literacy is an individual's ability to understand science and be able to apply science in everyday life and solve problems (Rusilowati et al., 2016). Scientific literacy consists of four aspects, namely science as a body of knowledge, science as investigation, science as a way of thinking, and the interaction of science, technology and society (Chiapetta, E. L., David, A. F., & Godrej, 1991). Scientific literacy provides habituation to a logical and systematic mindset. Scientific literacy-based learning in schools is provided as a provision for students to be able to develop their own abilities to face the rapid development of science and technology (Kristyowati & Purwanto, 2016).

The effectiveness of scientific thinking based on scientific literacy on students' understanding still needs to be investigated. This study aims to determine the effect of applying student worksheets based on scientific literacy on the ability to understand students' material.

## RESEARCH METHODS

Implementation of research on students in 2<sup>nd</sup> grade elementary school level. Learning uses student worksheets based on scientific literacy. There are four aspects of scientific literacy in students' worksheets, namely aspects of science as a body of knowledge, science as investigation, science as a way of thinking, and the interaction of science, technology, and society. Before starting learning activities, students are given a pre-test, and at the end of learning are given a post test. The results of the pre-test and post-test scores were tested for data normality and then to analysis using the N-gain test to find out how much influence the use of student worksheets had on students' understanding of the material. The results of the N-gain value were carried out by category analysis based on Table 1.

**Table 1.** N-gain Score Category(Hake, 1999)

N-gain score $\langle g \rangle$	Category
$\langle g \rangle \geq 0,7$	High
$0,3 \leq \langle g \rangle < 0,7$	Intermediate
$\langle g \rangle < 0,3$	Low

## RESULTS AND DISCUSSIONS

Data on pre-test and post-test values were tested for data normality using SPSS. The pretest is the test score obtained before students carry out learning activities using scientific literacy-based worksheets, while the posttest is the test score after using scientific literacy-based student worksheets. The calculation results are obtained as in Table 2.

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**Table 2.** Shapiro Wilk Normality Test

Description	Pre-test	Post test
Shapiro Wilk (Sig. 2)	0,394	0,209
Significancy (Sig. 1)	0,05	0,05
Analysis	Sig.2 > Sig.1	Sig.2 > Sig.1
Results	Normally distributed	Normally distributed

The results of the normality test show that the pre-test and post-test values are normally distributed. The next analysis is to calculate the N-gain value. The gain test results are in Table 3.

**Table 3.** N-gain Score

Description	Score
Min.	0
Max.	1
N-gain <g>	0,564

The minimum value (Min.) results in a value of zero (0), this indicates that there is respondent data, namely students who are given treatment do not experience an increase between the initial data (pretest scores) and final data (posttest scores). The maximum value (Max.) gives a value of one (Max. = 1), this indicates that there is a 100% increase in the number of respondents obtained based on the pretest value and then doubles in the posttest value. Data analysis of pre-test and post-test values using the gain test obtained a result of 0.564 based on the results of these calculations including the moderate or quite effective category. This means that there is a significant difference between the pre-test score data and the post test score data. The gain test value shows that the use of scientific literacy-based student worksheets on the theme Always Save Energy can help students improve their understanding of the material in the quite effective category.

There are four aspects written on student worksheets based on scientific literacy. The first part is the aspect of science as a body of knowledge. A brief description of the material is provided with illustrations to make it easier for students to understand the material provided. Illustrations provide a concrete picture of the application of the material in everyday life. Students can immediately show examples of real application and provide brief explanations based on the description of the material. The second aspect is science as inquiry. Providing simple practicum by providing work steps that help students carry out practicum on the material that has been studied. Learners are directed through communicative systematic work steps using clear and simple language, so as to allow practicum activities to be carried out independently, in groups, or with teacher guidance. The next section is an aspect of science as a way of thinking. There are questions related to the material and the results of investigations through simple practicum. Students are given the opportunity to explain the findings based on their understanding and observations during practicum activities. The questions are in the form of descriptive questions so that students can freely provide explanations according to their own understanding and the teacher is able to see the students' thinking flow and the depth of understanding of concepts based on the description of the answers. The fourth aspect on student worksheets is the interaction between science, technology, and society. Students are given a description of the latest technology that applies energy-saving principles. In this fourth aspect review, there are illustrative images as a real picture of the use of environmentally friendly technology.

The use of student worksheets based on scientific literacy helps students explore phenomena in everyday life on their own. The description of the material at the beginning

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only provides an overview of the general concept accompanied by illustrations. Students are given the opportunity to find their own deepening of the material. Simple practicum with exposure to short work steps and flowcharts provides a brief and clear description for students to carry out simple experiment. Exploration of knowledge and information is carried out based on direct investigation of the observed events. Questions are given at the end of the investigation activity which encourages students to review the results of their observations and study further material, making it one of the means for educators to direct students to re-explore the material previously presented. In this scientific literacy-based student worksheet, students are directed to discover for themselves the concept of the material being studied through experience. The opportunity for students to develop concepts and find their own knowledge makes worksheets in line with the concept of learning science so that they are able to produce innovations that are useful for life.

The four aspects of scientific literacy are found in the contents of the student worksheets arranged systematically. This makes it easier for students to understand the material clearly and coherently. According to the research of Febriana and Sasmita that a good understanding of concepts can be a provision for students to solve problems in everyday life (Febriana & Sasmita, 2022). Guided practicum activities through aspects of science as investigations add clarity to the material by making direct observations during simple practicums. Students have learned to think systematically and logically based on observations and experiences. Based on the results of the gain test analysis with a result of 0,564 it is included in the moderate or quite effective category, indicating that there is an increase in students' understanding of the theme Always Save Energy after learning using worksheets. scientific literacy-based students.

## **CONCLUSION**

The use of student worksheets based on scientific literacy with the theme Always Save Energy can be used to help increase students' understanding in the moderate effectiveness category. The results of the gain test based on the pretest and posttest data give a result of 0.564 so that it can be categorized as moderate or quite effective in using student worksheets based on scientific literacy for learning activities at the SD/MI level. Student worksheets based on scientific literacy not only provide direction for students to study the material but also the opportunity to experience, observe, and develop their knowledge.

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