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THE EFFECTIVENESS OF STUDENT WORKSHEET TO TRAIN SCIENCE PROCESS SKILLS

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Abstract

This study aims to describe the effectiveness of Student Worksheets used to train science process skills. The subjects of the study were the VII grade students of the Sepuluh Nopember Middle School, Sidoarjo. The research instrument used was a student activity observation sheet and a science process skill test item. The results showed that the worksheets given were effectively used to train science process skills.

Keywords: *Student worksheets, science process skills, effectiveness*

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INTRODUCTION

According to Gagne, Natural Science is a knowledge related to natural phenomena and material obtained through observation, experimentation, or testing based on human science observations (Wisudawati, 2014). According to Sapriati, science learning not only conveys information and understanding of the material, but also pay attention to other abilities such as the ability to use tools and solve problems (Juhji, 2016).

According to Carin (1993) IPA consists of three elements, namely attitudes, processes, and products. These three elements are interconnected with each other in conducting an investigation. Science learning is about learning inquiry which will later find a product in the form of concepts that are scientifically found. To produce a product, it must be accompanied by a scientific attitude and scientific process. The scientific attitude includes a strong curiosity, humility, doubt, determination, and an open mind in science, while the scientific process includes several skills such as identifying problems, observing, hypothesizing, analyzing, concluding, extrapolating, synthesizing, and evaluating. The existence of this scientific process can be accompanied by a Student Worksheet.

Student Worksheets are sheets containing assignments that must be done by students (MONE, 2008). Student Worksheet (LKS) is a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be done by students, which refers to the basic competencies that must be achieved (Prastowo, 2015). According to Erryanti and Poedjiastoeti, LKS is a guide sheet used in learning especially with the experimental method (Isnaningsih and D.S. Bimo, 2013).

Student Worksheets are of five types, namely LKS which are used to help students find a concept, help students apply and integrate various concepts that have been found, guide student learning, student reinforcement, and practical instructions (Prastowo, 2015). Student Worksheets (LKS) for practicum instructions can be used to process scientifically through science process skills.

Student Worksheets used for practicum instructions distributed in schools generally only contain goals, tools and materials, work steps, table of experimental results, and conclusions without any element of science process skills. This is supported by the results of researchers' interviews with one of the science teachers. He stated that the learning activities that he did when he met the material that had to do an experiment, he only used the worksheets provided by the book with these elements without adding or giving other elements especially elements of science process skills.

Science process skills are approaches based on the assumption that science is formed and developed through a scientific process (Rudy, 2011). According to Germann & Arman, students need science process skills in their learning processes or scientific inquiry (Rauf, RAA., Et al., 2013). According to Liang, science process skills can be used to identify problems and solve them through appropriate hypotheses (Aydin, 2013).

Based on some of these understandings, the science process skills are skills learned by students in scientific inquiry through scientific processes and appropriate hypotheses. To find out the hypothesis that is obtained right or wrong it is necessary to do several stages.

Science process skills consist of fifteen types, classifying, modeling, formulating hypotheses, generalizing, identifying variables, inference, interpreting data, making decisions, manipulating materials, measuring, observing, predicting, recording data, replicating, and using numbers (Carin, 1993). According to Funk, science process skills consist of two skills, namely basic skills and integrated skills. Basic skills consist of six skills, namely observing, classifying, communicating, measuring, predicting, and concluding. Integrated skills consist of ten skills namely identifying variables, making data tabulations, presenting data in graphical form, describing relationships between variables, collecting and processing data, analyzing research, compiling hypotheses, defining variables operationally, designing research, and carrying out experiments (Dimyati and Mudjiono, 2006).

Previous research conducted by Sudibyo, et al (2018) is to train students' science process skills through the use of worksheets. There are 6 kinds of science process skills that are trained, namely formulating problems, making hypotheses, identifying variables, interpreting data, drawing conclusions, and communicating.

Based on this, the research was conducted to train science process skills

METHOD

This type of research is quantitative descriptive research, which is analyzing data using statistical methods. The research design used is the One-shot Case Study Design. The subjects of the study were year seven students of the Sepuluh Nopember Middle School, Sidoarjo. Data collection instruments consisted of student activity observation sheets and science process skills test questions sheets. Analysis of observational data on the activity of science process skills using a Likert

Scale and then percentage, while the test questions using completeness based on Minimum Completeness Criteria (MCC), with MCC of 75.

Student Worksheets will be declared effective for training Science Process Skills (SPS) if student activities get a percentage of 61.00% (Riduwan, 2016). For SPS test results are declared complete if they get a test score <75 with sufficient criteria (Ministry of Education and Culture, 2017).

RESULTS AND DISCUSSION

The effectiveness of Student Worksheets (LKS) used to train science process skills can be known through two stages, namely:

a. Student Science Process Skill Activities

The results of the analysis of students' science process skill activities in each aspect of science process skills can be identified through the following Table 1.

Table 1. Results of student science process skill activities

Science Process Skills	Percentages (%)	Criteria
Formulating Problem	89,90	Very good
Creating Hypothesis	90,87	Very good
Identifying Variables	82,69	Very good
Interprating Data	80,29	Good
Making Conclusion	88,46	Very good

The science process skills that get the highest percentage are making hypotheses, while the science process skills that get the lowest percentage are interpreting the data. Making a hypothesis obtains a percentage of 90.87%, while interpreting the data obtains a percentage of 80.29%.

Making a hypothesis is a temporary answer to the formulation of a problem that contains variables and can be proven through experiments. The factor that causes the skill to make a hypothesis obtains the highest percentage is because before making a hypothesis, students read the problem orientation first where the problem orientation part can guide students in making a hypothesis, so students feel a little helped. Another factor is also helped by the existence of information on the ability to make hypotheses so that students practice their ability to process science. In addition, students also have begun to understand the material so students can predict the results that will be obtained in conducting experiments that will be conducted.

According to Carin (1993) data interpretation is analyzing data that has been obtained and organized by determining clear patterns or relationships in the data. Factors that caused the aspect of interpreting the data to get the lowest percentage were caused by the difficulty of the questions presented, drawing graphs with the help of Chart Layouts, and limited learning time, so these factors caused some students to be incomplete and inadequate in filling in the LKS data interpretation section. attitudes data of the two groups in the form of histograms.

b. Completeness Analysis of Students' Science Process Skills

The results of completeness analysis of students' science process skills in each aspect of science process skills can be known through the following Table 2.

Table 2. Results of completeness analysis of students' science process skills

Science Process Skills	Score	Criteria
Formulating Problem	83	Complete
Creating Hypothesis	90	Complete
Identifying Variables	79	Complete
Interprating Data	73	Incomplete
Making Conclusion	71	Incomplete

The mastery of science process skills can be known through the MCC grades given by schools in science subjects. MCC value given for science is 75, so the average value of each aspect of science process skills obtained by students is said to be complete if it gets a value <75. Based on Table 2, states that the average highest value obtained in the skills of making hypotheses, while the lowest gained in conclusion drawing skills.

The skill to make a hypothesis gets the highest score is 90, so this skill can be said to be complete based on MCC. This can be caused by

several factors, namely students have begun to understand the material concept of energy so students can predict the results to be obtained. In addition, in the activity of science process skills, the ability to make hypotheses also gets the highest score. This means that some students have indeed begun to be trained to make allegations of temporary answers related to the results of experiments and events in daily life.

The completeness of each skill is not only obtained by the ability to make hypotheses, but on the skills of formulating problems and identifying variables. Both of these skills scored 83 and 79, respectively. The value of the skill identified a lower variable than the skill of formulating the problem. This is because students are still confused in distinguishing between control, manipulation, and response variables. Based on the results of the pre-research interview, stated that in previous learning the teacher had never practiced the skills of identifying variables in students. For skills formulating problems whose value is higher than identifying variables, because before making a problem statement student get guidance from a problem orientation that can stimulate students to be skilled in these skills.

The value of the skill formulating the problem is higher than identifying the variables on the results of this test in line with the student's skill activities. The activity formulating the problem obtained a higher percentage of identifying variables, namely 89.90% and 82.69%, respectively. This means that students begin to be trained skillfully in science processing on these two skills as evidenced by the completeness of students in working on problems formulating problems and identifying variables.

The mastery obtained by students indicates that the science process skills have a special role for students. The role is to help students learn to develop their minds, improve memory, and help students learn science concepts (Trianto, 2011).

The ability to draw conclusions obtained the lowest overall average score of 71, so this skill has not met the completeness requirements based on MCC. This skill is incomplete because the answers given by students to problem number 10 are related to drawing conclusions, many students give incorrect answers. This can happen because the students assume that objects dropped simultaneously from different heights then the object that is the lowest position to the ground first because it has the fastest speed. The truth is that the object with the highest position has the fastest speed, because the speed value is directly proportional to the height.

Skill incompleteness is not only obtained by drawing conclusions, data interpretation skills also do not meet the completeness requirements based on MCC because they obtain an overall average score of 73. The factor that causes these skills incompleteness is because the data interpretation problem presented is too complicated for VII graders. The questions presented invite students to make patterns of guesswork that will be obtained in the results of the experiment. This is felt by students to be very difficult because students are not accustomed to solving problems related to making guess patterns. Like the results of the interview at the time of the pre-research which stated that in the learning process, the teacher had never taught students to solve science process skill questions so students still felt confused to solve problems with these patterns.

In general, students' incompleteness can be caused by students still needing more time to practice their skills in scientific processing. This happens because the science process skills will be formed only through an iterative process. Students will not be skilled if the opportunities for students to do the skills independently are still lacking and not done continuously (Trianto, 2011).

CONCLUSION

Based on the results and discussion shows that Student Worksheets (LKS) given to students are effectively used to practice science process skills. The average science process skills obtained by students when using worksheets get good and very good criteria. While the results of the test there are three skills that are complete namely formulating the problem, making hypotheses, and identifying variables. Two other skills that are incomplete are interpreting data and drawing conclusions.

There are two suggestions in the research, that are:

1. Science process skills cannot be trained in only one to two meetings, but it takes several meetings so students can practice their ability to solve science process skill questions and get maximum results.
2. When giving test questions to class VII students it should be given simple questions so that students can complete learning outcomes in the form of science process skills.

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